# Appendix A: Air Quality Report

# *HEIDORN VILLAGE RESIDENTIAL DEVELOPMENT TAC AND GHG EMISSIONS ASSESSMENT ANTIOCH, CALIFORNIA*

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## Introduction

The purpose of this report is to address toxic air contaminant (TAC) and greenhouse gas (GHG) emission impacts associated with the proposed Heidorn Village residential development project in Antioch, California. The Heidorn Village Project (project) would subdivide 20.3 acres into 117 residential lots. The project would also include park and open space areas and internal access roads.

Community risk and GHG impacts could occur due to temporary construction emissions and as a result of direct and indirect emissions from new occupants. Nearby sources of TAC emissions that could affect proposed residences were not identified. This analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).

## Setting

The project is located in Antioch, which lies in the eastern portion of the Contra Costa County. The project site is located in the eastern portion of the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter ($PM_{10}$), and fine particulate matter ($PM_{2.5}$).

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less ($PM_{10}$) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of $PM_{10}$ and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic air contaminants (TACs) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and Federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the state's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of diesel particulate matter (DPM). Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2008, CARB approved a new regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles.[1] The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or equivalent by 2023. These requirements are phased in over the compliance period and depend on the model year of the vehicle.

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California Environmental Protection Agency[EPA]) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published the California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[2]

## Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. The closest off-site sensitive receptors are single-family residences adjacent to the western project site boundary, residences to the north, Heritage Baptist Academy to the east, and scattered single-family residences to the southeast. The project would include residences, which are considered sensitive receptors.

## Greenhouse Gases

Gases that trap heat in the atmosphere, GHGs, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide ($CO_2$) and water vapor, but there are also several others, most importantly methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs),

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[1] Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: July 11, 2012.

[2] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$). These are released into the earth's atmosphere through a variety of natural processes and human activities. Sources of GHGs are generally as follows:

- $CO_2$ and $N_2O$ are byproducts of fossil fuel combustion.
- $N_2O$ is associated with agricultural operations such as fertilization of crops.
- $CH_4$ is commonly created by off-gassing from agricultural practices (e.g., keeping livestock) and landfill operations.
- Chlorofluorocarbons (CFCs) were widely used as refrigerants, propellants, and cleaning solvents but their production has been stopped by international treaty.
- HFCs are now used as a substitute for CFCs in refrigeration and cooling.
- PFCs and sulfur hexafluoride emissions are commonly created by industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect upon the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with $CO_2$ being assigned a value of 1 and sulfur hexafluoride being several orders of magnitude stronger with a GWP of 23,900. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of $CO_2$ equivalents ($CO_2e$).

An expanding body of scientific research supports the theory that global warming is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California could be adversely affected by the global warming trend. Increased precipitation and sea level rise could increase coastal flooding, saltwater intrusion, and degradation of wetlands. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes and drought; and increased levels of air pollution.

## Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1. These thresholds are considered the best available information available to assess air quality and greenhouse gas emission impacts from land use projects.

BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693).

The order requires BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds. However, this litigation remains pending as the California Supreme Court recently accepted a portion of CBIA's petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The specific portion of the argument to be considered is in regard to whether CEQA requires consideration of the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment). Therefore, the significance thresholds contained in the 2011 CEQA Air Quality Guidelines are applied to this project.

**Table 1. Air Quality Significance Thresholds**

| **Pollutant** | **Construction Thresholds** | **Operational Thresholds** | |
|---|---|---|---|
| | **Average Daily Emissions (lbs./day)** | **Average Daily Emissions (lbs./day)** | **Annual Average Emissions (tons/year)** |
| **Criteria Air Pollutants** | | | |
| ROG | 54 | 54 | 10 |
| NO$_x$ | 54 | 54 | 10 |
| PM$_{10}$ | 82 | 82 | 15 |
| PM$_{2.5}$ | 54 | 54 | 10 |
| CO | Not Applicable | 9.0 ppm (8-hour average) or 20.0 ppm (1-hour average) | |
| Fugitive Dust | Construction Dust Ordinance or other Best Management Practices | Not Applicable | |
| **Health Risks and Hazards for New Sources** | | | |
| Excess Cancer Risk | 10 per one million | | |
| Chronic or Acute Hazard Index | 1.0 | | |
| Incremental annual average PM$_{2.5}$ | 0.3 µg/m$^3$ | | |
| **Health Risks and Hazards for Sensitive Receptors (Cumulative from all sources within 1,000 foot zone of influence) and Cumulative Thresholds for New Sources** | | | |
| Excess Cancer Risk | 100 per one million | | |
| Chronic Hazard Index | 10.0 | | |
| Annual Average PM$_{2.5}$ | 0.8 µg/m$^3$ | | |
| **Greenhouse Gas Emissions** | | | |
| GHG Annual Emissions | 1,100 metric tons or 4.6 metric tons per capita | | |
| Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM$_{10}$ = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, PM$_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less; and GHG = greenhouse gas. | | | |

## Impacts and Mitigation Measures

**Impact 1:** Conflict with or obstruct implementation of the applicable air quality plan? ***Less than significant***

The most recent clean air plan is the *Bay Area 2010 Clean Air Plan* that was adopted by BAAQMD in September 2010. The proposed project would not conflict with the latest Clean Air planning efforts since the project would have emissions well below the BAAQMD thresholds (see Impact 2), and development would be near existing transit with regional connections. The project, at 117 single-family residences is too small to exceed any of the significance thresholds and, thus, it is not required to incorporate project-specific transportation control measures listed in the latest Clean Air Plan

**Impact 2:** 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 (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less than significant with construction period best management control measures.***

The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for $PM_{10}$ under the California Clean Air Act, but not the Federal act. The area has attained both State and Federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and $PM_{10}$, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NOx), $PM_{10}$, and $PM_{2.5}$ and apply to both construction period and operational period impacts.

Due to the project size, construction exhaust and operational period emissions would be less than significant. In their 2011 update to the CEQA Air Quality Guidelines, BAAQMD identified the size of land use projects that could result in significant air pollutant emissions. For construction exhaust impacts, the residential single-family size was identified at 114 dwelling units. For operational impacts, the project size was identified at 325 dwelling units. Since the project proposes 117 single-family homes, an analysis of the emissions from construction of the project was analyzed using the California Emissions Estimator Model, Version 2013.2.2 (CalEEMod). The project land use types and size, and trip generation rate were input to CalEEMod.

<u>Construction period emissions</u>

The proposed project land use was input into CalEEMod, which were 117 residential units entered as “single-family” on a 20.3-acre site. The construction build-out scenario was based on the model defaults that are computed based on the project type and size, including the site acreage. No import or export of fill material was assumed and a demolition phase was not included, since the site is relatively flat and undeveloped. CalEEMod provided annual emissions for construction. CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling and vendor traffic. *Attachment 1* includes the CalEEMod input and output values for construction emissions.

The applicant provided anticipated start date of June 2015. Based on this information, the modeling scenario assumes that the project would be built out over a period of approximately 435 construction workdays. Completion would not occur until very late 2016 or 2017. Average daily emissions were computed by dividing the total construction emissions by the number of construction days. Table 2 shows average daily construction emissions of ROG, $NO_X$, $PM_{10}$ exhaust, and $PM_{2.5}$ exhaust during construction of the project. As indicated in Table 2, predicted project emissions would not exceed the BAAQMD significance thresholds.

**Table 2. Construction Period Emissions**

| **Scenario** | **ROG** | **NOx** | **$PM_{10}$ Exhaust** | **$PM_{2.5}$ Exhaust** |
|---|---|---|---|---|
| Unmitigated Construction emissions (tons) | 2.70 tons | 6.64 tons | 0.42 tons | 0.39 tons |
| Average daily emissions (pounds)[1] | 12.4 lbs. | 30.5 lbs. | 1.9 lbs. | 1.8 lbs. |
| *BAAQMD Thresholds (pounds per day)* | *54* lbs. | *54* lbs. | *82* lbs. | *54* lbs. |
| **Exceed Threshold?** | **No** | **No** | **No** | **No** |
| [1] Assumes 435 workdays. | | | | |

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of $PM_{10}$ and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. *Mitigation Measure 1 would implement BAAQMD-recommended best management practices.*

Operational Period Emissions

Due to the project size, operational-period emissions would be less than significant. In the 2011 update to the CEQA Air Quality Guidelines, BAAQMD identifies screening criteria for the sizes of land use projects that could result in significant air pollutant emissions. For operational impacts, the screening project size is identified at 325 single-family dwelling units and the project proposes 117 units. Therefore, it is concluded that emissions would be below the BAAQMD significance thresholds for the operational period.

Mitigation Measure 1: *Construction Best Management Practices (BMPs) include measures to control dust emissions.* Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality and fugitive dust-related impacts associated with grading and new construction to a less than significant. The contractor shall implement the following Best Management Practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 mph.

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer’s specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District’s phone number shall also be visible to ensure compliance with applicable regulations.

**Impact 3:** Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less than significant.***

As discussed under Impact 2, the project would have emissions less than the BAAQMD screening size for evaluating impacts related to ozone and particulate matter. Therefore, the project would not contribute substantially to existing or projected violations of those standards. Carbon monoxide emissions from traffic generated by the project would be the pollutant of greatest concern at the local level. Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of carbon monoxide. Air pollutant monitoring data indicate that carbon monoxide levels have been at healthy levels (i.e., below State and federal standards) in the Bay Area since the early 1990s. As a result, the region has been designated as attainment for the standard. The highest measured level over any 8-hour averaging period during the last 3 years in the Bay Area was less than 3 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm. Intersections affected by the project would have traffic volumes less than the BAAQMD screening criteria and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[3]

**Impact 4:** Expose sensitive receptors to substantial pollutant concentrations? ***Less than significant with construction period mitigation measures.***

Sensitive receptors are locations where an identifiable subset of the general population (children, asthmatics, the elderly, and the chronically ill) that is at greater risk than the general population to the effects of air pollutants are likely to be exposed. These locations include residences, schools, playgrounds, childcare centers, retirement homes, hospitals, and medical clinics. The closest off-site sensitive receptors are residences adjacent to the western project site boundary. There is also the Heritage Baptist Church and Heritage Baptist Academy (K through 12th grade school) that borders the northeastern boundary of the project site.

Construction activity would generate dust and equipment exhaust on a temporary basis. Impacts from project construction and nearby operational TAC sources are addressed below. Operation of the project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. In addition, there are no nearby sources of TAC emissions, such as roadways and stationary sources, which would adversely affect the project site (i.e., proposed residences).

Project Construction Activity

Construction activities, particularly during site preparation and grading would temporarily generate fugitive dust in the form of $PM_{10}$ and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. *Mitigation Measure 1 would implement BAAQMD-required best management practices*.

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. Diesel exhaust poses both a health and nuisance impact to nearby receptors. A health risk assessment of the project construction activities was conducted that evaluated

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[3] For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less than significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections to more than 44,000 vehicles per hour.

potential health effects of sensitive receptors from construction emissions of DPM.[4] A dispersion model was used to predict the off-site DPM concentrations resulting from project construction at sensitive receptors so that lifetime cancer risks could be predicted. The closest off-site sensitive receptors are residences adjacent to the western project site boundary. There is also the Heritage Baptist Church and Heritage Baptist Academy (K through 12th grade school) that borders the northeastern boundary of the project site. Figure 1 shows the project site and sensitive receptor locations (residences and church/school) used in the air quality dispersion modeling analysis where potential health impacts were evaluated.

## Construction Emissions

The refined health risk assessment focused on modeling on-site construction activity. Construction period emissions were modeled using CalEEMod defaults for a project of this type and size, as described above. Construction of the project is expected to occur over an approximate 17 month period starting in June 2015. The CalEEMod model provided total annual $PM_{2.5}$ exhaust emissions (assumed to be DPM) for the off-road construction equipment and for exhaust emissions from on-road vehicles (vendor trucks and worker vehicles), with total emissions of 0.391 tons (781 pounds). The on-road emissions are a result of worker travel and vendor deliveries during construction activities. Trip lengths of 12.4 miles for workers and 7.3 miles for vendors were used to calculate vehicle emissions. In evaluating potential impacts, it was conservatively assumed that all emissions from on-road vehicles would occur at the construction site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 0.138 tons (275 pounds) for the overall construction period. The project emission calculations are provided in *Attachment 1*.

## Dispersion Modeling

The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ concentrations at existing sensitive receptors in the vicinity of the project construction area. The ISCST3 dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[5] Emission sources for the construction site were grouped into two categories, exhaust emissions of DPM and fugitive $PM_{2.5}$ dust emissions. The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for DPM exhaust emissions and the other for fugitive $PM_{2.5}$ dust emissions. For the exhaust emissions from construction equipment an emission release height of six meters was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive $PM_{2.5}$ emissions, a near-ground level release height of two meters was used for the area source. Emissions from vehicle travel around the project site were included in the modeled area sources. Construction emissions were modeled as occurring daily between 7 a.m. and 4 p.m. when the majority of the construction activity involving equipment usage would occur.

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[4] DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

[5] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0*. May.

The modeling used a two-year data set (2009 - 2010) of hourly meteorological data from the Contra Costa Power site located about four miles north of the project site. The meteorological data was prepared by the BAAQMD for use with the ISCST3 model. Annual DPM and $PM_{2.5}$ concentrations from construction activities in 2015 and 2016 were calculated using the model. DPM and $PM_{2.5}$ concentrations were calculated at nearby sensitive receptors using a receptor height of 1.5 meters (4.9 feet). Figure 1 shows the construction area modeled and locations of nearby sensitive receptors.

Predicted Cancer Risk and Hazards

The maximum modeled DPM and $PM_{2.5}$ concentrations occurred at a residence on the eastern side of South Winchester Boulevard, across the street from the project construction site. The location of this receptor is identified on Figure 1. Increased cancer risks were calculated using the modeled DPM concentrations and BAAQMD recommended risk assessment methods for both a child exposure (3rd trimester through 2 years of age) and adult exposure.[6] The cancer risk calculations were based on applying the BAAQMD recommended age sensitivity factors to the DPM exposures. Age-sensitivity factors reflect the greater sensitivity of infants and small children to cancer causing TACs. BAAQMD recommended exposure parameters were used for the cancer risk calculations.[7] Infant and child exposures were assumed to occur at all residences during the entire construction period and a child exposure was assumed to occur for the students at the Heritage Baptist Academy.

Results of this assessment indicate that for project construction the incremental residential child cancer risk at the maximally exposed individual (MEI) receptor would be 22.6 in one million and the incremental residential adult cancer risk would be 1.2 in one million. The maximum school child increased cancer risk would be 4.7 in one million. While the increased cancer risks for a residential adult and school child exposures would be lower than the BAAQMD significance threshold of a cancer risk of 10 in one million or greater, the increased cancer risk for a residential child exposure would be above the significance threshold. Since the increased child cancer risk exceeds the significance threshold, this would be considered a *significant impact*.

The maximum modeled annual $PM_{2.5}$ concentration was 0.20 micrograms per cubic meter ($\mu g/m^3$) occurring at the same location where the maximum residential cancer risk would occur. This $PM_{2.5}$ concentration is lower than the BAAQMD significance threshold of 0.3 $\mu g/m^3$ used to judge the significance of health impacts from $PM_{2.5}$. This would be considered a *less than significant* impact.

Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. Non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). California's Office of Environmental Health Hazard Assessment (OEHHA) has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are

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[6] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards*, May.

[7] Bay Area Air Quality Management District (BAAQMD), 2010, *Air Toxics NSR Program Health Risk Screening Analysis Guidelines*, January.

not expected to cause adverse health impacts, even for sensitive individuals. The chronic inhalation REL for DPM is 5 μg/m$^3$. The maximum modeled annual residential DPM concentration was 0.15 μg/m$^3$, which is much lower than the REL. The maximum computed hazard index based on this DPM concentration is 0.03 which is much lower than the BAAQMD significance criterion of a hazard index greater than 1.0.

*Attachment 2* includes the emission calculations used for the area source modeling and the cancer risk calculations.

The project would have a *significant impact* with respect to community risk caused by construction activities.

<u>Mitigation Measure 2:</u> Selection of equipment during demolition, grading, and trenching construction phases to minimize emissions. Such equipment selection would include the following:

1. All diesel-powered off-road equipment larger than 50 horsepower and operating on the site for more than two days continuously shall meet U.S. EPA particulate matter emissions standards for Tier 2 engines or equivalent;

2. All portable construction equipment shall meet CARB's most recent certification standard for particulate matter emissions; and

3. Minimize the number of hours that equipment will operate, including the use of idling restrictions.

Note that the construction contractor could use other measures to minimize construction period DPM emissions to reduce the predicted cancer risk below the thresholds. Such measures may be the use of alternative powered equipment (e.g., LPG-powered lifts), alternative fuels (e.g., biofuels), added exhaust devices, or a combination of measures, provided that these measures are approved by the City.

Implementation of *Mitigation Measure 1* is considered to reduce exhaust emissions by 5 percent and fugitive dust emissions by over 50 percent. Implementation of *Mitigation Measure 2* would further reduce on-site diesel exhaust emissions by over 60 percent. With mitigation the computed maximum increased child cancer risk would be 8.3 in one million and the maximum $PM_{2.5}$ concentration would be 0.07 μg/m$^3$. The maximum school child cancer risk would be reduced to 1.7 in one million, which is below the BAAQMD threshold of 10 per one million. *After implementation of these recommended measures, the project would have a less-than-significant impact with respect to community risk caused by construction activities.*

**Figure 1. Project Construction Site and Locations of Sensitive Receptors and Maximum Cancer Risk**

**Impact 5:** Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ***Less than significant.***

The BAAQMD May 2011 CEQA Guidelines included GHG emissions-based significance thresholds. These thresholds include a "bright-line" emissions level of 1,100 metric tons (MT) per year for land-use type projects and 10,000 metric tons per year for stationary sources. Land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita. Projects with emissions above the thresholds would be considered to have an impact, which, cumulatively, would be significant.

<u>CalEEMod Modeling</u>

CalEEMod was also used to predict GHG emissions from operation of the site assuming full build-out of the project. The project land use types and size and other project-specific information were input to the model. The use of this model for evaluating emissions from land use projects is recommended by the BAAQMD. Unless otherwise noted below, the CalEEMod model defaults for Contra Costa County were used. CalEEMod provides emissions for transportation, areas sources, electricity consumption, natural gas combustion, electricity usage associated with water usage and wastewater discharge, and solid waste land filling and transport. CalEEMod output worksheets are included in *Attachment 1*.

*Land Use Descriptions*
The proposed project land uses were input into CalEEMod, which included 117 dwelling units of "Single-Family Residence" on a 20.3-acre site.

*Trip Generation Rates*
The default CalEEMod trip rates were used in the model: Single Family Residence – 9.52 daily trips per weekday. The default trip lengths and trip types specified by CalEEMod for Contra Costa County were used.

*Model Year*
The model uses mobile emission factors from the CARB's EMFAC2011 model. This model is sensitive to the year selected, since vehicle emissions have and continue to be reduced due to fuel efficiency standards and low carbon fuels. The year 2018 was analyzed since it is the first full year that the project is expected to be fully occupied.

*Energy*
Default rates for energy consumption were assumed in the model. Emissions rates associated with electricity consumption were adjusted to account for Pacific Gas & Electric utility's (PG&E) projected 2016 $CO_2$ intensity rate. This 2016 rate is based, in part, on the requirement of a renewable energy portfolio standard of 33 percent by the year 2020. CalEEMod uses a default rate of 641.35 pounds of $CO_2$ per megawatt of electricity produced.

*Other Inputs*
Default model assumptions for GHG emissions associated with area sources, solid waste

generation and water/wastewater use were applied to the project.

*Service Population*

Project service population is the sum of future residents and full-time employees. The number of future residences was estimated at 374 and was based on the latest US Census data for Antioch, which shows an average of 3.20 residents per household.[8]

## Construction Emissions

GHG emissions associated with construction were computed to range from 273 to 274 MT of $CO_2e$ per year over the anticipated 2-year construction period. These are the emissions from on-site operation of construction equipment, vendor truck trips, and worker trips. BAAQMD does not have an adopted Threshold of Significance for construction-related GHG emissions, though the District recommends quantifying emissions and disclosing that GHG emissions would occur during construction. BAAQMD also encourages the incorporation of best management practices to reduce GHG emissions during construction where feasible and applicable. Best management practices assumed to be incorporated into construction of the proposed project include, but are not limited to: using local building materials of at least 10 percent and recycling or reusing at least 50 percent of construction waste or demolition materials.

## Operational Emissions

The CalEEMod model, along with the project vehicle trip generation rates, was used to predict daily emissions associated with operation of the fully-developed site under the proposed project. In 2018, annual emissions resulting from operation of the proposed project are predicted to be 1,554 MT of $CO_2e$. These emissions would exceed the BAAQMD threshold of 1,100 MT of $CO_2e$/yr. As discussed above, land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita to determine impact significance. Computed project per capita emissions are 4.15 MT of $CO_2e$/year/service population, which would not exceed the BAAQMD threshold of 4.6 MT of $CO_2e$/year/service population. Table 3 shows predicted project GHG emissions.

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[8] United States Census Bureau, 2014. *State & County QuickFacts: Milpitas (city), California*. Available online: http://quickfacts.census.gov/qfd/states/06/0602252.html. Accessed: October 14, 2014.

**Table 3. Annual Project GHG Emissions in Metric Tons**

| **Source Category** | **2018 Project Emissions** |
|---|---|
| Construction 2017 | 273 |
| Construction 2016 | 274 |
| Operation | |
| Area | 23 |
| Energy Consumption | 463 |
| Mobile | 978 |
| Solid Waste Generation | 64 |
| Water Usage | 26 |
| **Project Total** | 1,554 |
| ***BAAQMD Bright-Line Threshold*** | ***1,100 MT $CO_2$e/year*** |
| **Project Per Capita Emissions** | 4.16 MT $CO_2$e/year/capita |
| ***BAAQMD Per Capita Threshold*** | ***4 6 MT CO2e/year/capita*** |
| ***Significant?*** | ***No*** |

**Impact 6:** Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***No Impact.***

The project would be subject to new requirements under rule making developed at the State and local level, regarding greenhouse gas emissions and be subject to local policies that may regulate emissions of greenhouse gases.

# Attachment 1: CalEEMod Input and Output Worksheets and Construction Schedule

# Heidorn Village Default Inputs

### Contra Costa County, Annual

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Single Family Housing | 117.00 | Dwelling Unit | 20.30 | 210,600.00 | 335 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.2 | **Precipitation Freq (Days)** | 58 |
| **Climate Zone** | 4 | | | **Operational Year** | 2018 |
| **Utility Company** | Pacific Gas & Electric Company | | | | |
| **CO2 Intensity (lb/MWhr)** | 641.35 | **CH4 Intensity (lb/MWhr)** | 0.029 | **N2O Intensity (lb/MWhr)** | 0.006 |

### 1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project size and acreage

Construction Phase - Use default schedule, but start date of 6/1/2015.  No Demolition

Off-road Equipment -

Off-road Equipment - Default, except assume crane half time and no diesel-powered welders

Grading -

Demolition -

Trips and VMT -

Architectural Coating - VOC emission per BAAQMD Rules and Regulations

Vehicle Trips -

Construction Off-road Equipment Mitigation - Tier 2 for mobile and Tier 4 for Portable equipment plus BMPs for fugitive PM2.5

Mobile Land Use Mitigation -

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblArchitecturalCoating | EF_Nonresidential_Interior | 100.00 | 150.00 |
| tblArchitecturalCoating | EF_Residential_Interior | 100.00 | 150.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 3.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 4.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 9.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |

| | | | |
|---|---|---|---|
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 2 |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstructionPhase | PhaseEndDate | 1/25/2017 | 12/28/2016 |
| tblConstructionPhase | PhaseEndDate | 1/27/2017 | 12/28/2016 |
| tblConstructionPhase | PhaseStartDate | 12/29/2016 | 12/1/2016 |
| tblConstructionPhase | PhaseStartDate | 12/31/2016 | 12/1/2016 |
| tblLandUse | LotAcreage | 37.99 | 20.30 |
| tblOffRoadEquipment | UsageHours | 7.00 | 4.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblProjectCharacteristics | OperationalYear | 2014 | 2018 |

## 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 | | | | | |
| 2015 | 0.3166 | 3.1210 | 2.2264 | 2.9500e-003 | 0.2715 | 0.1821 | 0.4536 | 0.1205 | 0.1692 | 0.2897 | 0.0000 | 272.0435 | 272.0435 | 0.0651 | 0.0000 | 273.4109 |
| 2016 | 2.3799 | 3.5165 | 2.7319 | 4.1600e-003 | 0.0629 | 0.2368 | 0.2997 | 0.0170 | 0.2215 | 0.2385 | 0.0000 | 372.5076 | 372.5076 | 0.0741 | 0.0000 | 374.0636 |
| **Total** | **2.6965** | **6.6375** | **4.9584** | **7.1100e-003** | **0.3345** | **0.4189** | **0.7533** | **0.1375** | **0.3907** | **0.5282** | **0.0000** | **644.5511** | **644.5511** | **0.1392** | **0.0000** | **647.4745** |

**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 | | | | | |
| 2015 | 0.1008 | 1.9823 | 1.8843 | 2.9500e-003 | 0.1384 | 0.0609 | 0.1993 | 0.0333 | 0.0608 | 0.0941 | 0.0000 | 272.0432 | 272.0432 | 0.0651 | 0.0000 | 273.4106 |
| 2016 | 2.1247 | 2.3638 | 2.7230 | 4.1600e-003 | 0.0629 | 0.0825 | 0.1455 | 0.0170 | 0.0823 | 0.0993 | 0.0000 | 372.5073 | 372.5073 | 0.0741 | 0.0000 | 374.0633 |
| **Total** | **2.2255** | **4.3461** | **4.6073** | **7.1100e-003** | **0.2013** | **0.1435** | **0.3448** | **0.0502** | **0.1431** | **0.1933** | **0.0000** | **644.5505** | **644.5505** | **0.1392** | **0.0000** | **647.4739** |

| | **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** | **17.47** | **34.52** | **7.08** | **0.00** | **39.81** | **65.75** | **54.24** | **63.48** | **63.37** | **63.40** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

### 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 | 1.6855 | 0.0231 | 1.9315 | 1.1500e-003 | | 0.1587 | 0.1587 | | 0.1587 | 0.1587 | 16.1749 | 5.9550 | 22.1299 | 0.0362 | 8.6000e-004 | 23.1550 |
| Energy | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 461.0306 | 461.0306 | 0.0151 | 6.2900e-003 | 463.2980 |
| Mobile | 0.6079 | 1.2974 | 6.0896 | 0.0131 | 0.9262 | 0.0163 | 0.9425 | 0.2481 | 0.0150 | 0.2631 | 0.0000 | 976.7356 | 976.7356 | 0.0405 | 0.0000 | 977.5870 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 28.5608 | 0.0000 | 28.5608 | 1.6879 | 0.0000 | 64.0067 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 2.4184 | 16.8928 | 19.3112 | 0.2492 | 6.0200e-003 | 26.4108 |
| **Total** | **2.3156** | **1.5107** | **8.1021** | **0.0155** | **0.9262** | **0.1904** | **1.1166** | **0.2481** | **0.1891** | **0.4372** | **47.1542** | **1,460.6140** | **1,507.7681** | **2.0289** | **0.0132** | **1,554.4575** |

**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 | 1.6855 | 0.0231 | 1.9315 | 1.1500e-003 | | 0.1587 | 0.1587 | | 0.1587 | 0.1587 | 16.1749 | 5.9550 | 22.1299 | 0.0362 | 8.6000e-004 | 23.1550 |
| Energy | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 461.0306 | 461.0306 | 0.0151 | 6.2900e-003 | 463.2980 |
| Mobile | 0.6079 | 1.2974 | 6.0896 | 0.0131 | 0.9262 | 0.0163 | 0.9425 | 0.2481 | 0.0150 | 0.2631 | 0.0000 | 976.7356 | 976.7356 | 0.0405 | 0.0000 | 977.5870 |
| Waste | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 28.5608 | 0.0000 | 28.5608 | 1.6879 | 0.0000 | 64.0067 |
| Water | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 2.4184 | 16.8928 | 19.3112 | 0.2491 | 6.0100e-003 | 26.4069 |
| **Total** | **2.3156** | **1.5107** | **8.1021** | **0.0155** | **0.9262** | **0.1904** | **1.1166** | **0.2481** | **0.1891** | **0.4372** | **47.1542** | **1,460.6140** | **1,507.7681** | **2.0289** | **0.0132** | **1,554.4537** |

| | **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** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.08** | **0.00** |

## 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 | 6/1/2015 | 6/12/2015 | 5 | 10 | |
| 2 | Grading | Grading | 6/13/2015 | 7/31/2015 | 5 | 35 | |
| 3 | Building Construction | Building Construction | 8/1/2015 | 12/30/2016 | 5 | 370 | |
| 4 | Paving | Paving | 12/1/2016 | 12/28/2016 | 5 | 20 | |
| 5 | Architectural Coating | Architectural Coating | 12/1/2016 | 12/28/2016 | 5 | 20 | |

**Acres of Grading (Site Preparation Phase): 0**

**Acres of Grading (Grading Phase): 87.5**

**Acres of Paving: 0**

**Residential Indoor: 426,465; Residential Outdoor: 142,155; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating**

**OffRoad Equipment**

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Architectural Coating | Air Compressors | 1 | 6.00 | 78 | 0.48 |
| Grading | Excavators | 2 | 8.00 | 162 | 0.38 |
| Building Construction | Cranes | 1 | 4.00 | 226 | 0.29 |
| Building Construction | Forklifts | 3 | 8.00 | 89 | 0.20 |
| Building Construction | Generator Sets | 1 | 8.00 | 84 | 0.74 |
| Paving | Pavers | 2 | 8.00 | 125 | 0.42 |
| Paving | Rollers | 2 | 8.00 | 80 | 0.38 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Building Construction | Tractors/Loaders/Backhoes | 3 | 7.00 | 97 | 0.37 |
| Grading | Graders | 1 | 8.00 | 174 | 0.41 |
| Grading | Tractors/Loaders/Backhoes | 2 | 8.00 | 97 | 0.37 |
| Paving | Paving Equipment | 2 | 8.00 | 130 | 0.36 |
| Site Preparation | Tractors/Loaders/Backhoes | 4 | 8.00 | 97 | 0.37 |
| Site Preparation | Rubber Tired Dozers | 3 | 8.00 | 255 | 0.40 |
| Grading | Scrapers | 2 | 8.00 | 361 | 0.48 |
| Building Construction | Welders | 1 | 0.00 | 46 | 0.45 |

**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 | 7 | 18.00 | 0.00 | 0.00 | 12.40 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Grading | 8 | 20.00 | 0.00 | 0.00 | 12.40 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 9 | 42.00 | 13.00 | 0.00 | 12.40 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Paving | 6 | 15.00 | 0.00 | 0.00 | 12.40 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |
| Architectural Coating | 1 | 8.00 | 0.00 | 0.00 | 12.40 | 7.30 | 20.00 | LD_Mix | HDT_Mix | HHDT |

## 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

## 3.2 Site Preparation - 2015

**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 |  |  |  |  | 0.0903 | 0.0000 | 0.0903 | 0.0497 | 0.0000 | 0.0497 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0263 | 0.2845 | 0.2132 | 2.0000e-004 |  | 0.0154 | 0.0154 |  | 0.0142 | 0.0142 | 0.0000 | 18.6506 | 18.6506 | 5.5700e-003 | 0.0000 | 18.7675 |
| **Total** | **0.0263** | **0.2845** | **0.2132** | **2.0000e-004** | **0.0903** | **0.0154** | **0.1058** | **0.0497** | **0.0142** | **0.0639** | **0.0000** | **18.6506** | **18.6506** | **5.5700e-003** | **0.0000** | **18.7675** |

**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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 3.8000e-004 | 5.6000e-004 | 5.4400e-003 | 1.0000e-005 | 8.2000e-004 | 1.0000e-005 | 8.3000e-004 | 2.2000e-004 | 1.0000e-005 | 2.2000e-004 | 0.0000 | 0.7662 | 0.7662 | 4.0000e-005 | 0.0000 | 0.7671 |
| **Total** | **3.8000e-004** | **5.6000e-004** | **5.4400e-003** | **1.0000e-005** | **8.2000e-004** | **1.0000e-005** | **8.3000e-004** | **2.2000e-004** | **1.0000e-005** | **2.2000e-004** | **0.0000** | **0.7662** | **0.7662** | **4.0000e-005** | **0.0000** | **0.7671** |

## 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 | | | | | 0.0407 | 0.0000 | 0.0407 | 0.0112 | 0.0000 | 0.0112 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 6.1500e-003 | 0.1721 | 0.1170 | 2.0000e-004 | | 4.8100e-003 | 4.8100e-003 | | 4.8100e-003 | 4.8100e-003 | 0.0000 | 18.6505 | 18.6505 | 5.5700e-003 | 0.0000 | 18.7675 |
| **Total** | **6.1500e-003** | **0.1721** | **0.1170** | **2.0000e-004** | **0.0407** | **4.8100e-003** | **0.0455** | **0.0112** | **4.8100e-003** | **0.0160** | **0.0000** | **18.6505** | **18.6505** | **5.5700e-003** | **0.0000** | **18.7675** |

## 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 3.8000e-004 | 5.6000e-004 | 5.4400e-003 | 1.0000e-005 | 8.2000e-004 | 1.0000e-005 | 8.3000e-004 | 2.2000e-004 | 1.0000e-005 | 2.2000e-004 | 0.0000 | 0.7662 | 0.7662 | 4.0000e-005 | 0.0000 | 0.7671 |
| **Total** | **3.8000e-004** | **5.6000e-004** | **5.4400e-003** | **1.0000e-005** | **8.2000e-004** | **1.0000e-005** | **8.3000e-004** | **2.2000e-004** | **1.0000e-005** | **2.2000e-004** | **0.0000** | **0.7662** | **0.7662** | **4.0000e-005** | **0.0000** | **0.7671** |

## 3.3 Grading - 2015

## 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 | | | | | 0.1518 | 0.0000 | 0.1518 | 0.0629 | 0.0000 | 0.0629 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.1186 | 1.3833 | 0.8897 | 1.0800e-003 | | 0.0665 | 0.0665 | | 0.0612 | 0.0612 | 0.0000 | 102.9739 | 102.9739 | 0.0307 | 0.0000 | 103.6195 |
| **Total** | **0.1186** | **1.3833** | **0.8897** | **1.0800e-003** | **0.1518** | **0.0665** | **0.2183** | **0.0629** | **0.0612** | **0.1242** | **0.0000** | **102.9739** | **102.9739** | **0.0307** | **0.0000** | **103.6195** |

## 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 1.4800e-003 | 2.1600e-003 | 0.0212 | 4.0000e-005 | 3.1900e-003 | 3.0000e-005 | 3.2100e-003 | 8.5000e-004 | 3.0000e-005 | 8.7000e-004 | 0.0000 | 2.9797 | 2.9797 | 1.7000e-004 | 0.0000 | 2.9833 |
| **Total** | **1.4800e-003** | **2.1600e-003** | **0.0212** | **4.0000e-005** | **3.1900e-003** | **3.0000e-005** | **3.2100e-003** | **8.5000e-004** | **3.0000e-005** | **8.7000e-004** | **0.0000** | **2.9797** | **2.9797** | **1.7000e-004** | **0.0000** | **2.9833** |

**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 | | | | | 0.0683 | 0.0000 | 0.0683 | 0.0142 | 0.0000 | 0.0142 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0331 | 0.8916 | 0.6640 | 1.0800e-003 | | 0.0241 | 0.0241 | | 0.0241 | 0.0241 | 0.0000 | 102.9737 | 102.9737 | 0.0307 | 0.0000 | 103.6193 |
| **Total** | **0.0331** | **0.8916** | **0.6640** | **1.0800e-003** | **0.0683** | **0.0241** | **0.0924** | **0.0142** | **0.0241** | **0.0383** | **0.0000** | **102.9737** | **102.9737** | **0.0307** | **0.0000** | **103.6193** |

**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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 1.4800e-003 | 2.1600e-003 | 0.0212 | 4.0000e-005 | 3.1900e-003 | 3.0000e-005 | 3.2100e-003 | 8.5000e-004 | 3.0000e-005 | 8.7000e-004 | 0.0000 | 2.9797 | 2.9797 | 1.7000e-004 | 0.0000 | 2.9833 |
| **Total** | **1.4800e-003** | **2.1600e-003** | **0.0212** | **4.0000e-005** | **3.1900e-003** | **3.0000e-005** | **3.2100e-003** | **8.5000e-004** | **3.0000e-005** | **8.7000e-004** | **0.0000** | **2.9797** | **2.9797** | **1.7000e-004** | **0.0000** | **2.9833** |

## 3.4 Building Construction - 2015

**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 | 0.1501 | 1.3548 | 0.8482 | 1.2100e-003 | | 0.0986 | 0.0986 | | 0.0924 | 0.0924 | 0.0000 | 111.7363 | 111.7363 | 0.0273 | 0.0000 | 112.3097 |
| **Total** | **0.1501** | **1.3548** | **0.8482** | **1.2100e-003** | | **0.0986** | **0.0986** | | **0.0924** | **0.0924** | **0.0000** | **111.7363** | **111.7363** | **0.0273** | **0.0000** | **112.3097** |

**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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0101 | 0.0816 | 0.1103 | 1.7000e-004 | 4.5600e-003 | 1.3100e-003 | 5.8700e-003 | 1.3100e-003 | 1.2000e-003 | 2.5100e-003 | 0.0000 | 15.4500 | 15.4500 | 1.4000e-004 | 0.0000 | 15.4529 |
| Worker | 9.6500e-003 | 0.0141 | 0.1384 | 2.5000e-004 | 0.0208 | 1.8000e-004 | 0.0210 | 5.5400e-003 | 1.6000e-004 | 5.7100e-003 | 0.0000 | 19.4869 | 19.4869 | 1.1400e-003 | 0.0000 | 19.5109 |
| **Total** | **0.0197** | **0.0957** | **0.2488** | **4.2000e-004** | **0.0254** | **1.4900e-003** | **0.0269** | **6.8500e-003** | **1.3600e-003** | **8.2200e-003** | **0.0000** | **34.9369** | **34.9369** | **1.2800e-003** | **0.0000** | **34.9638** |

## 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 | 0.0400 | 0.8202 | 0.8280 | 1.2100e-003 |  | 0.0305 | 0.0305 |  | 0.0305 | 0.0305 | 0.0000 | 111.7362 | 111.7362 | 0.0273 | 0.0000 | 112.3096 |
| **Total** | **0.0400** | **0.8202** | **0.8280** | **1.2100e-003** |  | **0.0305** | **0.0305** |  | **0.0305** | **0.0305** | **0.0000** | **111.7362** | **111.7362** | **0.0273** | **0.0000** | **112.3096** |

## 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0101 | 0.0816 | 0.1103 | 1.7000e-004 | 4.5600e-003 | 1.3100e-003 | 5.8700e-003 | 1.3100e-003 | 1.2000e-003 | 2.5100e-003 | 0.0000 | 15.4500 | 15.4500 | 1.4000e-004 | 0.0000 | 15.4529 |
| Worker | 9.6500e-003 | 0.0141 | 0.1384 | 2.5000e-004 | 0.0208 | 1.8000e-004 | 0.0210 | 5.5400e-003 | 1.6000e-004 | 5.7100e-003 | 0.0000 | 19.4869 | 19.4869 | 1.1400e-003 | 0.0000 | 19.5109 |
| **Total** | **0.0197** | **0.0957** | **0.2488** | **4.2000e-004** | **0.0254** | **1.4900e-003** | **0.0269** | **6.8500e-003** | **1.3600e-003** | **8.2200e-003** | **0.0000** | **34.9369** | **34.9369** | **1.2800e-003** | **0.0000** | **34.9638** |

# 3.4 Building Construction - 2016

## 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 | 0.3359 | 3.0674 | 2.0120 | 2.8900e-003 |  | 0.2193 | 0.2193 |  | 0.2053 | 0.2053 | 0.0000 | 265.4215 | 265.4215 | 0.0646 | 0.0000 | 266.7773 |
| **Total** | **0.3359** | **3.0674** | **2.0120** | **2.8900e-003** |  | **0.2193** | **0.2193** |  | **0.2053** | **0.2053** | **0.0000** | **265.4215** | **265.4215** | **0.0646** | **0.0000** | **266.7773** |

## 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0213 | 0.1699 | 0.2442 | 4.0000e-004 | 0.0109 | 2.5100e-003 | 0.0134 | 3.1300e-003 | 2.3100e-003 | 5.4400e-003 | 0.0000 | 36.5628 | 36.5628 | 2.9000e-004 | 0.0000 | 36.5689 |
| Worker | 0.0207 | 0.0303 | 0.2963 | 5.9000e-004 | 0.0499 | 4.1000e-004 | 0.0503 | 0.0133 | 3.7000e-004 | 0.0136 | 0.0000 | 45.0652 | 45.0652 | 2.5000e-003 | 0.0000 | 45.1176 |
| **Total** | **0.0419** | **0.2003** | **0.5405** | **9.9000e-004** | **0.0608** | **2.9200e-003** | **0.0638** | **0.0164** | **2.6800e-003** | **0.0191** | **0.0000** | **81.6279** | **81.6279** | **2.7900e-003** | **0.0000** | **81.6865** |

### 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 | 0.0958 | 1.9640 | 1.9825 | 2.8900e-003 |  | 0.0730 | 0.0730 |  | 0.0730 | 0.0730 | 0.0000 | 265.4212 | 265.4212 | 0.0646 | 0.0000 | 266.7770 |
| **Total** | **0.0958** | **1.9640** | **1.9825** | **2.8900e-003** |  | **0.0730** | **0.0730** |  | **0.0730** | **0.0730** | **0.0000** | **265.4212** | **265.4212** | **0.0646** | **0.0000** | **266.7770** |

### 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Vendor | 0.0213 | 0.1699 | 0.2442 | 4.0000e-004 | 0.0109 | 2.5100e-003 | 0.0134 | 3.1300e-003 | 2.3100e-003 | 5.4400e-003 | 0.0000 | 36.5628 | 36.5628 | 2.9000e-004 | 0.0000 | 36.5689 |
| Worker | 0.0207 | 0.0303 | 0.2963 | 5.9000e-004 | 0.0499 | 4.1000e-004 | 0.0503 | 0.0133 | 3.7000e-004 | 0.0136 | 0.0000 | 45.0652 | 45.0652 | 2.5000e-003 | 0.0000 | 45.1176 |
| **Total** | **0.0419** | **0.2003** | **0.5405** | **9.9000e-004** | **0.0608** | **2.9200e-003** | **0.0638** | **0.0164** | **2.6800e-003** | **0.0191** | **0.0000** | **81.6279** | **81.6279** | **2.7900e-003** | **0.0000** | **81.6865** |

## 3.5 Paving - 2016

### 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 | 0.0209 | 0.2239 | 0.1482 | 2.2000e-004 |  | 0.0126 | 0.0126 |  | 0.0116 | 0.0116 | 0.0000 | 21.0138 | 21.0138 | 6.3400e-003 | 0.0000 | 21.1469 |
| Paving | 0.0000 |  |  |  |  | 0.0000 | 0.0000 |  | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **0.0209** | **0.2239** | **0.1482** | **2.2000e-004** |  | **0.0126** | **0.0126** |  | **0.0116** | **0.0116** | **0.0000** | **21.0138** | **21.0138** | **6.3400e-003** | **0.0000** | **21.1469** |

### 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 5.7000e-004 | 8.3000e-004 | 8.1100e-003 | 2.0000e-005 | 1.3700e-003 | 1.0000e-005 | 1.3800e-003 | 3.6000e-004 | 1.0000e-005 | 3.7000e-004 | 0.0000 | 1.2333 | 1.2333 | 7.0000e-005 | 0.0000 | 1.2348 |
| **Total** | **5.7000e-004** | **8.3000e-004** | **8.1100e-003** | **2.0000e-005** | **1.3700e-003** | **1.0000e-005** | **1.3800e-003** | **3.6000e-004** | **1.0000e-005** | **3.7000e-004** | **0.0000** | **1.2333** | **1.2333** | **7.0000e-005** | **0.0000** | **1.2348** |

## 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 | 9.1200e-003 | 0.1970 | 0.1693 | 2.2000e-004 | | 6.5400e-003 | 6.5400e-003 | | 6.5400e-003 | 6.5400e-003 | 0.0000 | 21.0138 | 21.0138 | 6.3400e-003 | 0.0000 | 21.1469 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **9.1200e-003** | **0.1970** | **0.1693** | **2.2000e-004** | | **6.5400e-003** | **6.5400e-003** | | **6.5400e-003** | **6.5400e-003** | **0.0000** | **21.0138** | **21.0138** | **6.3400e-003** | **0.0000** | **21.1469** |

## 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 5.7000e-004 | 8.3000e-004 | 8.1100e-003 | 2.0000e-005 | 1.3700e-003 | 1.0000e-005 | 1.3800e-003 | 3.6000e-004 | 1.0000e-005 | 3.7000e-004 | 0.0000 | 1.2333 | 1.2333 | 7.0000e-005 | 0.0000 | 1.2348 |
| **Total** | **5.7000e-004** | **8.3000e-004** | **8.1100e-003** | **2.0000e-005** | **1.3700e-003** | **1.0000e-005** | **1.3800e-003** | **3.6000e-004** | **1.0000e-005** | **3.7000e-004** | **0.0000** | **1.2333** | **1.2333** | **7.0000e-005** | **0.0000** | **1.2348** |

# 3.6 Architectural Coating - 2016

## 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 | 1.9767 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 3.6800e-003 | 0.0237 | 0.0188 | 3.0000e-005 | | 1.9700e-003 | 1.9700e-003 | | 1.9700e-003 | 1.9700e-003 | 0.0000 | 2.5533 | 2.5533 | 3.0000e-004 | 0.0000 | 2.5596 |
| **Total** | **1.9804** | **0.0237** | **0.0188** | **3.0000e-005** | | **1.9700e-003** | **1.9700e-003** | | **1.9700e-003** | **1.9700e-003** | **0.0000** | **2.5533** | **2.5533** | **3.0000e-004** | **0.0000** | **2.5596** |

## 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 3.0000e-004 | 4.4000e-004 | 4.3200e-003 | 1.0000e-005 | 7.3000e-004 | 1.0000e-005 | 7.3000e-004 | 1.9000e-004 | 1.0000e-005 | 2.0000e-004 | 0.0000 | 0.6578 | 0.6578 | 4.0000e-005 | 0.0000 | 0.6585 |
| **Total** | **3.0000e-004** | **4.4000e-004** | **4.3200e-003** | **1.0000e-005** | **7.3000e-004** | **1.0000e-005** | **7.3000e-004** | **1.9000e-004** | **1.0000e-005** | **2.0000e-004** | **0.0000** | **0.6578** | **0.6578** | **4.0000e-005** | **0.0000** | **0.6585** |

### 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 | 1.9767 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 3.0000e-004 | 1.2900e-003 | 0.0183 | 3.0000e-005 | | 4.0000e-005 | 4.0000e-005 | | 4.0000e-005 | 4.0000e-005 | 0.0000 | 2.5533 | 2.5533 | 3.0000e-004 | 0.0000 | 2.5596 |
| **Total** | **1.9770** | **1.2900e-003** | **0.0183** | **3.0000e-005** | | **4.0000e-005** | **4.0000e-005** | | **4.0000e-005** | **4.0000e-005** | **0.0000** | **2.5533** | **2.5533** | **3.0000e-004** | **0.0000** | **2.5596** |

### 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 | 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 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Worker | 3.0000e-004 | 4.4000e-004 | 4.3200e-003 | 1.0000e-005 | 7.3000e-004 | 1.0000e-005 | 7.3000e-004 | 1.9000e-004 | 1.0000e-005 | 2.0000e-004 | 0.0000 | 0.6578 | 0.6578 | 4.0000e-005 | 0.0000 | 0.6585 |
| **Total** | **3.0000e-004** | **4.4000e-004** | **4.3200e-003** | **1.0000e-005** | **7.3000e-004** | **1.0000e-005** | **7.3000e-004** | **1.9000e-004** | **1.0000e-005** | **2.0000e-004** | **0.0000** | **0.6578** | **0.6578** | **4.0000e-005** | **0.0000** | **0.6585** |

## 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 | 0.6079 | 1.2974 | 6.0896 | 0.0131 | 0.9262 | 0.0163 | 0.9425 | 0.2481 | 0.0150 | 0.2631 | 0.0000 | 976.7356 | 976.7356 | 0.0405 | 0.0000 | 977.5870 |
| Unmitigated | 0.6079 | 1.2974 | 6.0896 | 0.0131 | 0.9262 | 0.0163 | 0.9425 | 0.2481 | 0.0150 | 0.2631 | 0.0000 | 976.7356 | 976.7356 | 0.0405 | 0.0000 | 977.5870 |

### 4.2 Trip Summary Information

| | Average Daily Trip Rate | | | Unmitigated | Mitigated |
|---|---|---|---|---|---|
| Land Use | Weekday | Saturday | Sunday | Annual VMT | Annual VMT |
| Single Family Housing | 1,119.69 | 1,179.36 | 1026.09 | 2,488,737 | 2,488,737 |
| Total | 1,119.69 | 1,179.36 | 1,026.09 | 2,488,737 | 2,488,737 |

### 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- | H-S or C-C | H-O or C-NW | Primary | Diverted | Pass-by |
| Single Family Housing | 12.40 | 4.30 | 5.40 | 26.10 | 29.10 | 44.80 | 86 | 11 | 3 |

| LDA | LDT1 | LDT2 | MDV | LHD1 | LHD2 | MHD | HHD | OBUS | UBUS | MCY | SBUS | MH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.527213 | 0.065297 | 0.176718 | 0.144995 | 0.036242 | 0.004841 | 0.009763 | 0.021699 | 0.001225 | 0.001482 | 0.006415 | 0.002059 | 0.002052 |

## 5.0 Energy Detail

### 4.4 Fleet Mix

Historical Energy Use: N

### 5.1 Mitigation Measures Energy

| | 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 | 0.0000 | 240.7391 | 240.7391 | 0.0109 | 2.2500e-003 | 241.6659 |
| Electricity Unmitigated | | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 240.7391 | 240.7391 | 0.0109 | 2.2500e-003 | 241.6659 |
| NaturalGas Mitigated | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 220.2915 | 220.2915 | 4.2200e-003 | 4.0400e-003 | 221.6321 |
| NaturalGas Unmitigated | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 220.2915 | 220.2915 | 4.2200e-003 | 4.0400e-003 | 221.6321 |

### 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 | | | | | |
| Single Family Housing | 4.12811e+006 | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 220.2915 | 220.2915 | 4.2200e-003 | 4.0400e-003 | 221.6321 |
| **Total** | | **0.0223** | **0.1902** | **0.0809** | **1.2100e-003** | | **0.0154** | **0.0154** | | **0.0154** | **0.0154** | **0.0000** | **220.2915** | **220.2915** | **4.2200e-003** | **4.0400e-003** | **221.6321** |

**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 | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Single Family Housing | 4.12811e+006 | 0.0223 | 0.1902 | 0.0809 | 1.2100e-003 | | 0.0154 | 0.0154 | | 0.0154 | 0.0154 | 0.0000 | 220.2915 | 220.2915 | 4.2200e-003 | 4.0400e-003 | 221.6321 |
| **Total** | | **0.0223** | **0.1902** | **0.0809** | **1.2100e-003** | | **0.0154** | **0.0154** | | **0.0154** | **0.0154** | **0.0000** | **220.2915** | **220.2915** | **4.2200e-003** | **4.0400e-003** | **221.6321** |

## 5.3 Energy by Land Use - Electricity

**Unmitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Single Family Housing | 827534 | 240.7391 | 0.0109 | 2.2500e-003 | 241.6659 |
| **Total** | | **240.7391** | **0.0109** | **2.2500e-003** | **241.6659** |

**Mitigated**

| | Electricity Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | kWh/yr | MT/yr | | | |
| Single Family Housing | 827534 | 240.7391 | 0.0109 | 2.2500e-003 | 241.6659 |
| **Total** | | **240.7391** | **0.0109** | **2.2500e-003** | **241.6659** |

# 6.0 Area Detail

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## 6.1 Mitigation Measures Area

| | 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 | 1.6855 | 0.0231 | 1.9315 | 1.1500e-003 | | 0.1587 | 0.1587 | | 0.1587 | 0.1587 | 16.1749 | 5.9550 | 22.1299 | 0.0362 | 8.6000e-004 | 23.1550 |
| Unmitigated | 1.6855 | 0.0231 | 1.9315 | 1.1500e-003 | | 0.1587 | 0.1587 | | 0.1587 | 0.1587 | 16.1749 | 5.9550 | 22.1299 | 0.0362 | 8.6000e-004 | 23.1550 |

## 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 | 0.1483 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Consumer Products | 0.8225 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 0.6877 | 0.0129 | 1.0566 | 1.1100e-003 | | 0.1539 | 0.1539 | | 0.1539 | 0.1539 | 16.1749 | 4.5359 | 20.7108 | 0.0348 | 8.6000e-004 | 21.7064 |
| Landscaping | 0.0270 | 0.0102 | 0.8749 | 5.0000e-005 | | 4.7700e-003 | 4.7700e-003 | | 4.7700e-003 | 4.7700e-003 | 0.0000 | 1.4191 | 1.4191 | 1.4100e-003 | 0.0000 | 1.4486 |
| **Total** | **1.6855** | **0.0231** | **1.9315** | **1.1600e-003** | | **0.1587** | **0.1587** | | **0.1587** | **0.1587** | **16.1749** | **5.9550** | **22.1299** | **0.0362** | **8.6000e-004** | **23.1550** |

**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 | | | | | |
| Consumer Products | 0.8225 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Hearth | 0.6877 | 0.0129 | 1.0566 | 1.1100e-003 | | 0.1539 | 0.1539 | | 0.1539 | 0.1539 | 16.1749 | 4.5359 | 20.7108 | 0.0348 | 8.6000e-004 | 21.7064 |
| Landscaping | 0.0270 | 0.0102 | 0.8749 | 5.0000e-005 | | 4.7700e-003 | 4.7700e-003 | | 4.7700e-003 | 4.7700e-003 | 0.0000 | 1.4191 | 1.4191 | 1.4100e-003 | 0.0000 | 1.4486 |
| Architectural Coating | 0.1483 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **1.6855** | **0.0231** | **1.9315** | **1.1600e-003** | | **0.1587** | **0.1587** | | **0.1587** | **0.1587** | **16.1749** | **5.9550** | **22.1299** | **0.0362** | **8.6000e-004** | **23.1550** |

## 7.0 Water Detail

### 7.1 Mitigation Measures Water

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| Category | MT/yr | | | |
| Mitigated | 19.3112 | 0.2491 | 6.0100e-003 | 26.4069 |
| Unmitigated | 19.3112 | 0.2492 | 6.0200e-003 | 26.4108 |

### 7.2 Water by Land Use

**Unmitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | Mgal | MT/yr | | | |
| Single Family Housing | 7.62302 / 4.80582 | 19.3112 | 0.2492 | 6.0200e-003 | 26.4108 |
| **Total** | | **19.3112** | **0.2492** | **6.0200e-003** | **26.4108** |

**Mitigated**

| | Indoor/Outdoor Use | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|

| Land Use | Mgal | MT/yr | | | |
|---|---|---|---|---|---|
| Single Family Housing | 7.62302 / 4.80582 | 19.3112 | 0.2491 | 6.0100e-003 | 26.4069 |
| **Total** | | **19.3112** | **0.2491** | **6.0100e-003** | **26.4069** |

## 8.0 Waste Detail

### 8.1 Mitigation Measures Waste

**Category/Year**

| | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|
| | MT/yr | | | |
| Mitigated | 28.5608 | 1.6879 | 0.0000 | 64.0067 |
| Unmitigated | 28.5608 | 1.6879 | 0.0000 | 64.0067 |

### 8.2 Waste by Land Use

**Unmitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Single Family Housing | 140.7 | 28.5608 | 1.6879 | 0.0000 | 64.0067 |
| **Total** | | **28.5608** | **1.6879** | **0.0000** | **64.0067** |

**Mitigated**

| | Waste Disposed | Total CO2 | CH4 | N2O | CO2e |
|---|---|---|---|---|---|
| Land Use | tons | MT/yr | | | |
| Single Family Housing | 140.7 | 28.5608 | 1.6879 | 0.0000 | 64.0067 |
| **Total** | | **28.5608** | **1.6879** | **0.0000** | **64.0067** |

## 9.0 Operational Offroad

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

## 10.0 Vegetation

# Attachment 2: Construction Health Risk Modeling Emissions and Risk Calculations

## Construction Health Risk Modeling Emissions and Risk Calculations

**Heidorn Village, Antioch, CA**

**DPM Construction Emissions and Modeling Emission Rates**

| Construction Year | Activity | DPM (ton/year) | Area Source | DPM Emissions | | | Modeled Area (m$^2$) | DPM Emission Rate (g/s/m$^2$) |
|---|---|---|---|---|---|---|---|---|
| | | | | **(lb/yr)** | **(lb/hr)** | **(g/s)** | | |
| ***2015*** | Construction | 0.1692 | CON_DPM | 338.4 | 0.10301 | 1.30E-02 | 84,432 | 1.54E-07 |
| ***2016*** | Construction | 0.2215 | CON_DPM | 443.0 | 0.13486 | 1.70E-02 | 84,432 | 2.01E-07 |
| ***Total*** | | ***0.3907*** | | ***781*** | ***0.2379*** | ***0.0300*** | | |

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

**PM2.5 Fugitive Dust Construction Emissions for Modeling**

| Construction Year | Activity | Area Source | PM2.5 Emissions | | | | Modeled Area (m$^2$) | PM2.5 Emission Rate g/s/m$^2$ |
|---|---|---|---|---|---|---|---|---|
| | | | **(ton/year)** | **(lb/yr)** | **(lb/hr)** | **(g/s)** | | |
| ***2015*** | Construction | CON_FUG | 0.1205 | 241.0 | 0.07336 | 9.24E-03 | 84,432 | 1.09E-07 |
| ***2016*** | Construction | CON_FUG | 0.0170 | 34.0 | 0.01035 | 1.30E-03 | 84,432 | 1.54E-08 |
| ***Total*** | | | ***0.1375*** | ***275.0*** | ***0.0837*** | ***0.0105*** | | |

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

## DPM Construction Emissions and Modeling Emission Rates - With Mitigation

| Construction Year | Activity | DPM (ton/year) | Area Source | DPM Emissions (lb/yr) | DPM Emissions (lb/hr) | DPM Emissions (g/s) | Modeled Area ($m^2$) | DPM Emission Rate ($g/s/m^2$) |
|---|---|---|---|---|---|---|---|---|
| ***2015*** | Construction | 0.0608 | CON_DPM | 121.6 | 0.03702 | 4.66E-03 | 84,432 | 5.52E-08 |
| ***2016*** | Construction | 0.0823 | CON_DPM | 164.6 | 0.05011 | 6.31E-03 | 84,432 | 7.48E-08 |
| ***Total*** | | ***0.1431*** | | ***286*** | ***0.0871*** | ***0.0110*** | | |

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

## PM2.5 Fugitive Dust Construction Emissions for Modeling - With Mitigation

| Construction Year | Activity | Area Source | PM2.5 Emissions (ton/year) | PM2.5 Emissions (lb/yr) | PM2.5 Emissions (lb/hr) | PM2.5 Emissions (g/s) | Modeled Area ($m^2$) | PM2.5 Emission Rate $g/s/m^2$ |
|---|---|---|---|---|---|---|---|---|
| ***2015*** | Construction | CON_FUG | 0.0333 | 66.6 | 0.02027 | 2.55E-03 | 84,432 | 3.03E-08 |
| ***2016*** | Construction | CON_FUG | 0.0170 | 34.0 | 0.01035 | 1.30E-03 | 84,432 | 1.54E-08 |
| ***Total*** | | | ***0.0503*** | ***100.6*** | ***0.0306*** | ***0.0039*** | | |

Notes:

Emissions assumed to be evenly distributed over each construction areas

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

## Heidorn Village, Antioch, CA - Construction Health Impact Summary

### Maximum Residential Impacts - Unmitigated

| Construction Year | Unmitigated Emissions | | | | | |
|---|---|---|---|---|---|---|
| | Maximum Concentrations | | Cancer Risk (per million) | | Hazard Index (-) | Maximum Annual PM2.5 Concentration (µg/m$^3$) |
| | Exhaust PM2.5/DPM (µg/m$^3$) | Fugitive PM2.5 (µg/m$^3$) | Child | Adult | | |
| 2015 | 0.1120 | 0.0895 | 9.81 | 0.51 | 0.022 | 0.202 |
| 2016 | 0.1462 | 0.0126 | 12.80 | 0.67 | 0.029 | 0.159 |
| Total | - | - | **22.61** | **1.2** | - | - |
| Maximum Annual | 0.1462 | 0.0895 | - | - | **0.029** | **0.20** |

### Maximum Residential Impacts - Mitigated

| Construction Year | Mitigated Emissions | | | | | |
|---|---|---|---|---|---|---|
| | Maximum Concentrations | | Cancer Risk (per million) | | Hazard Index (-) | Maximum Annual PM2.5 Concentration (µg/m$^3$) |
| | Exhaust PM2.5/DPM (µg/m$^3$) | Fugitive PM2.5 (µg/m$^3$) | Child | Adult | | |
| 2015 | 0.0402 | 0.0249 | 3.52 | 0.18 | 0.008 | 0.065 |
| 2016 | 0.0542 | 0.0126 | 4.75 | 0.25 | 0.011 | 0.067 |
| Total | - | - | **8.26** | **0.4** | - | - |
| Maximum Annual | 0.0542 | 0.0249 | - | - | **0.011** | **0.07** |

### Maximum Impacts at Heritage Baptist Academy - Student Receptors

| Construction Year | UNMITIGATED | | | | |
|---|---|---|---|---|---|
| | Maximum Concentrations | | Student Cancer Risk (per million) | Hazard Index (-) | Maximum Annual PM2.5 Concentration (µg/m$^3$) |
| | Exhaust PM2.5/DPM (µg/m$^3$) | Fugitive PM2.5 (µg/m$^3$) | | | |
| 2015 | 0.0776 | 0.0615 | 2.04 | 0.016 | 0.139 |
| 2016 | 0.1013 | 0.0087 | 2.66 | 0.020 | 0.110 |
| Total | - | - | **4.70** | - | - |
| Maximum Annual | 0.1013 | 0.0615 | | **0.020** | **0.139** |

**Heidorn Village, Antioch, CA - Construction Impacts**
**Maximum DPM Cancer Risk Calculations From Construction**
**Off-Site Residential Receptor Locations - 1.5 meters**

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

Inhalation Dose = $C_{air}$ x DBR x A x EF x ED x $10^{-6}$ / AT

Where: $C_{air}$ = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
$10^{-6}$ = Conversion factor

**Values**

| Parameter | Child | Adult |
|---|---|---|
| CPF = | 1.10E+00 | 1.10E+00 |
| DBR = | 581 | 302 |
| A = | 1 | 1 |
| EF = | 350 | 350 |
| AT = | 25,550 | 25,550 |

**Construction Cancer Risk by Year - Maximum Impact Receptor Location**

| | | Child - Exposure Information | | | Child | Adult - Exposure Information | | | Adult | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Exposure Year** | **Exposure Duration (years)** | **DPM Conc (ug/m3) Year** | **Annual** | **Exposure Adjust Factor** | **Cancer Risk (per million)** | **Modeled DPM Conc (ug/m3) Year** | **Annual** | **Exposure Adjust Factor** | **Cancer Risk (per million)** | **Fugitive PM2.5** | **Total PM2.5** |
| 1 | 1 | 2015 | 0.1120 | 10 | 9.81 | 2015 | 0.1120 | 1 | 0.51 | 0.0895 | 0.202 |
| 2 | 1 | 2016 | 0.1462 | 10 | 12.80 | 2016 | 0.1462 | 1 | 0.67 | 0.0126 | 0.159 |
| 3 | 1 | | 0.0000 | 4.75 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 4 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 5 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 6 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 7 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 8 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 9 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 10 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 11 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 12 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 13 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 14 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 15 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 16 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 17 | 1 | | 0.0000 | 1.5 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 18 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| 65 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 66 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 67 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 68 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 69 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 70 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| **Total Increased Cancer Risk** | | | | | **22.61** | | | | **1.18** | | |

## Heidorn Village, Antioch, CA - Construction Impacts- Mitigated Emissions
## Maximum DPM Cancer Risk Calculations From Construction
## Off-Site Residential Receptor Locations - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(\text{mg/kg-day})^{-1}$

Inhalation Dose = $C_{air}$ x DBR x A x EF x ED x $10^{-6}$ / AT

Where: $C_{air}$ = concentration in air ($\mu g/m^3$)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

AT = Averaging time period over which exposure is averaged.

$10^{-6}$ = Conversion factor

**Values**

| Parameter | Child | Adult |
|---|---|---|
| CPF = | 1.10E+00 | 1.10E+00 |
| DBR = | 581 | 302 |
| A = | 1 | 1 |
| EF = | 350 | 350 |
| AT = | 25,550 | 25,550 |

### Construction Cancer Risk by Year - Maximum Impact Receptor Location

| | | Child - Exposure Information | | | Child | Adult - Exposure Information | | | Adult | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exposure | | | Exposure | Cancer | Modeled | | Exposure | Cancer | Mitigated | |
| Exposure | Duration | DPM Conc (ug/m3) | | Adjust | Risk | DPM Conc (ug/m3) | | Adjust | Risk | Fugitive | Total |
| Year | (years) | Year | Annual | Factor | (per million) | Year | Annual | Factor | (per million) | PM2.5 | PM2.5 |
| 1 | 1 | 2015 | 0.0402 | 10 | 3.52 | 2015 | 0.0402 | 1 | 0.18 | 0.0249 | 0.065 |
| 2 | 1 | 2016 | 0.0542 | 10 | 4.75 | 2016 | 0.0542 | 1 | 0.25 | 0.0126 | 0.067 |
| 3 | 1 | | 0.0000 | 4.75 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 4 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 5 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 6 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 7 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 8 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 9 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 10 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 11 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 12 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 13 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 14 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 15 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 16 | 1 | | 0.0000 | 3 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 17 | 1 | | 0.0000 | 1.5 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 18 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | | |
| 65 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 66 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 67 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 68 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 69 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| 70 | 1 | | 0.0000 | 1 | 0.00 | | 0.0000 | 1 | 0.00 | | |
| **Total Increased Cancer Risk** | | | | | **8.26** | | | | **0.43** | | |

## Heidorn Village, Antioch, CA - Construction Impacts
## Maximum DPM Cancer Risk Calculations From Construction
## Heritage Baptist Academy - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

Inhalation Dose = $C_{air}$ x DBR x A x EF x ED x $10^{-6}$ / AT

Where: $C_{air}$ = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
$10^{-6}$ = Conversion factor

**Values**

| Parameter | Child | Adult |
|---|---|---|
| CPF = | 1.10E+00 | 1.10E+00 |
| DBR = | 581 | 302 |
| A = | 1 | 1 |
| EF = | 350 | 350 |
| AT = | 25,550 | 25,550 |

### Construction Cancer Risk by Year - Student Exposure

| | Exposure | Student - Exposure Information | | | Student | | |
|---|---|---|---|---|---|---|---|
| | Exposure | | | Exposure | Cancer | | |
| | Duration | DPM Conc (ug/m3) | | Adjust | Risk | Fugitive | Total |
| **Year** | **(years)** | **Year** | **Conc** | **Factor*** | **(per million)** | **PM2.5** | **PM2.5** |
| 1 | 1 | 2015 | 0.0776 | 3 | 2.04 | 0.0615 | 0.139 |
| 2 | 1 | 2016 | 0.1013 | 3 | 2.66 | 0.0087 | 0.110 |
| 3 | 1 | | 0.0000 | 3 | 0.00 | | |
| 4 | 1 | | 0.000 | 3 | 0.00 | | |
| 5 | 1 | | 0.000 | 3 | 0.00 | | |
| 6 | 1 | | 0.000 | 3 | 0.00 | | |
| 7 | 1 | | 0.000 | 1 | 0.00 | | |
| 8 | 1 | | 0.000 | 1 | 0.00 | | |
| 9 | 1 | | 0.000 | 1 | 0.00 | | |
| 10 | 1 | | 0.000 | 1 | 0.00 | | |
| 11 | 1 | | 0.000 | 1 | 0.00 | | |
| 12 | 1 | | 0.000 | 1 | 0.00 | | |
| 13 | 1 | | 0.000 | 1 | 0.00 | | |
| 14 | 1 | | 0.000 | 1 | 0.00 | | |
| 15 | 1 | | 0.000 | 1 | 0.00 | | |
| 16 | 1 | | 0.000 | 1 | 0.00 | | |
| 17 | 1 | | 0.000 | 1 | 0.00 | | |
| 18 | 1 | | 0.000 | 1 | 0.00 | | |
| .• | .• | .• | .• | .• | .• | | |
| .• | .• | .• | .• | .• | .• | | |
| .• | .• | .• | .• | .• | .• | | |
| 65 | 1 | | 0.000 | 1 | 0.00 | | |
| 66 | 1 | | 0.000 | 1 | 0.00 | | |
| 67 | 1 | | 0.000 | 1 | 0.00 | | |
| 68 | 1 | | 0.000 | 1 | 0.00 | | |
| 69 | 1 | | 0.000 | 1 | 0.00 | | |
| 70 | 1 | | 0.000 | 1 | 0.00 | | |
| **Total Increased Cancer Risk** | | | | | **4.7** | | |

* Assumes that students at school are 16 years of age or younger for entire construction period

# Appendix B: Biological Evaluation Report

PACIFIC BIOLOGY
635 Carmel Avenue, Albany, CA 94706

# HEIDORN VILLAGE PROJECT

# BIOLOGICAL EVALUATION REPORT

**PREPARED FOR:**

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**1814 Franklin Street, Suite 1000**
**Oakland, CA 94612**

**PREPARED BY:**

**Pacific Biology**
**635 Carmel Avenue**
**Albany, CA 94706**
**Contact: Josh Phillips**
**510/527-1008**

**September 2014**

## INTRODUCTION

Pacific Biology conducted a Biological Habitat Evaluation for the Heidorn Village project site. The evaluation was conducted to provide CirclePoint with biological resources information for the California Environmental Quality Act (CEQA) document being prepared. The focus of the biological evaluation was to describe the biological resources present, identify any sensitive biological resources present or potentially present, identify project-related impacts to biological resources that could be considered significant under CEQA, and to recommend avoidance or mitigation measures that should be implemented to address potential impacts to biological resources.

The project site is 20.3 acres in size and is located in Antioch, California. As shown in **Figures 1** and **2**, the project site is bordered to the east by a church/school and Heidorn Ranch Road, to the west by single-family residences (along Summerfield Drive), to the north by a paved pedestrian/bicycle path (and Sungrove Way further to the north), and undeveloped agricultural land to the south. Prewett Ranch Drive terminates at the southwestern corner of the project site. The project site is located on the Antioch South 7.5-minute USGS quadrangles.

## METHODOLOGY

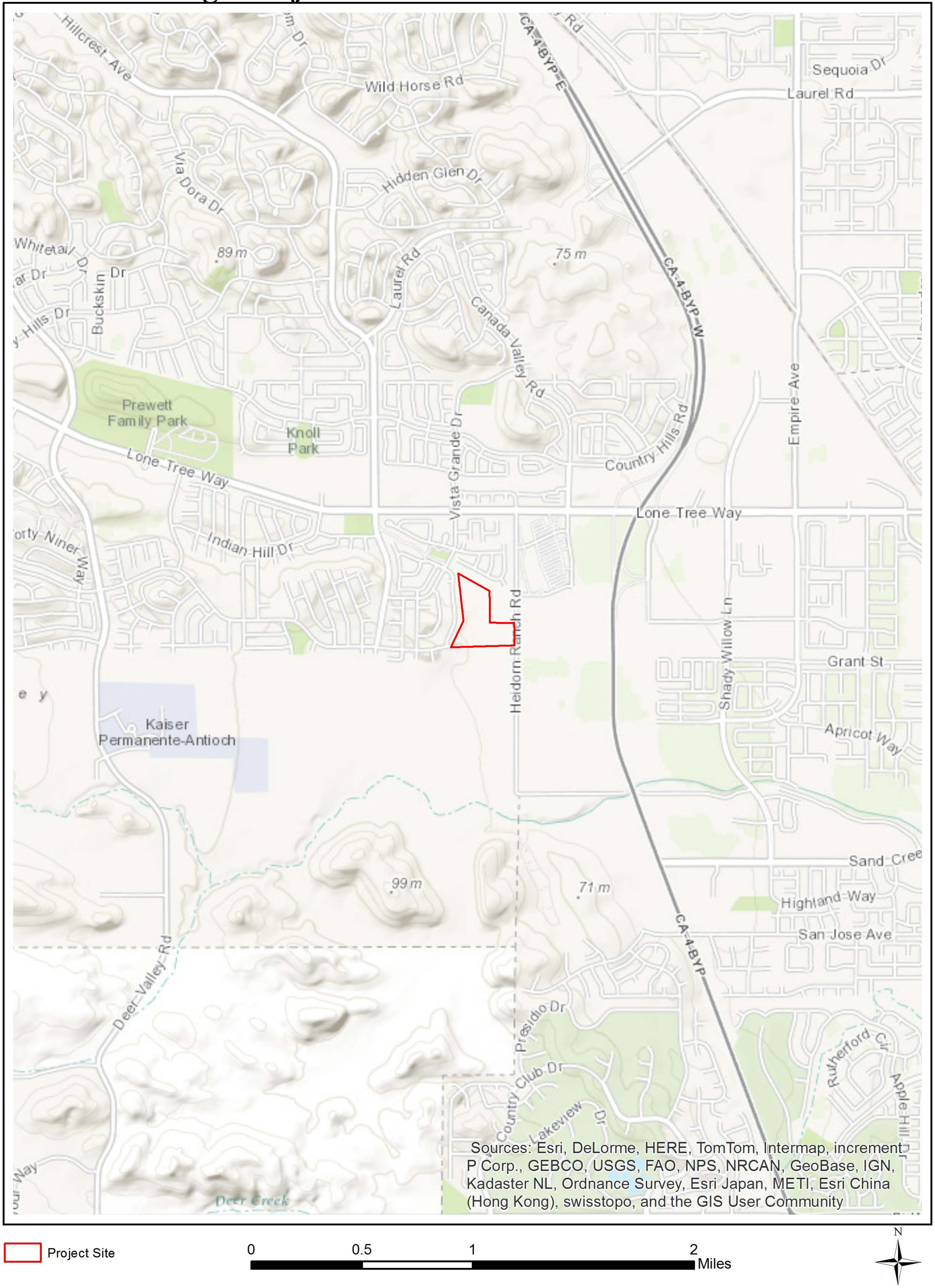
### Database Review

The latest version of the California Natural Diversity Data Base (CNDDB 2014) was reviewed for the project site and a surrounding five-mile area. The intent of the database review was to identify all documented occurrences of special-status species in the project area and to determine their locations relative to the project site.

### Reconnaissance-Level Field Surveys

Pacific Biology conducted a reconnaissance-level survey of the project site on September 9, 2014. The habitats and plant communities present were characterized, and an evaluation of the potential of special-status plant and wildlife species and other sensitive biological resources (e.g., jurisdictional wetlands) to occur was conducted. Pacific Biology also conducted reconnaissance-level surveys on the site on February 9 and 24, 2009; these surveys were conducted for a project previously proposed on the site and information from those site visits is used to supplement this analysis as appropriate.

# FIGURE 1: REGIONAL LOCATION
## Heidorn Village Project



Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

# FIGURE 2: PROJECT SITE
## Heidorn Village Project

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

## GENERAL BIOLOGICAL CONDITIONS

### Project Site

The project site was used as an orchard until 2003 and has been graded. The site was cleared of trees in 2003 and irrigation of the site ceased at that time. Since 2003, the project site has and continues to be regularly disked, as evidenced by the soil condition and almost complete absence of vegetation at the time of the site visit. At the time of the September 2014 site visit, disking had recently occurred and vegetation on the site was limited to several stinkwort (*Dittrichia graveolens*) plants, an invasive species. Non-native grasses and ruderal (i.e., weedy) species occur along the outer margins of the property (near existing fence lines), including species such as ripgut brome (*Bromus diandrus*), wild oat (*Avena* sp.), storks-bill (*Erodium botrys*), and mustard (*Brassica* sp.).

**Photo 1: Representative photo of project site; view north**

**Photo 2: Representative photo of project site; view south**

A drainage ditch is located on the project site that generally follows the southern boundary of the church/school. The drainage ditch is an earthen channel that is approximately 1-2 feet wide and 2-feet deep. The drainage ditch was completely dry at the time of the September 2014 site visit. It is connected to the roadside gutter along Heidorn Ranch Road, and it is expected that the ditch only contains water during storm events. Vegetation within the channel includes annual grasses, ruderal species, and some marginal wetland-associated species such as Italian ryegrass and curly dock (*Rumex crispus*). There are several small walnut trees bordering the drainage channel; these trees are likely remnant stock from when the site was used as an orchard.

**Photo 3: Representative photo of drainage ditch; view east**

Surrounding Area

The project site is bordered by dense residential development to the north and west (Figure 2). Some undeveloped land occurs to the east of the project site, but this land is crossed by heavily traveled roads (including Highway 4-Bypass Road) and contains areas of relatively dense urban and commercial development. A large expanse of undeveloped land occurs directly to the south of the project site, which includes agricultural lands, Los Vaqueros Reservoir and eventually reaches Livermore. At its closest point, Sand Creek is located approximately 0.5 mile to the south of the project site, and there are no barriers between the creek and the project site (Figure 2). However, the land between the creek and the project site appears to be in agricultural use, was recently disked at the time of the site visit, and vegetation was generally absent.

There is a small detention basin to the south of the project site, near Prewett Ranch Road (Figure 2). At the time of the field survey, the basin was completely dry. However, given the topography of the basin and the presence of cracks in the soil (an indication clay soils), it is expected that the detention basin holds water for periods of time during the wet season. Vegetation present in the basin included marginal wetland species such curly dock and flat sedge (*Cyperus* sp.), but species associated with longer ponding durations (i.e., cattails) were absent. The primary water source of the basin appears to be a culvert that conveys storm-water and irrigation runoff from the nearby residential development.

## SENSITIVE BIOLOGICAL RESOURCES AND AVOIDANCE MEASURES

### Special-Status Wildlife Species

The latest version of the CNDDB was reviewed to identify documented occurrences of special-status wildlife species from the project area (i.e., within approximately 3 miles of the project site). The following special-status wildlife species are known from the surrounding project area: California red-legged frog, California tiger salamander, vernal pool fairy shrimp, vernal pool tadpole shrimp, San Joaquin kit fox, Swainson's hawk, burrowing owl, American badger, white-tailed kite, loggerhead shrike, and tricolored blackbird. The potential onsite occurrence of these species is further discussed below, and the locations of special-status species documented within approximately 3 miles of the project site are shown in **Figure 3**.

### (i) Federally and/or State Listed Wildlife Species

California Red-Legged Frog

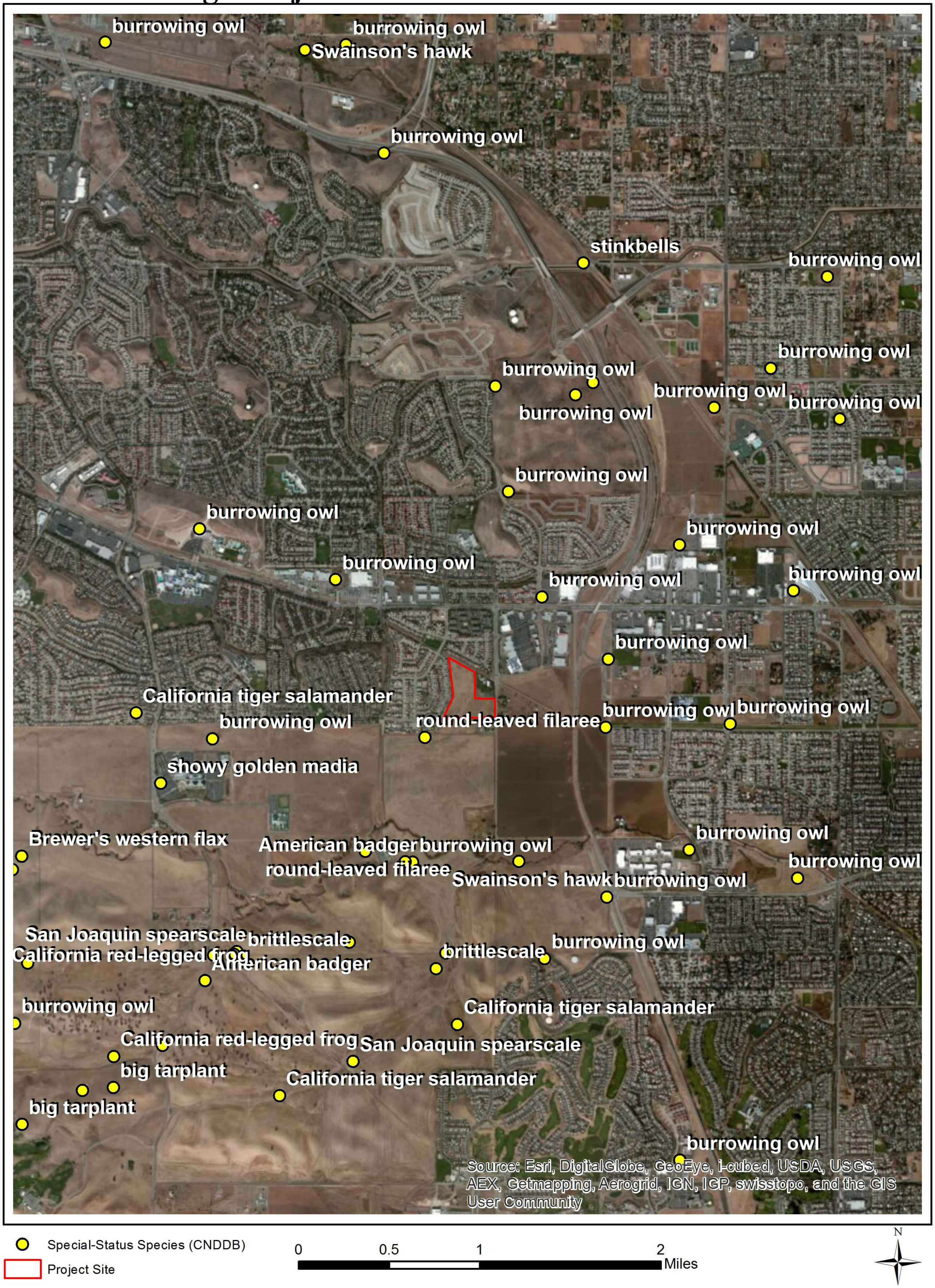
*Background Information*

The California red-legged frog (*Rana draytonii*) is a federally-listed Threatened species and a California Species of Special Concern. Breeding occurs in streams, deep pools, backwaters within streams and creeks, ponds, marshes, sag ponds, dune ponds, lagoons, and stock ponds. California red-legged frog can occur in ephemeral ponds or permanent streams and ponds; however populations probably cannot persist in ephemeral streams (Jennings and Hayes 1985). The species generally avoids large river channels with widely fluctuating flows because such habitat does not permit successful reproductive activity (Hayes and Jennings 1988).

Breeding adults are often associated with deep (greater than 2 feet [0.7 meter]) still or slow moving water and dense, shrubby riparian or emergent vegetation (Hayes and Jennings 1988), but frogs have been observed in shallow sections of streams and ponds that are devoid of vegetative cover. Habitats with the highest densities of frogs are deep-water ponds with dense stands of overhanging willows and a fringe of cattails between the willow roots and overhanging willow limbs (Jennings 1988; Rathbun *et al*. 1993).

# FIGURE 3: LOCAL CNDDB MAP

## Heidorn Village Project



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

This semi-aquatic species also utilizes non-aquatic habitats for refuge and dispersal. It rests and feeds in riparian vegetation and the moisture and cover of the riparian zone may facilitate dispersal. The species has also been documented dispersing through areas with sparse vegetative cover and dispersal patterns are considered to be dependent on habitat availability and environmental conditions (Scott *et. al.* 1998). During periods when water is absent, California red-legged frogs may take refuge in moist areas within riparian habitats and small mammal burrows in surrounding upland areas.

*Occurrences in Project Area*

As shown in Figure 3, California red-legged frogs have been documented in locations to the south and west of the project site. The closest of these locations (CNDDB Occurrence #933) is located approximately 1.7 miles to the southwest of the project site. This occurrence is from Sand Creek, just east of Deer Valley Road.

*Status on Project Site*

The project site does not provide suitable California red-legged frog habitat given that it is regularly disked and lacks long-lasting aquatic features. It should be noted that shallow ponding was observed on portions of the project site during a period of heavy rain in February of 2009. The observed pools were shallow (less than 12-inches) and short lasting (likely only several weeks during rainy periods). These pools were not deep enough and did not hold water for sufficient duration to support California red-legged frog breeding. Additionally, it is not known if ponding would still occur on the site should heavy rain occur, as the site has continued to be disked since 2009 and no evidence of ponding (i.e., cracked soils, wetland vegetation) was observed during September 2014 site visit.

The project site also does not contain any woodland areas or springs that would provide typical refuge habitat for the species during dry periods. While ground squirrel burrows are present, it is very unlikely that red-legged frogs would use these burrows for refuge for the following reasons: (1) the project site is regularly disked; (2) the project site is greater than 0.5 mile from the closest suitable breeding habitat (i.e., Sand Creek); (3) portions of Sand Creek are perennial (thus the species would not need to move relatively long distances to marginal refuge habitat); and (4) the project site is not located between aquatic habitats and is not part of an expected dispersal pathway.

However, given that California red-legged frogs are known from Sand Creek, and that Sand Creek is located 0.5 mile to the south of the project site and no barriers to movement are present, it is possible that dispersing frogs could infrequently occur on the project site. This would be most likely to occur during periods of rain when red-legged frogs are known to disperse across upland habitats. Also, the detention basin adjacent to the south of the project site could potentially attract frogs from nearby Sand Creek. If frogs occupy the basin, it is possible that they could disperse from the basin and temporarily occur within the project boundaries. While it is possible that red-legged frogs could disperse onto the project site and temporarily occur, the potential of this occurring is considered to be low.

*Potential Project Impacts*

There is a low potential that individual California red-legged frogs could disperse from Sand Creek and temporarily occur on the project site. There is also potential that individual frogs could disperse from the adjacent detention basin (if the species is present) and temporarily occur on the project site. The possibility of frogs to disperse onto the project site would be the highest during and immediately following rain when the species is more likely to disperse across upland habitats. In the event that individual California red-legged frogs are present during construction activities, individual frogs could be harmed. Therefore, construction-related impacts to California red-legged frog may be considered a potentially significant impact under CEQA.

*Recommended Avoidance Measure*

The implementation of the following avoidance measure would protect California red-legged frogs from harm during construction activities and reduce related impacts to a less than significant level.

1) Prior to the commencement of construction activities, temporary exclusionary fencing will be installed along the southern property boundary of the project, which separates the project site from the adjacent detention basin and Sand Creek. The fencing will be installed in a manner to prevent California red-legged frogs from dispersing from the detention basin or Sand Creek into the construction zone. The fencing will be maintained throughout the duration of construction activities. The adequacy of the fencing to prevent frogs from entering the construction zone will be approved by a qualified biologist (subject to the approval of the City of Antioch) prior to the commencement of construction activities.

   The qualified biologist will also survey the construction zone to ensure that no frogs were trapped in the construction zone during the installation of the exclusionary fencing. Should a California red-legged frog be observed during the survey, the

> USFWS will be immediately contacted and construction activities will be halted. Any California red-legged frogs present may only be removed by a permitted biologist (authorized by the USFWS). Construction activities may only proceed once it is determined by the qualified biologist that California red-legged frogs are not present in the construction zone.

### California Tiger Salamander

#### *Background Information*

The California tiger salamander (*Ambystoma californiense*) is a federally- and state-listed Threatened species. The California tiger salamander (CTS) is a relatively large, mostly terrestrial salamander. Sexually mature adults move at night (generally during rain events) from underground refugia (e.g., squirrel burrows) to breeding ponds from late November to early March. The species may move distances up to 1.24 miles from upland refugia to a breeding pool (USFWS 2003a), but the distance is normally less when there are large numbers of refuge sites in close proximity to breeding sites. Vernal pools or seasonal ponds are used for breeding, which occurs from late winter into early spring. The species also breeds in man-made ponds including stock ponds, reservoirs, and small lakes.

After breeding, the adults then return to their underground burrows. The eggs then hatch and the resulting gilled aquatic larvae metamorphose into juveniles. Beginning in late spring and early summer, juveniles migrate from the ponds into underground burrows often created by ground squirrels and other rodent or man-made structures where they remain until the dry season ends.

#### *Occurrences in Project Area*

As shown in Figure 3, numerous occurrences of California tiger salamander have been documented to the south and west of the project site. The two closest occurrences (CNDDB Occurrence #479 and #856) are located approximately 1.6 miles to the west and south of the project site. This distance is slightly greater than 1.24-miles, which is the maximum distance the species is known to move between breeding ponds and upland habitat.

#### *Status on Project Site*

The project site does not contain suitable breeding or upland habitat for California tiger salamander. The project site is regularly disked, which precludes its successful use by CTS as upland habitat. The agricultural fields bordering the project site to the south are also regularly disked. The species requires standing water for a minimum of 12 consecutive weeks, and the onsite ponding observed in 2009 occurred for a much shorter duration. It is also not expected that the detention basin adjacent to the south of the project site would be used by California tiger salamanders; the pond is surrounded by large expanses of agricultural lands that are regularly disked, and therefore, suitable upland habitat (an essential habitat component) is not present.

*Potential Project Impacts*

No project-related impacts to California tiger salamander are expected to occur.

*Recommended Mitigation Measures*

No mitigation measures are required.

### Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

*Background Information*

Vernal pool fairy shrimp (*Branchinecta Lynchi*) is a federally Threatened species and vernal pool tadpole shrimp (*Lepidurus Packardi)* is a federally Endangered species. These branchiopod species are associated with seasonal water features, including vernal pools and seasonal wetlands. These species lay cysts that remain dormant in soils when pools are dry and hatch when pools become inundated.

Vernal pool fairy shrimp can be found in a variety of vernal pool habitats, including small, clear, sandstone rock pools and large, turbid, alkaline, grassland valley floor pools (USFWS 2003b). The species tends to occur in smaller pools, and is most commonly found in pools that are less than 0.05 acres in grass or mud-bottomed swales or basalt flow depression pools in unplowed grasslands (USFWS 2003b). Vernal pool tadpole shrimp are generally found in vernal pools with clear to highly turbid water. They have been observed in pools ranging in size from 54 square feet to 89 acres.

*Occurrences in Project Area*

As shown in Figure 3, several occurrences of vernal pool fairy shrimp have been documented near the project site. Based on the CNDDB, the closest documented occurrence of vernal pool fairy shrimp is from approximately 2.5 miles to the southwest of the project site. This occurrence (CNDDB Occurrence #354) is located between Lone Tree Valley and Horse Valley within a northern claypan vernal pool. Based on the CNDDB, there is only one documented occurrence of vernal pool tadpole shrimp in Contra Costa County. This occurrence (CNDDB Occurrence #177) is from approximately 3.5 miles west of the project site, on the east side of Empire Mine Road.

Status on the Project Site

As previously discussed, shallow ponding was observed on portions of the project site during a period of heavy rain in February of 2009. The observed pools were shallow (less than 12-inches) and short lasting (likely only several weeks during rainy periods). Water was first observed in the pools during the February 9, 2009 field survey, and water was still present during the field survey conducted on February 24, 2009. This period exceeds two weeks, so the pools may provide potential habitat for the species. However, the period between February 9 and 24, 2009, was characterized by multiple days of heavy rain and the pools may not persist for prolonged periods in the absence of near continual rain. Vegetation within the pools was sparse and did not differ from the surrounding area, which indicates that the pools only recently filled, did not hold water for long enough periods to develop wetland-associated vegetation, and that the presence of standing water may closely coincide with storm events. It is not known if ponding would still occur on the site should heavy rain occur, as the site has continued to be disked since 2009 and no evidence of ponding (i.e., cracked soils, wetland vegetation) was observed during the September 2014 site visit.

If water still ponds on the site during heavy rain events, the quality of the habitat for vernal pool fairy and tadpole shrimp is compromised by the following factors: (1) the pools (observed in 2009) are within a field that is regularly disked and that was previously an orchard, and (2) the water source of the pools appeared to primarily be stormwater runoff from the road (which is carried to the pools from the onsite drainage ditch). Given the above, it is considered unlikely that suitable habitat for vernal pool fairy shrimp and/or tadpole shrimp occurs on the project site. However, further evaluation would be required to confirm this conclusion.

Potential Project Impacts

While it is unlikely that suitable habitat is present for vernal pool branchipods, further analysis is required to confirm this finding. Therefore, if present, the proposed project could result in the loss of federally listed vernal pool branchiopods and their habitat. Any loss of vernal pool fairy or tadpole shrimp would be considered a significant impact under CEQA.

Recommended Mitigation Measures

The project applicant should implement Measure 2A, and implement Measure 2B only if suitable habitat for vernal pool branchiopods is found to be present. Measure 2C would only be required in the unlikely event that federally listed vernal pool branchiopods are detected on the site or if the presence of the species is assumed (in lieu of conducting Measures 2A and/or 2B). The implementation of the below measures would reduce related impacts to a less than significant level.

2A) The project site should be monitored during the winter of 2014/2015 to determine if suitable habitat for vernal pool branchiopods occurs on the project site. Suitable habitat would include pools that persist for a minimum of three weeks before drying. If suitable habitat is found not to be present, then no further actions are required.

2B) If it is found that suitable habitat is present, then protocol surveys for vernal pool fairy shrimp and tadpole shrimp should be conducted prior to the construction of the proposed project. These surveys may be conducted concurrently with Measure 2A, above. The surveys would be conducted according to the accepted USFWS survey protocol, which includes either two wet season surveys (with eight individual surveys per wet season), or one wet season survey followed by a dry season survey. If no vernal pool fairy shrimp or tadpole shrimp are observed during the surveys, then no further action would be required. If federally-listed fairy shrimp are detected during the surveys, then the compensation outlined below in Mitigation Measure 2C would be implemented.

2C) The loss of vernal pool fairy and tadpole shrimp habitat would be compensated for by purchasing credits at a 3:1 ratio at an USFWS-approved mitigation bank. The amount of project-related habitat loss may be determined as follows: (1) any areas of suitable habitat (i.e., ponding for at least 3 weeks) on the site will be mapped during the winter months and may be assumed to be occupied habitat; or (2) the area of habitat found to be occupied during the implementation of Measure 2B (see above) would be

> compensated for. The availability of credits at an USFWS-approved mitigation bank must be demonstrated prior to the issuance of a grading permit, or other equivalent compensation must be approved by the USFWS.

## San Joaquin Kit Fox

### *Background Information*

The San Joaquin kit fox (*Vulpes macrotis utica*) is a federally Endangered and state Threatened species. The species is generally associated with annual grasslands or grassy open stages with scattered shrubby vegetation. The species requires loose-textured sandy soils for burrowing, and a suitable prey base. Kit fox are known to prey on ground squirrels and to occupy enlarged ground squirrel burrows. The species may also be found in manmade structures, including abandoned pipelines, banks in roadbeds or sumps, and culverts (USFWS 1998). Dens are critical for protection from predators, but also provide shelter from inclement weather and thermal regulation. The species typically occupies a number of dens at any one time and may change dens often throughout the year.

### *Occurrences in Project Area*

Based on the CNDDB, the closest documented occurrence of San Joaquin kit fox to the project site is located approximately 5 miles to the west of the project site. This occurrence (CNDDB Occurrence #21) was recorded from 1995 at the southern end of the Contra Loma Reservoir. The species has also been documented approximately 5 miles to the south of the project site. This occurrence (CNDDB Occurrence #936) occurred during the period of 1972 to 1975. San Joaquin kit fox was last documented at Black Diamond Mines Regional Preserve (approximately 6 miles west of the project site) in 1999. The species has not been documented in the general project area since 1999.

As discussed in the *Conservation of San Joaquin Kit Foxes in Western Merced County, California* prepared by the California State University Stanislaus Endangered Species Recovery Program (May 2009), the current status of San Joaquin kit fox in the northern range (including the project area) is unclear.

> *"The status of kit foxes from Santa Nella northward is unclear. This region is commonly referred to as the "northern range", and even the historical distribution and abundance of kit foxes in this region is uncertain. Grinnell et al. (1937) found little evidence of kit foxes north of Merced County. They speculated that the historic range may have extended further to the north along the west side of the San Joaquin Valley, but offered no*

> *information to support this other than the location for the type specimen near Tracy in San Joaquin County (Merriam 1902).”*
>
> *“An extensive survey was conducted throughout the northern range during May 2001-February 2003. This effort likely constitutes the most comprehensive survey conducted to date in the northern range. Trained scat-detection dogs were used to survey 213 km of transects on 24 different properties. Of 17 fox scats found and genetically identified to species, all were from red foxes (Smith et al. 2006). No kit fox scats were located.”*
>
> *“Available data offers little support for the presence of resident kit fox populations in the northern range. Currently, kit fox presence in the northern range may consist primarily of occasional dispersing animals from populations to the south of Santa Nella. It is conceivable that such animals might even persist for multiple years resulting in reports of sightings. However, there have been no recent and indeed only two historical records of documented reproduction by kit foxes in the northern range. If self-supporting kit fox populations are not present in the northern range, then this region could be functioning as a dispersal sink, as suggested by Smith et al. (2006).”*

*Status on the Project Site*

San Joaquin kit fox is not expected to occur on the project site for the following reasons: (1) the project site is regularly disked, which limits the abundance of prey and potential den sites; (2) the species has not been documented in the project area in approximately 15 years; (3) the project site is not part of an expected movement corridor for the species as it is bordered on three sides by development; and (4) dogs from the adjacent residential developments and bike path occur on the project site and chase wildlife (such as jackrabbits and ground squirrels).

*Potential Project Impacts*

No project-related impacts to San Joaquin kit fox are expected to occur.

*Recommended Mitigation Measures*

No mitigation measures are required.

### Swainson’s Hawk

*Background Information*

Swainson’s hawk (*Buteo swainsoni*) is a state Threatened species and a federal Bird of Conservation Concern. This species nests in western North America from March to July and migrates to South America for the winter starting in August. The species generally nests in riparian areas or in large isolated trees adjacent to or within easy flying distance to agricultural areas providing suitable foraging habitat. Valley oaks (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*), willows (*Salix* spp.), sycamores (*Platanus* spp.), and walnuts (J*uglans* spp.) are the preferred nest trees for Swainson's hawk (Bloom 1980, Estep 1989). The California Department of Fish and Wildlife (CDFG 1994), has identified the following vegetation types/agricultural crops as foraging habitat for Swainson's hawk: alfalfa; fallow fields; beet, tomato, and other low-growing row or field crops; dry-land and irrigated pasture, rice land (when not flooded); and cereal grain crops (including corn after harvest). Given the importance of available foraging habitat for successful nesting, the CDFW has developed policies to protect suitable Swainson's hawk foraging habitat within a 10-mile radius of an active nest (i.e., a nest used during one or more of the last five years).

*Occurrences in the Project Area*

Swainson's hawks are known to nest in the greater project area (Figure 3). Based on the CNDDB, the closest documented nesting of occurrence (CNDDB Occurrence #1681) is located approximately 0.8 mile south of the project site along Sand Creek. Two adults were observed nesting at this location in 2007. It is not known if recent surveys have been conducted of the nest and if the nest is still active. Another nest has been documented approximately 3.5 miles north of the project site (CNDDB Occurrence #1804). According to the CNDDB, this nest was active in 2011 and 2012, but was not active in 2013. The current status of the nest is also not known.

*Status on Project Site*

Suitable nesting habitat is not present on the project site as there are no trees of adequate size to support nesting. However, the species could nest near (within 500 feet of) the project site in the large eucalyptus trees along Heidorn Ranch Road. Additionally, as the project site contains suitable foraging habitat and is within 1-mile of a potentially active nest and 3.5 miles of another potentially active nest, Swainson's hawks could forage on the project site.

*Potential Project Impacts*

The proposed project would not result in the direct loss of an active Swainson's hawk nest, as suitable nesting habitat is not present on the project site. However, should an active nest of the species be present within 500-feet of the project site (in the off-site eucalyptus trees along Heidorn Ranch Road), construction-related activities could result in the noise-related abandonment of the nest. Additionally, given the importance of nearby foraging habitat for successful nesting, the CDFW has developed recommendations to protect suitable Swainson's hawk foraging habitat within a 10-mile radius of an active nest (a nest used during one or more of the last five years). It is not known if either of the Swainson's hawk nest sites recorded by the CNDDB in the project area are still actively used. If either of these nest sites is still active, the project site will likely be considered to provide Swainson's hawk foraging habitat by the CDFW. Therefore, the potential noise-related abandonment of an active Swainson's hawk nest and the potential loss of 20.3 acres of foraging habitat would be considered significant impacts under CEQA.

Recommended Mitigation Measures

The implementation of the below measures would reduce potential impacts to Swainson's hawks to a less than significant level.

3A) If construction would commence anytime during the nesting/breeding season of native bird species potentially nesting on or near the site (typically February through August in the project region), a pre-construction survey of the project vicinity for nesting birds shall be conducted.

This survey shall be conducted by a qualified biologist (experienced with the nesting behavior of bird species of the region) within 14 days of the commencement of construction activities that would occur during the nesting/breeding season. The intent of the survey shall be to determine if active nests of special status bird species or other species protected by the Migratory Bird Treaty Act and/or the California Fish and Game Code are present within the construction zone or within 500 feet of the construction zone. The survey area shall include all trees and shrubs, as well as fallow fields (which could be utilized by burrowing owls) in the construction zone and a surrounding 500 feet area (were access is possible). The surveys shall be timed such that the last survey is concluded no more than two weeks prior to initiation of construction or tree removal. If ground disturbance activities are delayed following a survey, then an additional pre-construction survey shall be conducted such that no more than two weeks will have elapsed between the last survey and the commencement of ground disturbance activities.

If active nests are found in areas that could be directly affected or are within 500 feet of construction and would be subject to prolonged construction-related noise, a no-disturbance buffer zone shall be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them will be determined by taking into account factors such as the following:

- Noise and human disturbance levels at the construction site at the time of the survey and the noise and disturbance expected during the construction activity;
- Distance and amount of vegetation or other screening between the construction site and the nest; and
- Sensitivity of individual nesting species and behaviors of the nesting birds.

Limits of construction to avoid an active nest shall be established in the field with flagging, fencing, or another appropriate barrier, and construction personnel shall be instructed on the sensitivity of nest areas. The biologist will serve as a construction monitor during those periods when construction activities would occur near active nest areas of special-status bird species to ensure that no impacts on these nests occur.

3B) The CDFW will be contacted to determine if the Swainson's hawk nests documented in project area are still considered to be "active" based on the most recent survey information available. If it is determined that the project site is within 10 miles of an active Swainson's hawk nest, the applicant will mitigate for the loss of suitable Swainson’s hawk foraging habitat by implementing <u>one</u> of the below measures. Measures “a”, “b”, and "c" are generally recommended by the CDFW (CDFG 1994), while measure “d” could benefit the species given the effort to acquire land in the project region as part of the East Contra Costa County Habitat Conservation Plan (ECCCHCP):

a. **Active nest identified within 1 mile of project site**. One acre of suitable foraging habitat shall be protected for each acre of suitable foraging habitat developed. At least 10% of the land requirements shall be met by fee title acquisition or a conservation easement allowing the active management of the habitat, with the remaining 90% of the protected land protected by a conservation easement (subject to CDFW approval); or

   One-half acre of suitable foraging habitat shall be protected for each acre of suitable foraging habitat developed. All of the land requirements shall be met by fee title acquisition or a conservation easement (subject to CDFW approval).

b. **Nest identified within 5 miles (but greater than 1 mile) of the project site.** 0.75 acre of suitable foraging habitat shall be protected for each acre of suitable foraging habitat developed. All of the land requirements may be met by fee title acquisition or a conservation easement (subject to CDFW approval).

c. **Nest identified within 10 miles (but greater than 5 miles) of the project site.** 0.5 acre of suitable foraging habitat shall be protected for each acre of suitable foraging habitat developed. All of the land requirements may be met by fee title acquisition or a conservation easement (subject to CDFW approval).

d. A financial contribution shall be made to a CDFG-approved entity (such as the ECCCHCP) to be used towards the protection of Swainson's hawk foraging habitat. The amount of the contribution will be determined by the CDFW based on the acreage and condition of foraging habitat to be developed by the proposed project.

### (ii) Other Special-Status Wildlife Species

Burrowing Owl

Burrowing Owl (*Athene Cunicularia*) is a federal Bird of Conservation Concern and a California Species of Special Concern. The burrowing owl is a small ground-dwelling owl that lives in open, dry grasslands, agricultural and range lands, and desert habitats associated with burrowing mammals. Burrowing owls nest and shelter in ground squirrel and other suitable small mammal burrows or artificial structures. The species prefers areas of short grass or bare ground and few trees to reduce the potential for predators to hide near the nest or foraging grounds.

As shown in Figure 3, numerous occurrences of burrowing owl have been documented from within 1-mile of the project site. California ground squirrels are present on the project site to varying degree based on the frequency of disking. At the time of the September 2014 site visit, the burrows of this small mammal occurred on portions of the project site. Therefore, when ground squirrel burrows are present, the project site provides potential nesting and wintering habitat for burrowing owl.

It should be noted that given the presence of suitable habitat and nearby known occurrences, Pacific Biology conducted protocol burrowing owls surveys during the nesting season in 2009. No owls or sign of owl (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement) were observed during the surveys. No burrowing owls were observed and it was concluded that while suitable burrowing owl habitat is present between disking cycles, it is likely that the disking prevents burrowing owls from successfully colonizing the site. Additionally, several dogs (from the adjacent residential development) were frequently observed on the project site. It is possible that these dogs could further deter owls from colonizing the site.

Based on the above and because the site continues to be regularly disked, burrowing owls are not expected to permanently reside or nest on the project site. However, there is some potential that non-breeding owls could temporarily occur on the project site during winter migration or dispersal. Given these potential non-breeding uses, the nesting success or continued persistence of burrowing owls in the project region is not dependent on the habitat provided by the site. Accordingly, the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (which has been adopted by the CDFW) only recommends the preservation or replacement of burrowing owl habitat if a site (to be developed) is used by nesting or resident burrowing owls. However, should non-breeding owls be present during construction activities, individual owls could be harmed. Therefore, the potential loss or harm of non-breeding burrowing owls would be a potentially significant impact under CEQA.

Recommended Mitigation Measures

4) The applicant will retain a qualified biologist, as approved by the City of Antioch, to conduct clearance surveys for burrowing owls. The survey will be conducted using CDFW accepted methods and be conducted no more than 14 days prior to commencement of construction activities. If burrowing owls are observed using burrows during the non-breeding season, or after young have fledged following the conclusion of the breeding season, owls will be excluded from all active burrows through the use of exclusion devices placed in occupied burrows in accordance with CDFW protocols (CDFG 1995). Specifically, exclusion devices, utilizing one-way doors, will be installed in the entrance of all active burrows. The devices will be left in the burrows for at least 48 hours to ensure that all owls have been excluded from the burrows. Each of the burrows will then be excavated by hand and refilled to prevent reoccupation. Exclusion will continue until the owls have been successfully excluded from the site, as determined by a qualified biologist. In the unlikely event that nesting owls are observed, then the nests will be avoided until all young have fledged.

White-Tailed Kite

White-tailed kite (*Elanus Leucurus*) is a California Fully Protected Species. This species typically nests in trees, often in isolated stands, surrounded by open foraging habitat. Nests are built on top of oaks, willows, or other dense, broad-leafed deciduous trees within partially cleared or cultivated fields, grasslands, marsh, riparian, woodland, and savanna habitats. The proposed project would not result in the direct loss of an active white-tailed kite nest because suitable nesting habitat is not present on the project site. However, should an active nest of the species be present within 500-feet of the project site (in the off-site eucalyptus trees along Heidorn Ranch Road), construction-related activities could result in the abandonment of the nest. Therefore, the potential disturbance to an active white-tailed kite nest would be a potentially significant impact under CEQA.

### Recommended Mitigation Measures

The implementation of Mitigation Measure 3A, above, would serve to prevent the loss of an active white-tailed kite nest.

### Loggerhead Shrike

Loggerhead Shrike (*Lanius ludovicianus*) is a federal Bird of Conservation Concern and a California Species of Special Concern. The loggerhead shrike is a predatory passerine that is a resident in the lowlands and foothills throughout California where its' habitat consists of open spaces, such as grasslands, with scattered trees, shrubs, utility lines, and/or fences for perching. Loggerhead shrike typically nest in densely vegetated trees and shrubs. The project site provides low quality, but potential nesting habitat, with potential nesting habitat being limited to the several small shrubby trees near the drainage ditch. Should the species nest on the project site, construction activities could result in the direct loss or abandonment of an active loggerhead shrike nest. Therefore, the potential loss or disturbance to an active loggerhead shrike nest would be a potentially significant impact under CEQA.

### Recommended Mitigation Measures

The implementation of Mitigation Measure 3A, above, would serve to prevent the loss of an active loggerhead shrike nest.

### Tricolored Blackbird

Tricolored blackbird (*Agelaius tricolor*) is a federal Bird of Conservation Concern and a California Species of Special Concern. This species typically nests in large colonies in dense stands of cattails or tules in freshwater, emergent wetlands. It also has been observed nesting in dense stands of willows, blackberry, wild rose, and tall herbs. Suitable nesting habitat is not present on or bordering the project site. Therefore, the proposed project would not result in the loss of a tricolored blackbird nest and related impacts would be considered less than significant under CEQA.

American Badger

American Badger (*Taxidea taxus*) is a California Species of Special Concern. American badgers are most abundant in drier open stages of shrub, forest, and herbaceous habitats with friable soils, where they dig burrows. As shown in Figure 3, American badgers are known from the project area and the closest documented occurrence of the species is from approximately 0.6 mile south of the project site (near Sand Creek). The regular disking of the site would prevent the species from colonizing the project site. Therefore, impacts to American badger would be less than significant under CEQA.

### Special-Status Plant Species

Numerous special-status plant species have been documented in the project area. However, prior to 2003, the project site was an irrigated orchard, and since that time, the project site has been regularly disked. Currently, the project site is generally devoid of vegetation, with the only herbaceous vegetation consisting of non-native annual grasses and weedy vegetation. The extent of historic and ongoing disturbance to the project site has eliminated any habitat that could support special-status plant species and no special-status plant species are expected to occur. Therefore, the proposed project would not result in any impacts to special-status plant species.

### Jurisdictional Resources

Wetlands and permanent and intermittent drainages, creeks, and streams are generally subject to jurisdiction of the Army Corps of Engineers (ACOE) under Section 404 of the Federal Clean Water Act. The ACOE has jurisdiction up to the “ordinary high water mark” of rivers, creeks, and streams that are considered “waters of the U.S.” as defined by the Clean Water Act. If adjacent wetlands occur, the limits of jurisdiction extend beyond the ordinary high water mark to the outer edge of the wetlands. Wetlands are defined by ACOE as “those areas that are inundated or saturated by surface or groundwater at a frequency or duration to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (ACOE 1987). The presence and extent of wetland areas are normally determined by examination of the vegetation, soils, and hydrology of a site. The ACOE definition of wetlands requires that all three wetland identification parameters be met. It is also generally required that jurisdictional wetlands have a hydrologic connection, or are adjacent to a Waters of the U.S.

As previously discussed, several pools of standing water were observed on the site during periods of heavy rain in February 2009. It appeared that the onsite drainage ditch was the primary water source of the pools. The source of water for the drainage ditch appears to be roadside runoff. The drainage ditch is not a natural feature and appears to have been excavated in upland habitat. Vegetation within the areas of ponded water was sparse and did not differ from the surrounding disked fields, which may indicate that the pools generally do not hold water for long enough periods to develop wetland-associated vegetation and that the presence of standing water may closely coincide with storm events. The drainage ditch and the observed areas of ponding do not have an apparent hydrologic connection to a Waters of the U.S. It is not known if ponding would still occur on the site should heavy rain occur, as the site has continued to be disked since 2009 and no evidence of ponding (i.e., cracked soils, wetland vegetation) was observed during September 2014 site visit.

The above factors suggest that the ponded areas and drainage ditch may not be under the jurisdiction of the ACOE. However, atypical conditions occur on the project site given the regular disking, and the ACOE takes atypical conditions into consideration in making a jurisdictional determination. Additionally, only the ACOE can make the determination of if a wetland or drainage is under their jurisdiction. Therefore, there is some (although limited) potential that the ponded areas (observed in 2009) and drainage ditch may be considered to be jurisdictional wetlands by the ACOE.

In its current condition, the area where ponding occurred in 2009 does not provide habitat values that differ from the surrounding disked field. Also, it should be noted that wetland vegetation was not present in the ponded areas in 2009, that this area has continued to be regularly disked since 2003, and that prior to 2003 the project site was an orchard. Therefore, from a habitat perspective, the development of the areas where ponding occurred would not result in a substantial adverse affect to wetland habitat. Similarly, as the drainage ditch appears to have been excavated in an upland area, because vegetation within the ditch does not substantially differ from adjacent weedy habitats, and because the drainage ditch only conveys surface runoff from Heidorn Ranch Road (and is not part of a natural stream system), the loss of this feature also would not be considered substantial or a significant impact under CEQA.

Recommended Measures

For the reasons discussed above, it is unlikely that the areas where ponding occurred in 2009 and the onsite drainage ditch are under the jurisdiction of the ACOE or Regional Water Quality Control Board (RWQCB). However, only the ACOE can make the determination of if a feature is under their jurisdiction and subject to the requirements of the federal Clean Water Act. Therefore, the following measure should be implemented.

5) A jurisdictional delineation should be conducted and the results submitted to the ACOE for verification. If it is determined that jurisdictional wetlands or other water are not present, no future actions would be required. If it is determined that jurisdictional wetlands and/or other waters are present, the applicant will apply for the required permits from the ACOE and RWQCB prior to fill of the features. The applicant will comply with all the conditions and mitigation requirements contained in the permit agreements.

**Riparian and Sensitive Plant Communities**

The project site does not contain any riparian or sensitive plant communities. The project site is regularly disked and vegetation is limited to non-native, annual grasses and ruderal plant species. Therefore, no project-related impacts to riparian or sensitive plant communities would occur.

**Wildlife Movement Corridors**

Wildlife corridors are described as pathways or habitat linkages that connect discrete areas of natural open space otherwise separated or fragmented by topography, changes in vegetation, and other natural or human induced factors such as urbanization.

The project site is located at the outer edge of a heavily developed area. The project site is immediately bordered to the north and west by dense residential development. Therefore, wildlife movement in these directions is not possible. Some undeveloped land occurs to the east of the project site, but between the project site and 0.7 mile to the east, this land is crossed by heavily traveled roads (including Highway 4-Bypass Road) and contains some areas of relatively dense urban and commercial development. Very dense development then occurs at distances of greater than 0.7 mile to the east of the project site. Therefore, wildlife movement opportunities to the east are heavily constrained and the project site does not provide habitat connectivity to open spaces to the east.

A very large expanse of undeveloped land occurs directly to the south of the project site, and there are no substantial barriers to wildlife movement from the project site south to Livermore. While open space occurs to the south of the project site, the project site is not part of a wildlife movement corridor because of its location at the outer edge of an urban area. Wildlife corridors occur where the corridor provides connectivity between two patches of large open space areas that are otherwise separated by rugged terrain, changes in vegetation, or by human disturbance.

Due to the dense developed uses to the north, west, and east of the project site, the site does not provide connectivity between large open space areas. Therefore, the project site is not considered to be part of a wildlife movement corridor. Project-related impacts to wildlife movement would therefore be considered to be less than significant under CEQA.

### Compliance with a Tree Protection Ordinance

The only trees on the project site are several (two to three) small, non-native trees bordering the drainage ditch. The City of Antioch Tree Ordinance (Article 12: Tree Preservation and Regulation) does not specify what species and size of trees are protected. Therefore, the trees on the project site are assumed to be protected under the City of Antioch Tree Ordinance, despite their small size and being non-native species. Compliance with the City of Antioch Tree Ordinance would be required.

<u>Recommended Mitigation Measures</u>

6) The applicant shall comply with the requirements outlined in the City of Antioch Tree Ordinance (Article 12: Tree Preservation and Regulation).

### Compliance with Adopted Habitat Conservation Plan

The City of Antioch has elected not to be included within the East Contra Costa County Habitat Conservation Plan (ECCCHCP) and therefore is not subject to the requirements of the ECCCHCP. Therefore, related impacts would be less than significant under CEQA.

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# Appendix C: Geotechnical Study

# GEOTECHNICAL STUDY FOR PROPOSED
# TIERRA VILLAS
# SINGLE-FAMILY HOME SUBDIVISION
NORTHWEST CORNER OF HEIDORN RANCH ROAD
AND PREWETT RANCH DRIVE
ANTIOCH, CALIFORNIA

FOR

THE MISSION PEAK COMPANY
PROJECT NO. GM-115/G240-01
JANUARY 31, 2007

The PRA Group, Inc.

**PRA Group**
CONSULTING ENGINEERS

No. GM-115/G240-01
January 31, 2007

Mr. Steve Allen
The Mission Peak Company
40480 Encyclopedia Circle
Fremont, CA 94538

Subject: **GEOTECHNICAL STUDY**
Proposed Tierra Villas Single-Family Home Subdivision
Northwest Corner of Heidorn Rd. and Prewett Ranch Dr.
Antioch, California

Dear Mr. Allen:

In response to your request and authorization, we are herein presenting the results of a Geotechnical Engineering Study prepared by our firm for the subdivision located at the corner of Heidorn Rd. and Prewett Ranch Drive in Antioch, California. Our report describes the services performed and presents our conclusions and recommended geotechnical design criteria.

In our opinion, the site is suitable for the proposed development provided the geotechnical recommendations in this report are incorporated into the design and followed during construction. We reserve the right to make supplemental recommendations at any time during construction based on observed or changed conditions.

It has been a pleasure to be of service to you on this project. Should you have any questions concerning the findings, recommendations or conclusions of the attached report, please contact this office.

Very truly yours,

~~PRA GROUP~~, INC.

Daniel Jay Rhoades
No. GE-716
Exp. 06/30/07

Daniel J. Rhoades, P.E.
Principal
GE-716, Expires: 06/30/07

John L. Maier
Staff Engineer

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## INTRODUCTION

### Purpose

The purpose of this study was to evaluate the soil and geologic characteristics relevant to the design of the proposed single-family home subdivision to be known as Tierra Villas Development. General foundation engineering design and geotechnical recommendations are provided based on the physical characteristics of the subsurface materials and the geotechnical limitations created by the site's surface features.

### Proposed Development

The proposed Teirra Villas Development would consist of subdividing the property into 122-lots for single-family home construction using a post-tension foundation system. Structural loads for the wood frame construction are expected to be relatively light. In addition to the houses, the development would also include construction of underground utilities, public and private roadways, and open space facilities. No final grading plans were available at the time of our report with preliminary plans indicating minor cut and fills. Please contact our office, if the conditions of the project change.

### Scope

The scope of or services for the proposed development, as set forth in our September 26, 2006, proposal, included the following: researching soil and geotechnical data, exploratory drilling, sampling and laboratory testing of soil encountered during drilling procedures, analyzing the soil data compiled during the exploration, and reporting our findings and recommendations. This phase of the study did not include assessments for toxic substances or soil or groundwater contamination.

## SITE SETTING

### Site Location and Description

The subject site is located northwest of the Intersection of Heidorn Ranch Road and Prewett Ranch Drive, which is approximately 0.7 miles south of Lone Tree Way in Antioch, California (see Figure 1, Site Location Map). The site is an irregular 'L'-shape, with an existing elementary school to the north and east of the property separated from the subject parcel by a chain-link fence. For shape and dimensions of the proposed property, please refer to Figure 2, "Site Plan and Boring Locations".

During our Exploratory Borings, it was evident that the upper 12-inches of soil and vegetation had been ripped and left in-place. There was dead grass in the tilled material and it is understood that this material will later be removed or used in the landscaped areas. Presently, there are no trees on the site. At the southwest portion of the property, there was a natural drainage swale, where storm water collected during the seasonal wet period as indicated by tall grass.

## General Geologic Setting

The subject site is situated east of the San Francisco Bay Area, in the Great Valley Geologic Province of California near the boundary of the Coast Range Geologic Province. In the geologic mapping of the Brentwood area, Brian Atwater (1982) indicated that the subject site is underlain by Holocene and upper Pleistocene alluvium deposits of Marsh Creek. The Marsh Creek Formation consists of alluvial-fan and alluvial-terrace deposits derived from unglaciated drainage basins. The younger deposits were described as over bank silt overlying channel sand and gravel, which grades into and includes gray silt and clay. Due to the general flat topographic relief of the area, no landslides were mapped on the subject site or on the adjacent properties (Nilsen, 1975). The map by Helley and Graymer (1997) describes the site area as Holocene age alluvial fan deposits (see Figure 3, Area Geology Map).

## Seismic Considerations

The subject site lies within the eastern portion of the San Francisco Bay Area, a region of high seismic activity. The probability is very high for a major earthquake to occur in the Bay Area within the economic lifetime of the proposed structures. Several active and potentially active faults occur in the region. Geologic references indicate that no fault trace designated active or potentially active passes through the subject property (Brabb and Switzer, 1971). According to the Seismic Safety Element of the Contra Costa County General Plan (CCCCSSE), the nearest fault designated as active is the Marsh Creek-Greenville Fault, approximately 7 miles southwest of the site. Other active or potentially active Bay Area faults, which could also cause ground shaking at the site, include the Concord Fault, approximately 13 miles west, the Calaveras Fault, approximately 16-1/2 miles southwest, and the Hayward Fault, approximately 26 miles west. The Antioch Fault, located approximately 1 mile west of the site is no longer considered active (CDMG, 1993).

Since the site is located in eastern Contra Costa County, we have considered a buried tectonic feature, termed the Great Valley-Coast Range (GVCR) tectonic boundary as a potential seismic source. Wakabayashi and Smith (1994) described their evaluation of recurrence intervals, characteristic earthquakes and slip rates associated with thrusting along the GVCR geomorphic boundary. In the paper of Wakabayashi and Smith (1994), they stated that the recurrence interval for the average segment is 350 to 440 years. Additionally, based upon their estimates, the GVCR, "...accommodates most of the plate convergence between the North American and Pacific Plates, indicating that the historical earthquakes efficiently released strain accumulated on the CRCV and suggesting that a seismic deformation along the CRCV is minor." Further, the California Geologic Survey (2003) had determined that movement on the Mt. Diablo Thrust justified delisting the segment in the area of the site as a potential seismic source.

The project site would be susceptible to ground shaking and ground failure during a major earthquake on the faults listed above; also, ground shaking may occur during an earthquake on other nearby faults. Ground rupture tends to occur along lines of previous fault rupture or tectonic creep. Because no known faults (active or otherwise) cross the site, this hazard is low. The seismic risk to a structure depends on the distance from the epicenter, the characteristics of the earthquake; the geologic, groundwater, and soil conditions, underlying the structures and its vicinity; and the nature of the construction.

According to the CGS interactive web site for probabilistic seismic hazards, a peak ground acceleration value of approximately 0.4g would have a 10 percent chance of being exceeded in a 50 year period. This peak value would represent a single-pulse during an earthquake, and the repeatable ground acceleration value would be approximately 65 percent of the peak value for epicenters occurring within a 20 mile radius of the site.

### Liquefaction Potential - Regional

Liquefaction occurs when loose, saturated granular deposits experience substantial strength loss and consequently, flow due to increase pore pressure during cyclic seismic loading. According to Contra Costa County Seismic Element (1990), the project is located in an area with a generally moderate to low potential for liquefaction. A more recent liquefaction assessment by Witter and others (2006), did not specifically map the subject property, but determined that Holocene alluvial fan deposits, such as mapped at the subject site, had a Moderate liquefaction susceptibility with free groundwater levels of less than 30 feet below the ground surface. Areas of Holocene alluvial fan deposits with groundwater levels deeper than 30 feet were considered to have a Low susceptibility for liquefaction.

## SITE EXPLORATION AND LABORATORY TESTING

### Site Exploration

Field exploration of the site was conducted on September 29, 2006, and consisted of exploratory drilling with a B-24 track-mounted drill rig. Eight Borings were drilled randomly on the site, with depths ranging from 4-1/2 to 31-1/2 feet, with an average depth of 13 feet, to determine the subsurface nature of the in-situ soils through observation during drilling and recovery of the soil samples for laboratory testing and interpretation of the laboratory data. A 4-inch solid auger was used to drill the test borings to the selected depth of each boring, including the depth where each soil sample obtained for laboratory testing and evaluation. This undisturbed soil samples were recovered in a 2-inch inside diameter Modified California Sampler driven into the subsurface material by a 140-pound hammer dropped from a height of 30-inches. The number of blows necessary to advance the sample barrel 18-inches into the soil was converted to a Standard Penetration Number, which is presented on the boring logs as Figures 4 through 11.

### Laboratory Testing

Samples of the subsurface soil material were collected as described above and tested under laboratory conditions to determine on-site soil properties. Tests performed were: Moisture/Density, Unconfined Compression, #200 Wash Sieve Analysis, Hydrometer, Swell, Atterberg Limits, and Modified Proctor.

Swell tests were performed in accordance with ASTM D-4545-90, Method B. Surcharge loads of 150 lb/ft$^2$ were applied to samples 1-inch in height and 1.94 inches in diameter, followed with the inundation of the sample. During the first test, with an applied 150 lb/ft$^2$ surcharge load, a total swell of 8.1 percent was observed over a total of three days, whereas, a swell of 1.7 percent was observed, during Swell Test 2, over a three day period with an applied pressure of 500 lb/ft$^2$. Swell Test 1 and 2 samples taken at 2 feet below grade in Boring 3 and 5, respectively had in-situ moisture contents of 18 and 20 percent and were dried back to moisture content of 11 and 14 percent, respectively. Atterberg Limit tests, ASTM D-4318, for determination of the plasticity of the soil, indicated a Plasticity Index (PI) of 18 for Boring No. 2 at 2 feet and a PI of 24 for Boring Nos. 7 and 8 at 2 feet. A Plasticity Index of 10 to 20, indicates a soil of low to medium expansion, whereas, a Plasticity Index ranging from 25 to 40, indicates an expansive to highly expansive soil. The Plasticity Index of a soil has thus a direct correlation to the expansive potential of the soil as verified by the Swell Tests mentioned above. These and all other test results are presented in the Boring Logs 4 through 11.

A Hydrometer Analysis, ASTM D-4221, was performed to determine the percentage of clay particles (diameter less than 0.002 mm) present in the subsurface material. The sample used for analysis was extracted from a depth of approximately 24-inches by sampling methods described above, at approximately the center of the site and results indicated the sample to have 74 percent clay particles. A #200 Sieve Test was performed of the soil materials at a depth of 2 feet below grade in test Borings 7 and 8, revealing a percent passing the #200 Sieve of 93% and 88% for the silty clay materials.

## **Subsurface Conditions**

Material encountered in the center to northern area of the site, in the upper 1 to 3 feet, consisted of a silty clay of medium to high plasticity, with an average 18 percent moisture content and 106 lb/ft$^3$ dry density. Below the silty clay material, a fine sandy clay occurred from approximately 3 to 10 feet., with the soil becoming a silty clay to sandy silt at the maximum depth drilled of 11-1/2 ft. for Borings 5 through 8.

The southern portion of the site included Borings 1 through 4 consisted of approximately 3 ft., of silty clay with a change to a layer of fine sandy clay to an approximate depth of 11 ft., underlain by sandy silt to silty sand, which extended to the maximum 1-1/2 ft. depth for Boring 2. In general the subsoils became stiffer or dense with depth indicated by the recorded blow count data recorded on each log of boring where subsurface soil samples were obtained. Although fine sand was observed with the clay in the soil at shallow depths in the southern section of the site, the predominate soil material for this soil strata was the clay portion.

## Groundwater

Groundwater was not encountered on-site in any boring, with Boring 2 extending 31-1/2 feet below grade. Groundwater levels should be expected to fluctuate seasonally, and due to the actions of man.

## Liquefaction Potential - Site

In order to evaluate the liquefaction potential of the subject site, the encountered soil materials were described during exploratory drilling and the soil properties were determined from blow count data, and laboratory testing. The borings showed the absence of a free ground water level to the maximum depth explored of 31-1/2 feet below the ground surface for Boring B-2. Blow counts from the Standard Penetration Tests indicated that if groundwater had been present during a seismic event, the chance of liquefaction would be low.

A #200 Wash-Sieve Analysis was performed on a sample from Boring 2, from a depth of 31-1/2 feet. The test determined a fines content of approximately 16 percent. In general, soil with a fines content greater than 15 percent show an increased resistance to the affects of liquefaction (Borchardt and Kennedy, 1979). The high penetration resistance of these materials also indicates a Low susceptibility for liquefaction.

Therefore, based upon the classification of the subsurface materials encountered, fines content, penetration resistance, and the absence of a free ground water level, it is our opinion that the liquefaction susceptibility of the subject site would be considered Low.

## Discussion

The property had been recently disced with organic contamination in the top one-foot of the disced area, which will be mitigated during the stripping portion of the grading operations.

The project soil materials in the top 4-feet for the property generally consist of moderate to expansive silty clay to sandy clay materials that impact the foundation and pavement design for the project. During grading operations, the soil material at the subgrade and final pad elevation may be altered due to the depth of cut or fill planned for the development. An inventory of the final pad grade soil condition will be required upon completion of grading operations for soil corrosion and expansive conditions in order to verify the recommendation of the report or to provide supplemental recommendations based upon changed soil conditions.

Moisture conditioning of all pad grade soils will be required, prior to foundation placement in order to reduce the future expansion potential of the pad soils due to unforseen soil moisture change from environmental conditions. This later requirement is a preventative measure to provide a more uniform moisture condition below the slab as foundation construction may occur during the Summer and Fall dry cycle resulting in a low subgrade moisture content. The post-tension slab foundation system deflection from soil movement is dependent upon many variables, both environmental and design, that are discussed in the Foundation Section of this report. It would be helpful to inform future owners of the homes to follow prudent landscaping practices to comply with the drainage intent as set for in this report. The following conclusions and recommendations address the above issues.

## CONCLUSION

It is our opinion, based on an analysis of the data and information obtained from the site exploration, laboratory testing, geotechnical evaluation, and our experience and knowledge of the soil conditions in this area, the site is geotechnically suitable for the proposed development provided the recommendations contained herein are incorporated into the project designs and adhered to during construction. The principal adverse geotechnical factors affecting the development of the site are the expansion potential of the surface and subsurface soils and the potentially strong shaking due to earthquakes. The recommendations presented herein are intended to reduce th risks associated with these factors and to minimize their effects. The following conclusions are based on the results of our study of the subject site.

1. The proposed subdivision is feasible from a Geotechnical Engineering and standpoint provided the recommendations contained herein are followed in the design construction of the Tierra Villas Development.

2. Seismically induced ground shaking with minor structural damage may occur within the economic life of the development.

3. It is our opinion, that a low liquefaction hazard exists at the subject site. This opinion is based on soil and groundwater conditions encountered in our borings, the standard penetration tests obtained within each soil substrata of concern and the results of laboratory tests conducted on selected recovered soil samples.

4. Our laboratory testing and observations indicate that the near surface soil is characterized as moderate to high in expansion potential.

5. Due to the geotechnical conditions encountered at the site, it is our opinion, that the proposed single-family subdivision may be supported on a post-tensioned structural slab foundation system. Use of this foundation system is contingent on the grading and foundation recommendations, and moisture-conditioning of the pad soils prior to concrete placement as presented in this report.

6. It is our opinion, that a final lot inventory of the pad subgrade soils for corrosion and expansive soil condition is necessary for quality control purposes and to verify the geotechnical design recommendations provided in this report based upon the random surface soil sampling and testing of the existing grade materials, which change with the planned grading.

## RECOMMENDATIONS

### Geotechnical Hazards

Risk of geotechnical hazards will always exist due to uncertainties of geologic conditions and the unpredictability of seismic activity in the Bay Area. However, in our opinion, based on available data, there are no indications of geotechnical hazards that would preclude use of the site for the proposed development. The purposed structures should be designed to meet the current *Uniform Building Code* (UBC) requirements to limit potential damage from ground shaking and ground failure.

### UBC Seismic Parameters

We have reviewed the 1997 edition of the Uniform Building Code (UBC) and our files to provide seismic shaking criteria for your structural engineer's consideration in the foundation design of the proposed development.

The nearest known seismic source is the Greenville fault (Type B), located approximately 12 km southwest of the site. The near-source factors for the Greenville fault are provided below:

| SEISMIC CRITERIA | VALUE |
|---|---|
| Seismic Zone (UBC, Figure 16-2) | 4 |
| Seismic Zone Factor (UBC, Table 16-I) | 0.4 |
| Soil Profile Type (UBC, Table 16-J) | $S_D$ |
| Near-Source Factor $N_a$ (UBC, Table 16-S) | 1.0 |
| Near-Source Factor $N_v$ (UBC, Table 16-T) | 1.0 |
| Seismic Coefficient $C_a$ (UBC, Table 16-Q) | 0.44 |
| Seismic Coefficient $C_v$ (UBC, Table 16-R) | 0.64 |

## Grading

We anticipate that grading will be minor for this project. Final Grading Plans were not available during preparation of this report. We recommend that Final Grading Plans be reviewed by our office prior to starting mass grading. All grading must conform to the specific recommendations in this report and to Appendix A, "Recommended Grading Specifications." The specifications are general and the grading effort is expected to vary with site and soil conditions encountered during development.

All grading must be observed by a representative of our firm, including stripping and scarification processes to observe whether undesirable materials or below grade facilities such as utilities, buried pipes, debris or similar buried materials are encountered. If loose fill or soft native soils are encountered, sub-excavation and recompaction may be required.

On-site soil generated by site grading may be used as fill provided that the soil is free of deleterious and organic materials and that it has been approved for use as fill by the Geotechnical Engineer. Our firm shall be notified one to two weeks prior to the anticipated date of grading commencement to allow for an on-site pre-construction meeting with the Grading Contractor to discuss proposed grading operations and to acquire samples of proposed fill material. This will provide sufficient time for laboratory testing and results prior to general fill placement.

The onsite soils had been disced to a depth of approximately 12-inches with concentration of organic material in the top 6-inches of the disced area. To reduce the potential of organic concentrations and to provide more uniform conditions in the building areas, we recommend that the upper 6-inches of organic contaminated type material, which has already been ripped, be removed from the building pad areas and be used in landscaping areas. Following removal of this material, the upper 12-inches of remaining soil shall be scarified, moisture-conditioned, and recompacted, to a minimum 85 percent to a maximum of 90 percent relative compaction with a minimum 5 percent over optimum moisture content in accordance with ASTM D-1557. The scarification and the recompaction should extend at least 5 feet outside the building perimeter with the balance of the pad processed to the satisfaction of the Geotechnical Engineer. The upper 2 feet of subgrade below street sections should be moisture-conditioned to 5 percent over the optimum moisture content and compacted to a minimum of 95 percent relative compaction. The final grading report must include verification tests of the foundation pad areas of all lots in relation to potential corrosive soils, in addition to the expansion characteristics of the site soil as revealed in this study. Corrosion, Plasticity Index, and Swell Tests, on representative lots are required in the final lot inventory assessment program after completion of the grading operations.

The attached "Grading Recommendations," (Appendix A) are general in nature and intended to indicate how site preparation and grading should generally proceed. However, because of the variability of conditions on a property, all conditions, which may become exposed during grading cannot be foreseen at this time. Therefore, it is recommended, that the site preparation and grading operations be done under the observations of the PRA Group, Inc. (PRAG) so that actual conditions can be evaluated in the field as the job progresses. The Geotechnical Engineer or the Engineer's representative must be notified 48-hours prior to commencement of any grading operations os that arrangements can be made to provide observation and testing services.

## Constructed slopes

Cut and fill slopes, if any, should be designed and constructed at slope gradients no steeper than 2:1 (horizontal to vertical).

## Building Pad Moisture Conditioning

For the proposed structural post-tension slab foundations to perform as designed, we recommend that the existing building pad subgrade soils be moisture-conditioned with water to a minimum depth of 12-inches and be tested for acceptance by a Geo-Probe penetration of 12-inches, prior to placement of foundation concrete. We reserve the right to modify the moisture-conditioning requirements depending on the soil encountered during the final building pad inventory of site soil conditions.

The site preparation as recommended herein reduces the potential for expansion of the clay soil due to variations in moisture-conditions and replaces the lost moisture of the subgrade soil that occurs during the time period between mass grading and foundation improvements. The slabs should be placed within one week from completion of the pad preparation moisture-conditioning.

Continuous wetting of each pad is recommended for at least 24-hours prior to placement of visqueen and concrete. The use of a wetting agent in conjunction with rainbirds or berming and ponding of water on each pad is recommended to perform the moisture-conditioning. We recommend that a Geotechnical Engineer or a representative of PRAG be present to observe and verify the final moisture-conditioning of subgrade soils prior to visqueen and concrete placement.

## Foundations

We understand that the proposed single-family homes will be one to two-story, and wood-framed. Structural loads for this type of construction are expected to be relatively light. Based upon the results of our study, we are recommending that the proposed structures be supported on a stiffened structural slab-on-grade foundation system reinforced with post-tension cables.

Geotechnical design criteria should be implemented at the discretion of the Structural Engineer based upon his review and design of stiffened structural slab in conformance with current industry standards and the geotechnical recommendations of this report.

If a foundation other than that recommended is desired, this office should be called for supplemental recommendations. Such recommendations would be presented as an addendum to this report. The following foundation recommendations are based on the expansive near-surface soil encountered in our exploratory borings. If the lot inventory program (discussed in the "Grading Section" of this report) reveals expansive soil types differing than planned within some building pads, the foundation design criteria outlined below may be modified for those lots. These additional design values would be provided after completion of laboratory testing of representative soil samples recovered from the building pads. Recommendation for post-tensioned slab-on-grade foundations, based on the more conservative soil conditions encountered at the subject site, are discussed below.

## Slab-On-Grade Foundation System

We recommend the following geotechnical design criteria in Table I be used by the Structural Engineer for design of the foundations system.

## TABLE I
## STRUCTURAL MAT FOUNDATION RECOMMENDATIONS

| | Design Factor | |
|---|---|---|
| 1 | Pad Moisture-Conditioning, Top 12-inches | Required |
| 2 | Max, Allowable bearing pressure, psf (Dead Load and Live Load) | 2500 |
| 3 | Subgrade Modulus (K) - pci | 150 |
| 4 | External Cantilever -ft. (Random 10' length) | 4 |
| 5 | Interior span - ft. | 12 |
| 6 | Max. Deflection -any 10' span - inches | 1/4 |
| 7 | Edge uplift pressure -psf to 0 at 10' | 250 |
| 8 | External Thickened Edge - in. | 12 x 12<br>i.e., an additional 2-inches of slab thickness) |
| 9a | Visqueen - 10 mil minimum | Required |
| 9b | Min. Visqueen cover, sand - inches | 2 |
| 10 | Min. Slab Thickness - inches | 10 |

The above values are based upon the average soil conditions expected within the soil materials located within the top 3 feet of pad grade. A capillary break of 10 mil. Visqueen type vapor barrier must be utilized to prevent moisture transmission through the slab and also to protect the concrete from potentially corrosive soils. Surface drainage will be required; with all gutters tied into a tight line discharging to a suitable discharge point. The liberal use of Swales with drop inlet facilities are desirable in order to facilitate the rapid removal of all surface storm or irrigation water.

The following geotechnical design parameters are provided for use by the Structural Engineer for design of the foundation system using the post-tension slab-on-grade criteria in the Second Edition, Post Tension Design Manual with modifications set forth in the 3rd Edition as necessary for a balanced design. The design values provided are based on our experience with other developments in the general Antioch and San Francisco Bay Area.

## POST-TENSION FOUNDATION DESIGN CRITERIA*

| Swelling Parameters | Center Lift | Edge Lift |
|---|---|---|
| Edge Moisture Variation Distance, $e_m$ | 4.2 ft. | 4.0 ft. |
| Differential Soil Movement, $y_m$ | 2.2 in. | 1.7 in. |

Refer to Table I for additional geotechnical design criteria. The post-tension foundation slab must be designed as a rigid, structural slab with adequate strength to resist excessive deflection from soil shrinkage or heave forces.

If, after grading, building pads become severely rutted from equipment operations during wet weather periods or if pads have erosion ditches generated from pad drainage, these areas will require reworking and acceptance by the Geotechnical Engineer prior to foundation construction.

The Post-Tensioned Institute (PTI), Second Edition manual and the 1997 Edition of the *Uniform Building Code* (UBC) manual indicate that the differential soil movement factor ($y_m$), derived by empirical methodology in the PTI Manual, does not account for factors not related to climate. The 3rd Edition, PTI Manual states: "Factors not related to climate, if not properly controlled, may induce movements potentially larger than those resulting from climatic influences alone. Tables 3.2 through 3.6 on pages 24 and 25 of the 3rd Edition, PTI Manual consider alternative moisture variation influences that need to be accounted for during design. "Dry Periods," Section 4.4 "Site Parameters" on Page 30, through Section 4.4.11 on Page 31, provide a good overview of environmental changes that impact a post-tension slab system. In a section titled, "Time of Construction," on page 30, Section 4.4.7, it is stated:

> "If the slab is cast at the end of a lengthy dry period, it may experience greater uplift around the edges when the soil becomes wetter at the conclusion of the dry period. Similarly, a slab cast at the end of a wet period, may experience greater drying around the edges during the subsequent period of dryness."

As a result of controversy involving what was considered excessive cracking of both interior and exterior elements of the superstructure placed upon the flexible PT-Slab-On-Grade system, a new provision was included in the 2005 Edition of the PTI Manual on page 52, that discussed Compatibility Considerations." A description of this is as follows:

> "Post-tensioned foundations as well as other non-prestressed shallow foundation systems constructed on expansive or compressible soils are expected to deform. The foundation flexibility distributed localized soil movements to a more uniform slab shape (edge lift, center lift). It is important to advise other consultants and suppliers to consider compatible design or products for the selected foundation system. In particular, deformation compatibility should be addressed for roof trusses, load concentrations, non-flexible exterior siding, brittle floor coverings, and areas that slope to drain or where utility connections be located."

Section 6.10 of the 3rd Edition, PTI Manual, "Stiffeners" on Page 45 and 46 discuss the differential foundation deflection and means to minimize future damage to more brittle sidings or rigid framing materials. Table 6.2, page 48 of the Post-Tensioned Manual (below) indicates stiffener coefficients for various building components.

**RECOMMENDED VALUES OF STIFFENER COEFFICIENT $C_\Delta$**

| Material | Center Lift | Edge Lift |
|---|---|---|
| Wood Frame | 240 | 480 |
| Stucco or Plaster | 360 | 720 |
| Brick Veneer | 480 | 960 |
| Concrete Masonry Units | 960 | 1920 |
| Prefab Roof Trusses* | 1000 | 2000 |

* - Trusses with clearspan the full-length or width of the foundation from edge to edge.

Section 3 through 5 of the 3rd Edition, PTI Manual consider the requirements for the construction of a post-tensioned slab from a geotechnical standpoint and was used in conjunction with the 2nd Edition PIT, in the derivation of the above data for differential soil movement, $y_m$, and edge moisture movement, $e_m$ set forth on Page 14 of this report. The $y_m$ values are results which are based on Stress Change Factor (SCF) influenced by a situation where a flower bed were planted adjacent to the structure. Although the data was derived as such, it is not recommended that extensive vegetation be planted within 5 feet of the structure due to the increased change of soil swelling and movement with irrigation water required for plant maintenance. We urge the landscape planting use a drought resistant design with a drip irrigation system for irrigation.

We recommend that the Structural Engineer design the structural slabs based on current industry standards, the stated geotechnical criteria, and using a cantilever design for soil shrinkage and uplift forces. The structural slabs should be designed to resist uplift forces to maintain planarity for the maximum differential vertical movement set forth in Table I of this Report.

Prior to placement of the sand and structural elements in the slab area, the subgrade must be moisture-conditioned by the use of a wetting agent and extended sprinkling. We recommend that an impermeable membrane of 10 millimeter minimum thickness visqueen be placed on the pad soil or on the crushed capillary break rock, if used to further reduce vapor transmission, and overlain at the Structural Engineer's option by 1 or 2-inches of clean sand to assist in the proper curing of the slab. The length of overlap for the impermeable membrane should conform to the manufacturer's specifications or a minimum of 12-inches, whichever is greater. Furthermore, at no time should the membrane be punctured during the construction of the concrete slab-on-grade. Where Geo-probe penetration tests are required to verify the moisture conditioning of the pad soils, visqueen removal areas must be made available with no random punctures of the visqueen by the Geo-probe testing permitted. We recommend that if the membrane is punctured, the repair conform with the manufacturer's specifications and be observed by a representative of our firm. Improper placement of the membrane may results in adverse moisture-conditions that could contribute to heaving of the slab. Excess moisture could also pass through the slab resulting in moisture vapor conditions in the residence.

Recommendations presented in the American Concrete Institute manual should be complied with for all concrete placement and curing operations. Improper curing techniques and/or excessive slump (water-cemented ratio) could cause excessive shrinkage, cracking, or curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor coverings. We recommend that the project Structural Engineer also consider specifying air-entrainment for the concrete mix design to reduce the permeability of the concrete slab.

We recommend isolated exterior footings be structurally tied to the exterior perimeter footings as set forth by the Project Structural Engineer.

The excavations for footings should be cleaned of loose material and debris prior to placement of concrete. All footing excavations must be observed by a representative of our firm to verify the compatibility of the foundation and to observe the competence and moisture-condition of the soil material in the excavations. The excavations should be kept moist until the foundation concrete is placed.

## Garage Floors and Driveways

We recommend that garage floor slab-on-grade be incorporated into the main foundation system and be designed in accordance with the geotechnical requirements of this report. The driveway should be a minimum thickness of 4-inches and be underlain by a 4-inch thick cushion of "pea gravel" or Class II Aggregate Base Rock placed upon a 12-inch deep section of pre-saturated subgrade. Extending the outer edge of the slab 6 to 8-inches into the ground would assist in preventing moisture variation at the outer edge of the slab and help prevent soil and slab movement. Reinforcement of the concrete slabs shall be as directed by the Project Structural Engineer.

## Miscellaneous Flatwork

Exterior flatwork should be designed as follows:

1. It is recommended that the exterior slab-on-grade flatwork be a minimum thickness of 4-inches and be structurally independent of the foundation to provide freedom of movement due to soil volume changes.

2. Reinforcement of the concrete and construction of crack control joints shall be as directed by the Project Structural Engineer.

3. Ponding of storm or irrigation water adjacent to the exterior slabs must be prevented by use of area drains or liberal surface drainage to a suitable controlled discharge point. Liberal surface slope of all exterior slab work is necessary to prevent reverse

drainage toward the structural improvement.

## Pavement Design

Due to the expansive soils at the site, we recommend that the pavement section planning consist of a minimum 3-1/2-inches asphaltic concrete over a minimum of 12-inches Aggregate Base Rock. The final pavement design template will require an 'R'-Value test of the subgrade and a Traffic Index to be assigned by the City of Antioch. Grade elevation changes should be anticipated to accommodate a modified pavement thickness unless a pre-determined can be agreed upon during the map approval process. To perform to its greatest efficiency, the pavement section requires the following construction criteria:

(a) Remove organic and deleterious materials from all pavement subgrade.
(b) Moisture-condition the upper 12-inches of subgrade soil and compact it to a minimum relative compaction of 95 percent at a moisture content of 2 percent over the optimum moisture content. All pavement subgrade should be stable with no "pumping" at the time base rock is placed.
(c) Use only good quality materials of the type and minimum thickness specified. All base rock should meet the Standard Specifications of the State of California for Class II Base Rock and be angular in shape.
(d) Compact the base rock uniformly to a minimum relative compaction of 95 percent.
(e) Place the asphaltic concrete only during periods of fair weather, when the free air temperature is within the prescribed limits as set forth by the Asphalt Concrete Institute.
(f) Compact all trench backfill under the pavement to reduce fill settlement and minimize pavement damage that may results from such settlement. Trench backfill must be performed in accordance with the recommendations in the Utility Trench Section of this report. Mechanical compaction is recommended because material placed by jetting or ponding will probably not attain satisfactory density.
(g) Provide adequate drainage to prevent surface water from migrating into the pavement subgrade soils from behind curb-and-gutter sections. The need for curb-and-gutter subdrains should be evaluated based on the results of mass grading.

## Retaining Walls

Free-standing retaining walls on the site should be designed to maximum height of 5 feet based on the following parameters:

| | |
|---|---|
| Active Earth Pressure | |
| Horizontal Backfill | 50 (pcf )EFP) |
| Sloping Backfill (maximum 2:1 Slope) | 65 pcf (EFP) |
| Surcharge, if present | Variable |
| Passive Earth Pressure* | 300 pcf (EFP) |
| Coefficient of Sliding Friction (concrete-soil) | 0.30 |
| Allowable Bearing Capacity | 2,000 psf (18" depth) |

*Acting at a minimum depth of 12-inches below lowest adjacent grade. (Where EFP=Equivalent Fluid Pressure).

The retaining wall footing should consist of a conventional footing placed 18-inches minimum below lowest adjacent grade.

Retaining walls should be designed to resist the surcharge of foundation elements that are located within a distance equal to the height of the retaining wall from the wall. Alternatively, the depth of the foundation elements can be increased so that they derive their support below the bottom of the wall.

Adequate drainage is required behind the walls to prevent build-up of hydrostatic water pressure. All retaining walls should be drained by providing a perforated horizontal pipe behind the all or other method deemed acceptable by the Geotechnical Engineer. Where a drain pipe is used, we recommend placing the pipe near the bottom of a vertical gravel drain blanket and at the base of the footing. The perforated solid pipe should be a minimum of 4-inches in diameter and lie at a 1 percent slope commencing at the heel of the footing elevation, so as to drain to a suitable outlet and should be covered with drain rock to within 18-inches of the surface. The top 18-inches of backfill should consist of compacted, relatively impervious, native soil material. The gravel drains should be a minimum of 12-inches in width. The filter material should be imported, graded aggregate, conforming to gradation of Class II Permeable material as listed in Section 68-11.025 of the January 1988 CalTrans Standard Specifications, or as otherwise approved by the Geotechnical Engineer.

## Free Standing Sound Walls

Free standing sound walls should be founded on piers based on the following parameters:

| | |
|---|---|
| Diameter | Minimum 16-inches |
| Friction Value | Allowable friction value of 400 psf, which may be increased by 1/3 for wind and seismic loads. |
| Passive Value | 300 pcf to be taken over 1-1/2 times, the pier diameter commencing 2 feet below lowest adjacent grade. |
| Depth: | Minimum depth equal to height of sound wall, or as specified by the Design Engineer, whichever depth is greater. |

The depth of pier embedment is measured from the lowest adjacent soil grade to the bottom of the pier hole. The load-carrying capacity of the upper 2 feet of soil should be omitted in selecting the allowable pier capacity. We recommend that all pier holes be cleaned of slough and loose material prior to placing steel reinforcement and concrete. Care should be taken to avoid "mushrooming" at the tops of piers when placing concrete. Care should also be used to prevent or remove concrete spillage around piers to avoid an increase in uplift pressure.

Depending on the time of year of drilling and the pier locations, groundwater may be encountered in some pier holes. In such cases, the pier holes should be cleaned of loose slough and either pumped dry just prior to pouring concrete or tremied with concrete to "float" the water above the concrete with the tremie hose maintaining a minimum 5 foot head of concrete at all times during hose removal.

## Utility Trenches

All trenches should be backfilled with native materials compacted uniformly to the relative compaction specified in the "Grading Section" presented in this report. If local building codes require the usage of sand as the trench backfill, all utility trenches entering the building must be provided with an impervious seal of either cohesive or lean concrete where the trench passes under the building perimeter. The impervious plug should extend 2 feet into, and out of, the building perimeter. Jetting of trench backfill is not recommended as it may result in an unsatisfactory degree of compaction. All disturbed areas within 5 feet of the foundation from trench excavation, including electric lines, must be reprocessed as engineered fill to prevent a localized soft soil area that could serve as a moisture accumulation zone resulting in potential impact an movement of the foundation system.

Utility trench safety is the responsibility of the underground utility contractor. It is their responsibility to ensure that ll Cal/OSHA regulations regarding site safety and tench stability are adhered to during trenching, placement of utilities and placement of compacted trench backfill. The contractor's designated Competent Person must monitor the soil conditions as required by Cal/OSHA.

## Drainage

Surface water must not be allowed to pond or saturate soils adjacent to the building foundations. To preclude this, it will be necessary to direct all water collected from roof downspouts into tightlines that will direct the collected drainage away from the building foundation and into suitable discharge points.

Due to lot size restrictions, the minimum available side lot distance may be 5 feet or less from the structure. We recommend that where 5 feet to property line is present, a positive slope gradient of 3 to 5 percent down and away from the structure perimeter be applied to the finished subgrade (including topsoil) for a distance of at least 3 feet at which point a drainage swale or other drainage method deemed acceptable by the Geotechnical Engineer should be provided to remove surface water from the structure to an acceptable discharge pont or storm drain inlet.

As mentioned above, planted areas located immediately adjacent to the structure should be avoided. If vegetation must be planted adjacent to the structure, plants that require very little moisture should be considered. Again, if vegetation must be planted adjacent to the structure, a drip irrigation system is recommended unless drop inlets or area drains are utilized to control drainage around the foundation; sprinkler heads should not be placed where they would saturate the foundation soil. No flatwork should be placed adjacent to the foundation where a trapped water condition could occur. The use of drop inlets in such areas would control the discharge of irrigation or storm water at these locations and help reduce the expansion potential of the pad subgrade soils.

## Plan Review

Before submitting design drawings and construction documents to the appropriate local agency for approval, we recommend that copies of the documents be reviewed by our firm to confirm that the recommendations in this report have been effectively incorporated into the design.

## Construction Observations

Our representative must be present during grading to observe the work performed and to perform whatever testing is necessary to properly evaluate the quality of the materials and their relative compaction. A final lot survey assessment program is required upon completion of grading for verification tests for corrosion and expansion potential of the pad subgrade soil. Foundation observations by our representative is recommended so that the foundation pads are properly moisture-conditioned. The depth of foundation pre-soaking is also dependent upon site grading and other unforeseen local anomalies, and thus the actual moisture-conditioning depths may vary.

At the completion of the site grading operations and foundation excavations, we will submit a report that summarizes the work observed and the results of all tests performed by our firm during the construction phase of the project, along with any supplemental recommendations that may be warranted. To allow proper scheduling so that our personnel are present at the job site when needed, we should be furnished no less than two (2) working days advance notice of when work requiring our presence will be accomplished.

Furthermore, we recommend that our representative perform a final site visit at the completion of the project to confirm that the drainage, soil conditions, and, if necessary, landscaping are in conformance with our recommendations presented in this report.

## Construction During Fall and Winter Seasons

Wet weather may raise the moisture content of the soil well above optimum conditions and earthwork construction may be difficult or impossible. Supplemental recommendations should be provided by the Geotechnical Engineer if grading operations are planned in the Winter season.

## Site Safety

All excavations and site work must comply with applicable local, state, and federal safety regulations. Construction site safety is the responsibility of the Contractor, who shall be solely responsible for the means, methods, and sequencing of construction operations. Our services and recommendations for site safety are advisory and not supervisory. PRA Group, Inc. Assumes no responsibility for construction, site safety, or the Contractor's activities during any phase of the construction project.

## Miscellaneous

Our exploration did not reveal the presence of buried items such as leaching fields, septic tanks, storage tanks, etc., at the location of the borings. If such items are encountered during grading or demolition, our firm should be notified immediately to provide recommendations for proper disposal procedures.

This phase of the study did not include investigations for toxic substances or soil or groundwater contamination of any type. If such conditions are encountered during the site development, additional studies may be recommended.

## LIMITATIONS

This report has been prepared for the exclusive use of The Mission Peak Company and their consultants for specific application to the proposed development. If changes occur in the nature design location, or configuration of the proposed development, the conclusions and recommendations contained herein shall not be considered valid. Changes must be reviewed by our firm.

The analysis, opinions, conclusions, and recommendations, submitted in this report are based in part on the referenced materials, site visit, and evaluation, and subsurface exploration. The nature and extent of variation among exploratory borings may not become evident until construction. If variations appear, it will be necessary to re-evaluate or revise recommendations made in this report.

The recommendations in this report are contingent on conducting an adequate testing and monitoring program during construction of the proposed development. Unless the construction monitoring and testing program is provide by or coordinated with our firm. PRA Group, Inc. Will not be held responsible for compliance with design recommendations presented in this report and other supplemental reports submitted as part of this report. Our services have been provided in accordance with generally accepted geotechnical engineering practices. No warranties are made, expressed or implied, as to the professional opinions or advice provided. Recommendations contained in this report are valid for a period of 2 years, after 2 years they must be reviewed by this firm to determine whether or not they still apply.

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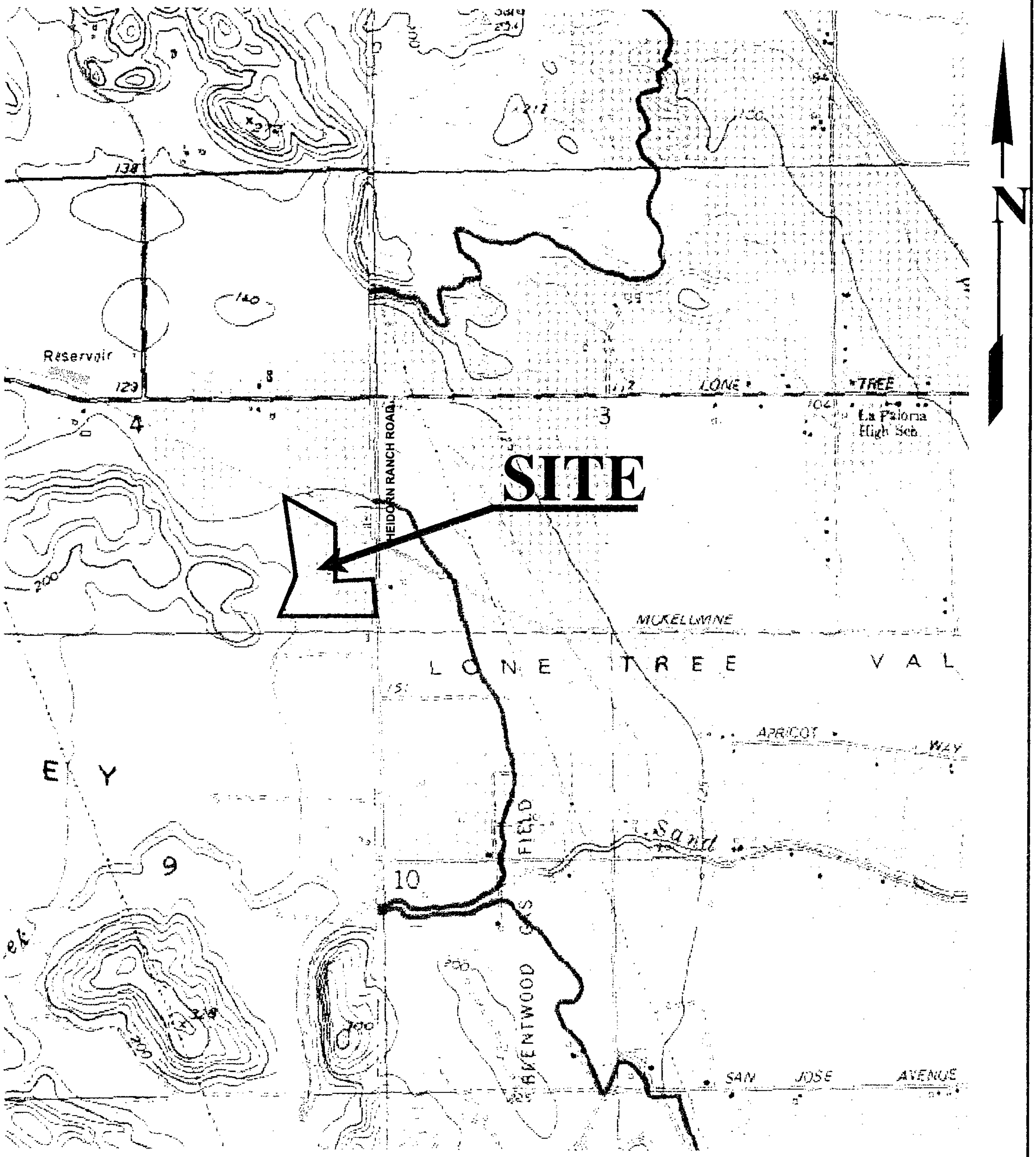


NOT TO SCALE

NOTES

SOURCE:

TOPOZONE - ANTIOCH SOUTH QUAD

DATE JANUARY 2007

JOB NO G240-01

DWG NO G24001FIG1

DRAWN IDA

CHK'D DJR

APP'D DJR

**PRA Group**

CONSULTING ENGINEERS

**SITE LOCATION MAP**

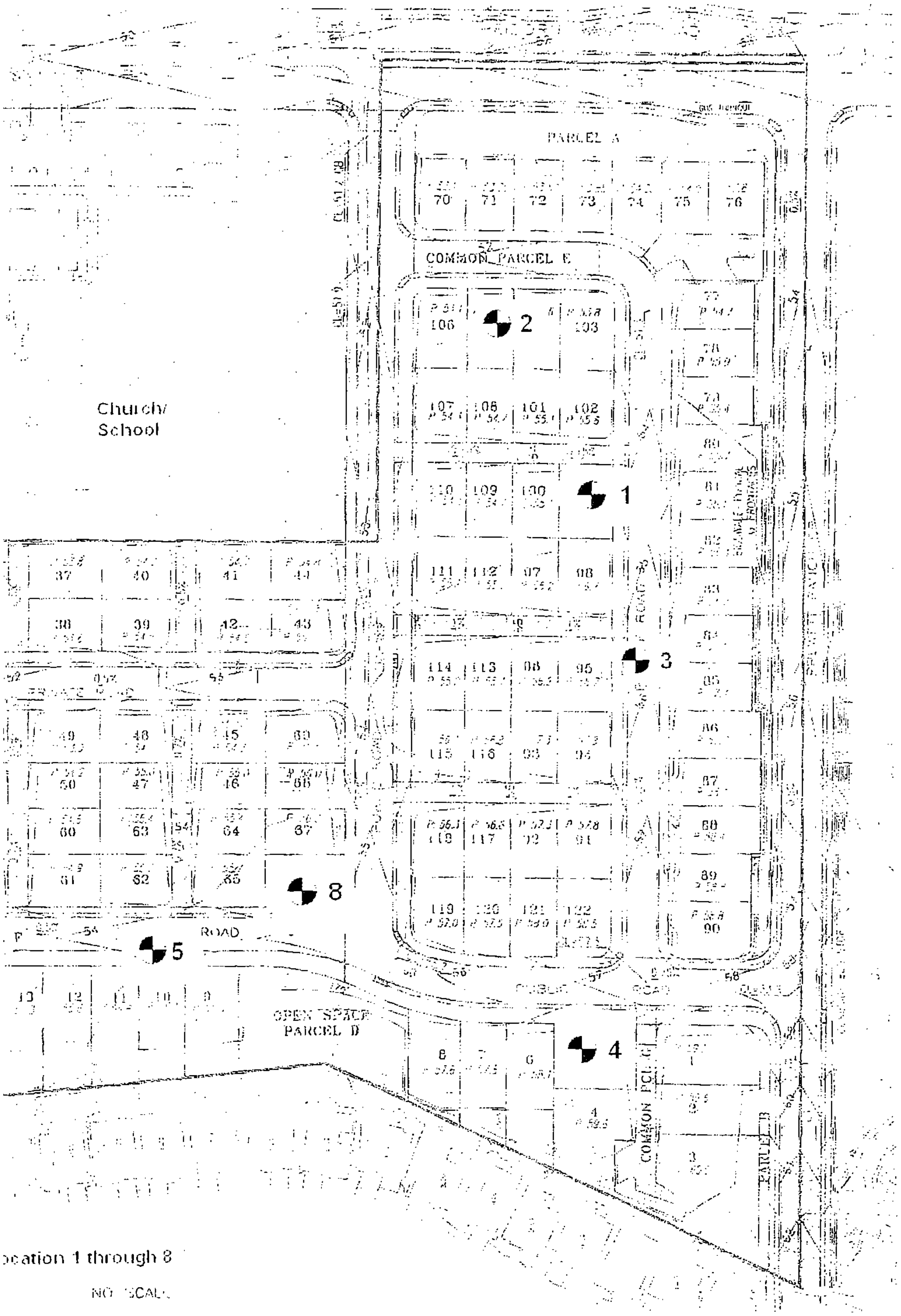
TIERRA VILLAS - HEIDORN RANCH ROAD

ANTIOCH, CALIFORNIA

CLIENT MISSION PEAK HOMES

FIGURE NO 1

REV. NO.



**PRA Group**
CONSULTING ENGINEERS

FIGURE NO.

# SITE PLAN AND BORING LOCATIONS

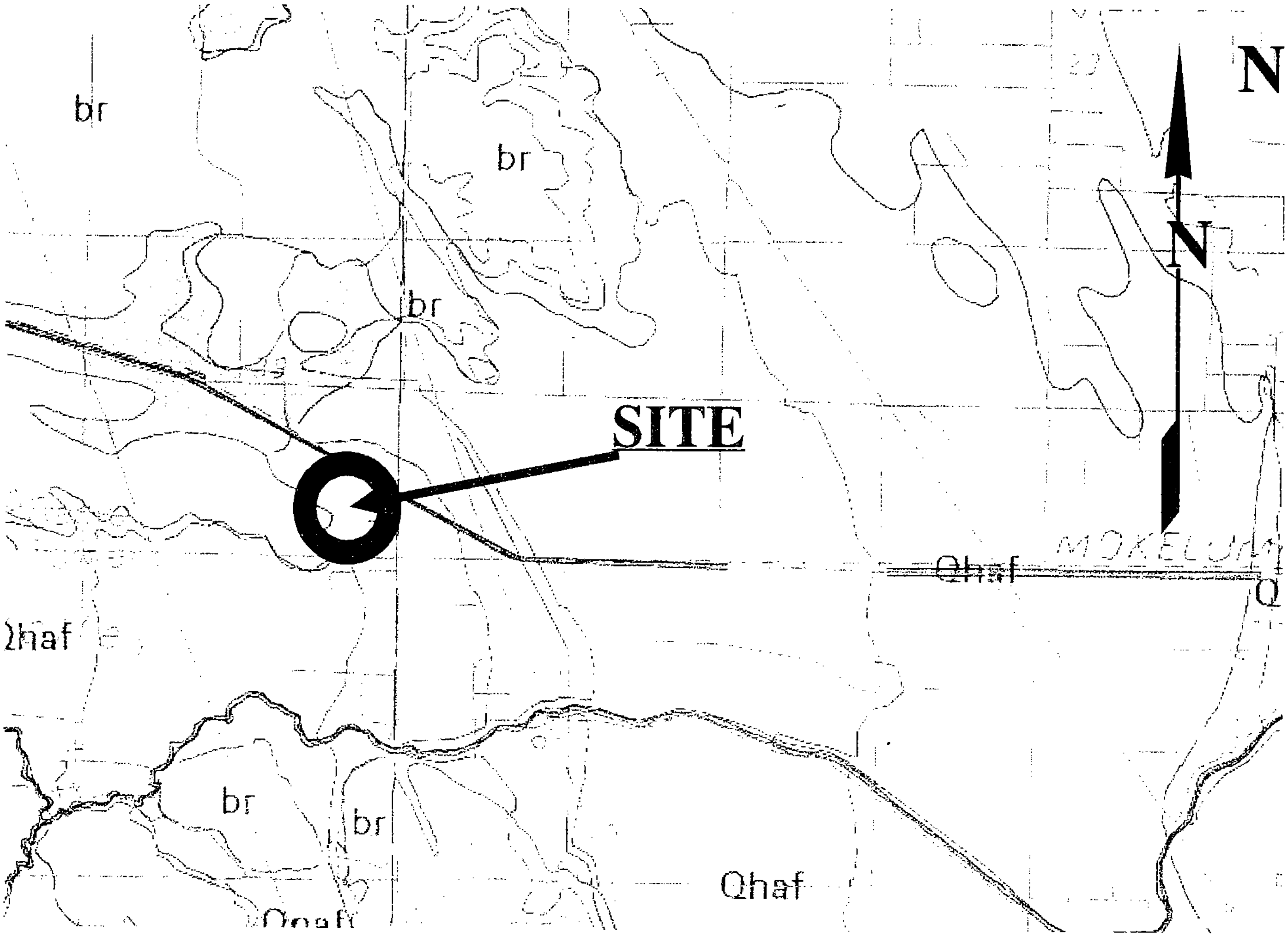
TIERRA VILLAS - HEIDORN RANCH ROAD
ANTIOCH, CALIFORNIA

2

CLIENT

MISSION PEAK HOMES

REV. NO.



EXPLANATION

| | |
|---|---|
| Qhl | Holocene Natural Levee Deposits |
| Qhb | Holocene Basin Deposits |
| Qhaf | Holocene Alluvial Fan and Fluvial Deposits |
| br | Bedrock |

NOTES

SOURCE: HELLEY AND GRAYMER (1997)

| | |
|---|---|
| DATE | FEBRUARY 2007 |
| JOB NO. | G240-01 |
| DWG NO. | G24001FIG3 |
| DRAWN | IDA |
| CHK'D | DJR |
| APP'D | DJR |

CLIENT

**PRA Group**
CONSULTING ENGINEERS

## AREA GEOLOGY MAP

TIERRA VILLAS
HEIDORN RANCH ROAD
ANTIOCH, CALIFORNIA
MISSION PEAK

FIGURE NO
3

REV. NO.

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01
LOGGED BY: jlm
DATE DRILLED: 9/29/06
PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs
DROP: 30 in
Note: Blow counts converted standard pen.
BORING ELEV.: E.G.
BORING DIAM.: 3.5 INCHES
BORING NO.
**B-1**

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | COHESION | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 1 | | | | | | | | | | | | |
| 2 | ■ | 1-1 | 14 | Fine Sandy Clay, medium rust brown. Moist | Stiff | CL | 112 | 17 | | 18 | 8290 | |
| 3 | | | | | | | | | | | | |
| 4 | ■ | 1-2 | 18 | | Very Stiff | CL | 114 | 15 | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | ■ | 1-3 | 14 | | Stiff | CL | 104 | 9 | | | | |
| 11 | | | | **BORING TERMINATED AT 10 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
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**EXPLORATORY BORING LOG B-1**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

FIGURE NO.
4

Client: Mission Peak

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01
LOGGED BY: jlm
DATE DRILLED: 9/29/06
PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs
Note: Blow counts converted standard pen.
DROP: 30 in
BORING ELEV.: E.G.
BORING DIAM.: 3.5 INCHES
BORING NO. **B-2**

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| 1 | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 2 | ■ | 2-1 | 18 | Sandy Clay, medium to dark brown/rust, moist | Very Stiff | CL | 111 | 18 | | | 5790 | |
| 4 | ■ | 2-2 | 15 | | Stiff | CL | 112 | 16 | | | | |
| 11 | ■ | 2-3 | 16 | | Stiff to Very Stiff | CL | 105 | 19 | | | | |
| 16 | ■ | 2-4 | 15 | Sandy Silt, medium to dark brown/rust, moist | Stiff | SM | 102 | 20 | | | | |
| 21 | ■ | 2-5 | 20 | | | | | | | | | |
| 26 | ■ | 2-6 | 44 | | | | | | | | | |
| 31 | ■ | 2-7 | 48 | Silty Sand,mottled brown, moist | Dense | SM | 115 | 9 | | | | 16 |
| 32 | | | | **BORING TERMINATED AT 31.5 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |

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**EXPLORATORY BORING LOG B-2**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
5

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01

LOGGED BY: jlm

DATE DRILLED: 9/29/06

PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs DROP: 30 in
Note Blow counts converted standard pen

BORING ELEV.: E.G.

BORING DIAM.: 3.5 INCHES

BORING NO.
**B-3**

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | HYDROMETER (Clay/Total)% | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 1 | ☐ | | | | | | | | | | | |
| 2 | ■ | 3-1 | 11 | Silty Clay, medium to dark brown, moist | Stiff | CL | | | 8.1/ 250 | 74 | | |
| 3 | ☐ | | | | | | | | | | | |
| 4 | ■ | 3-2 | 20 | Fine Sandy Clay, medium brown to rust, moist | Very Stiff | | | 14 | | | | |
| 5 | | | | **BORING TERMINATED AT 4.5 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
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**EXPLORATORY BORING LOG B-3**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
6

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01
LOGGED BY: jlm
DATE DRILLED: 9/29/06
PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs
DROP: 30 in
Note: Blow counts converted standard pen
BORING ELEV.: E.G.
BORING DIAM.: 3.5 INCHES
BORING NO.
**B-4**

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | COHESION | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 2 | ■ | 4-1 | 19 | Fine Sandy Clay, medium brown, moist | Very Stiff | CL | | | | | | |
| 4 | ■ | 4-2 | 14 | | Stiff | CL | 98 | 22 | | | | |
| 11 | ■ | 4-3 | 44/ 11" | Silty Clay, light to medium brown, dry | Hard | CL | 112 | 15 | | | | |
| 16 | ■ | 4-4 | 14 | Fine Sandy Clay, medium brown/rust, moist | Stiff | CL | 97 | 22 | | | | |
| | | | | **BORING TERMINATED AT 16.5 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |

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**EXPLORATORY BORING LOG B-4**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
7

# EXPLORATORY BORING LOG

| | | | |
|---|---|---|---|
| CLIENT: Mission Peak<br>PROJECT NO.: G240-01 | LOGGED BY: jlm | DATE DRILLED: 9/29/06 | PAGE 1 OF 1 |
| DRILL: B-24 Truck Mounted Rig<br>DRILLER: RAM Geotechnical Drilling<br>WEIGHT OF HAMMER: 140 lbs DROP: 30 in<br>Note: Blow counts converted standard pen | | BORING ELEV.: E.G.<br>BORING DIAM.: 3.5 INCHES | BORING NO.<br>**B-5** |

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 1 | ☐ | | | | | | | | | | | |
| 2 | ■ | 5-1 | 13 | Fine Sandy Clay, medium brown to rust, moist | Stiff | CL | 103 | 20 | 1.7/<br>500 | | | |
| 3 | ☐ | | | | | | | | | | | |
| 4 | ■ | 5-2 | 20 | | Very Stiff | CL | 109 | 16 | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | ☐ | | | | | | | | | | | |
| 11 | ■ | 5-3 | 33 | Silty Clay, medium brown to rust, moist | Hard | CL | 111 | 13 | | | | |
| 12 | | | | **BORING TERMINATED AT 11.5 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |
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**EXPLORATORY BORING LOG B-5**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
8

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01
LOGGED BY: jlm
DATE DRILLED: 9/29/06
PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs
DROP: 30 in
Note. Blow counts converted standard pen.
BORING ELEV.: E.G.
BORING DIAM.: 3.5 INCHES
BORING NO. **B-6**

| FIELD | | | | DESCRIPTION | LABORATORY | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| 1 | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 2 | ▨ | 6-1 | 16 | Fine Sandy Clay, medium to dark brown, moist | Stiff to Very Stiff | CL | 103 | 20 | | | | |
| 4 | ▨ | 6-2 | 15 | | Stiff | CL | 107 | 19 | | | | |
| 8 | | | | Sandy Silt, rust brown, moist | | | | | | | | |
| 11 | ▨ | 6-3 | 12 | | Stiff | SM | 103 | 15 | | | | |
| 12 | | | | **BORING TERMINATED AT 11.5 ft.<br>NO GROUNDWATER ENCOUNTERED** | | | | | | | | |

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Consultants in the Applied Earth Sciences

**EXPLORATORY BORING LOG B-6**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
9

# EXPLORATORY BORING LOG

CLIENT: Mission Peak
PROJECT NO.: G240-01
LOGGED BY: jlm
DATE DRILLED: 9/29/06
PAGE 1 OF 1

DRILL: B-24 Truck Mounted Rig
DRILLER: RAM Geotechnical Drilling
WEIGHT OF HAMMER: 140 lbs
DROP: 30 in
Note: Blow counts converted standard pen.
BORING ELEV.: E.G.
BORING DIAM.: 3.5 INCHES
BORING NO. **B-7**

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| 1 | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 2 | ■ | 7-1 | 17 | Silty Clay, medium brown, moist | Very Stiff | CL | 106 | 19 | | 24 | | 93 |
| 4 | ■ | 7-2 | 20 | Fine Sandy Clay, mottled brown, moist | Very Stiff | CL | | 12 | | | | |
| 11 | ■ | 7-3 | 30 | Fine Sandy Clay, medium brown to rust, moist | Very Stiff | SM | 103 | 22 | | | | |
| 12 | | | | **BORING TERMINATED AT 11.5 ft.<br>NO GROUNDWATER ENCOUNTERED** | | | | | | | | |

PRA Group
Consultants in the Applied Earth Sciences

**EXPLORATORY BORING LOG B-7**
Heidron Ranch Rd. and Prewett Ranch Dr.
Antioch, California

Client: Mission Peak

FIGURE NO.
10

# EXPLORATORY BORING LOG

| | | | |
|---|---|---|---|
| CLIENT: Mission Peak<br>PROJECT NO.: G240-01 | LOGGED BY: jlm | DATE DRILLED: 9/29/06 | PAGE 1 OF 1 |
| DRILL: B-24 Truck Mounted Rig<br>DRILLER: RAM Geotechnical Drilling<br>WEIGHT OF HAMMER: 140 lbs DROP: 30 in<br>Note: Blow counts converted standard pen. | | BORING ELEV.: E.G.<br>BORING DIAM.: 3.5 INCHES | BORING NO.<br>**B-8** |

| FIELD | | | | DESCRIPTION | | | LABORATORY | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEPTH (FT.) | SAMPLE | SAMPLE NO. | BLOWS / FT. | MATERIAL DESCRIPTION AND REMARKS | CONSISTENCY | USCS LETTER SYMBOL | DRY DENSITY (PCF) | MOISTURE CONTENT (%) | SWELL %/ SURCHARGE LOAD (PSF) | PLASTICITY INDEX | UNCONFINED COMPRESSIVE STRENGHT (PSF) | PERCENT PASSING NO. 200 SIEVE |
| 1 | | | | Silty Clay, light to medium brown, dry (Easy drilling) | | | | | | | | |
| 2 | ☐<br>■ | 8-1 | 13 | Silty Clay, medium to dark brown, moist | Stiff | CL | 101 | 21 | | 24 | 4730 | 88 |
| 4 | ☐<br>■ | 8-2 | 26 | Fine Sandy Clay, medium brown to rust, moist | Very Stiff | | 109 | 16 | | | | |
| 11 | ☐<br>■ | 8-3 | 66/ 11" | | Hard | | 103 | 25 | | | | |
| 12 | | | | **BORING TERMINATED AT 11.5 ft.**<br>**NO GROUNDWATER ENCOUNTERED** | | | | | | | | |

| | | |
|---|---|---|
| PRA Group<br>Consultants in the Applied Earth Sciences | **EXPLORATORY BORING LOG B-8**<br>Heidron Ranch Rd. and Prewett Ranch Dr.<br>Antioch, California<br>Client: Mission Peak | FIGURE NO.<br>11 |

# APPENDIX A

## RECOMMENDED GRADING SPECIFICATIONS
For
Tierra Villas Development
Proposed Single-Family Home Subdivision
Northwest Corner of Heidron Ranch Road and
Prewett Ranch Drive
Antioch, California
For
The Mission Peak Company

- The pipe shall be removed, and the trench shall be filled and compacted according to applicable requirements for compacting native soil (Section 3) or fill (Section 5).

- The pipe shall be crushed in the trench, and the trench shall be filled and compacted according to applicable portions of Sections 3 and 5.

- The ends of the pipes shall be capped with concrete to prevent entrance of water. The length of the cap shall be at least 5 feet.

7.2 Any existing wells on the site shall be filled, buried and capped according to the requirements of the local regulatory agency. The final elevation of the top of the well casing shall be a minimum of 36 inches below any adjacent grade at the completion of grading or filling. Under no circumstances should structural foundations be placed over the capped wells.

## 8. Grading Slopes

8.1 Slopes shall be graded at gradients no steeper than 2:1 (horizontal to vertical) for fill and cut, except as noted in the referenced report.

8.2 After the slopes have been graded, they shall be track-rolled, and provisions shall be made for planting the slopes for erosion control. Drainage facilities shall be constructed to prevent water from flowing over slopes. No slope shall be left to stand through a winter season without erosion control.

## 9. Installing Subdrains

9.1 For subdrains, the contractor shall provide and install perforated pipe Standard Designation Ratio (SDR) 23.5 or equivalent approved by the Geotechnical Engineer or the Engineer's Representative and filter material for subdrains as shown on the plans or as directed by the PRA Group, Inc. The following restrictions apply:

9.1.1 Clay drain tile, concrete drain tile and perforated clay pipe shall not be permitted. Use no wyes, tees, or other joints of these materials.

9.1.2 Porous concrete pipe, perforated asbestos-cement pipe, bituminous fiber or pipe of other materials shall be permitted only on written authorization of the Geotechnical Engineer.

9.1.3 The contractor shall use ½ by 3/4 inch drain rock wrapped within a filter fabric approved by our Geotechnical Engineer, unless otherwise permitted by written authorization from the Geotechnical Engineer.

9.1.4 Unless recommended otherwise by the Geotechnical Engineer or the Engineer's Representative, the contractor shall use pipes not less than 4 inches in diameter for lateral drains up to 50 feet in length. Use pipes of not less than 6 inches in diameter for lateral drains greater than 50 feet in length. Larger minimum pipe diameters may be specified by the Geotechnical Engineer or the Engineer's Representative during construction.

## 10. Unusual Conditions

10.1 If unusual conditions occur during grading, the Geotechnical Engineer shall be immediately notified for recommendations.

# Appendix D: Phase I Environmental Site Assessment

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Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

July 17, 2014

# Phase I Environmental Site Assessment

of

Heidorn Village
5220-5306 Heidorn Ranch Road
Antioch, California

Prepared for:

Mission Peak Homes, Inc.
47289 Mission Falls Court
Fremont, CA  94539

ASE Job No. 4612

# TABLE OF CONTENTS

# EXECUTIVE SUMMARY

## Findings and Opinions

Based on the site reconnaissance and observations of neighboring properties, historical and regulatory agency research, and interviews conducted by Aqua Science Engineers Inc, (ASE), the following issues were identified in regard to the subject site.

The following Potential Environmental Conditions (PECs) were identified during this Phase I ESA:

- The site and general vicinity has been used for agricultural usage, row crops, from the early 1900's to the 1990's. Although there is no data to support the usage of pesticides or herbicides on the subject site, it is widely recognized in the environmental industry that toxic chemicals have historically been used on soil at agricultural properties to control pests and unwanted weeds. No sampling or sample analysis was conducted by ASE during this Phase I ESA.

- Small stockpiles of what appear to be concrete rubble exist in the southeast corner of the site and in the northernmost quadrant of the property. ASE is unable to determine the makeup of the debris or where such debris came from.

- The subsurface vault usage is unknown.

It is the opinion of ASE that the conditions identified above have the potential to impact the subject site if (a) toxic chemicals were actually used historically at the site for purposes of rodent and weed control, (b) the debris is of a hazardous nature, or (c) the vault was somehow used for hazardous materials.

## Conclusions

ASE performed a Phase I Environmental Site Assessment (Phase I ESA) in conformance with the scope and limitations of ASTM Practice E 1527-13 for the property located at 5220 to 5306 Heidorn Ranch Road in Antioch, California. Any exceptions to, or deletions from, this practice are described in Sections 1.3 and 1.4 of this report. Potential environmental conditions (PECs) were identified by ASE in regard to the subject site.

# 1.0 INTRODUCTION

## 1.1 Purpose

The objective of this Phase I Environmental Site Assessment (Phase I ESA) is to identify recognized environmental conditions (RECs) and/or potential environmental concerns (PECs) in connection with the subject site. This Phase I ESA contains four major components (1) site reconnaissance; (2) records review; (3) interviews with regulatory agencies and site owners/occupants; and (4) preparation of this Phase I ESA. It is ASE's understanding that the purpose of this Phase I report is for a future property redevelopment as a residential community.

## 1.2 Scope of Services

This Phase I ESA was performed in accordance with ASE's original proposal #2014-117 dated June 6, 2014 and following the guidelines of the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Assessment: Phase I Environmental Site Assessment Process* (Designation: E 1527–13).

As defined by ASTM E 1527-13, a "recognized environmental condition" (REC) is a term defined as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions.

As defined by ASTM E 1527-13, a "controlled recognized environmental condition" (CREC) is a REC resulting from a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority with hazardous substances or petroleum products allowed to remain in place subject to implementation of required controls.

As defined by ASTM E 1527-13, a "historical recognized environmental condition" (HREC) is a term defined as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (ie. property use restrictions, activity and use limitations, institutional or engineering controls). The final decision rests with the environmental professional and will be influenced by the current impact of the historical recognized environmental condition on the property. If a past release of any hazardous substances or petroleum products has occurred in connection with the property and has been remediated, with such remediation accepted by the responsible regulatory agency (for example, as evidenced by the issuance of a "no further action letter" or equivalent), this condition shall be considered an historical recognized environmental condition and included in the findings section of the Phase I ESA Report. The environmental professional shall provide an opinion of the current impact to the property of this historical recognized environmental condition. If this historical recognized environmental condition remains as a current recognized environmental condition at the time the Phase I ESA is conducted, the condition shall be identified as such and listed in the conclusions section of the report.

The scope of this Phase I ESA did not include sample collection or testing. The following ASTM Non-Scope Items were not included in the scope of this Phase I ESA:

- Asbestos-containing Materials (ACM)
- Mold and Moisture Intrusion
- Lead-based Paint (LBP)
- Radon
- Wetlands
- Lead in Drinking Water
- Regulatory Compliance
- Health and Safety and Industrial Hygiene
- Cultural and Historic Resources
- Ecological Resources and Endangered Species
- Indoor Air Quality and Vapor Intrusion
- Biological Agents

### 1.3 Limitations and Exceptions

This Phase I ESA report has been prepared by the professional staff of ASE in accordance with generally accepted professional practices following the guidance of the standard practice ASTM E 1527-13.

The reasonably ascertainable information obtained for this Phase I ESA was provided by our client Mission Peak Homes, Inc., Environmental Data Resources, Inc (EDR), and collected from ASE's interviews and research of available documents and records held by government agencies or private parties. The integrity of the information obtained is subject to the accuracy and limitations of the documentation provided by EDR and the agencies or private parties consulted by ASE. The findings, opinions and conclusions presented in this Phase I ESA report were developed using our environmental professional judgment based on the reasonably ascertainable information obtained for the subject site in accordance with the guidelines of the standard practice ASTM E 1527-13. ASE assumes no responsibility or liability for the documents' accuracy or for the withholding by any of the involved parties of any reports or other information that could affect this transaction or this Phase I. As stated in ASTM E 1527-13 Section 4.5.1, Uncertainty Not Eliminated – No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. No warranty or guarantee is expressed or implied.

As with all environmental assessments, it is inconceivable to define all negative impacts that may exist on, near or beneath a property. There is always a possibility that unknown issues such as unidentified tanks, subsurface pollution, unpermitted historical activities, and the like could exist on a property without any current or historical documented evidence. ASE can assume no liability for negative impacts on a property that may be present where no current or historical documented evidence or records were made available to ASE.

The findings, opinions and conclusions set forth in this report are strictly limited in time and scope to the date of the evaluation and for the sole use of our Client. Use of this report by any third party is at their sole risk. ASE's liability is limited to the monetary fees received for this Phase I.

### 1.4 Special Terms and Reliance

No special terms or conditions were made between ASE and Mr. John Wong of Mission Peak Homes, Inc. (client) or Mr. Doug Krah. This report shall not be relied upon by or transferred to any other party, or used for any other purpose, without the expressed written authorization of ASE.

### 1.5 Information Supplied By User/Client

Documents and information pertaining to the property's size and title were supplied to ASE by Mr. John Wong of Mission Peak Homes, Inc. and Mr. Doug Krah. An Environmental Questionnaire was completed by Mr. John Wong of Mission Peak Homes, Inc., the current property owner. Mr. Wong and Mr. Krah provided information regarding their knowledge of the property, and did not indicate to ASE the presence of any liens or activity or use limitations (AULs) for the site.

## 2.0 SITE RECONNAISSANCE

### 2.1 Site Description Summary

| | |
|---|---|
| **Current Site Name** | Heidorn Village |
| **Site Address** | 5220-5306 Heidorn Ranch Road, Antioch, CA |
| **Parcel Number** | 056-130-013, 015, 017 & 018 |
| **Property Owner** | Mission Peak Homes, Inc. |
| **Site Contacts** | Mr. John Wong, Mr. Doug Krah |
| **Site Observation Date** | June 20, 2014 |
| **ASE Field Representative** | David Allen |
| **Weather Conditions** | Sunny, 75° F |
| **Current Site Use** | Vacant land |
| **Site Area** | The property is approximately 20 acres |
| **Site Elevation (above mean sea level)** | 151 feet |
| **Geology and Surficial Soils** | The subject site is located in an area identified within the EDR as CAPAY, which is a clay with very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer. Moderately well drained. |
| **Hydrogeology** | The beneficial uses within this area, per the RWQCB, is potential drinking water. Per the EDR report, the site lies within a 100-year flood zone. |
| **Estimated Groundwater Depth (below ground surface)** | Based on information within the file, the groundwater depth in the area can range between 30 and 55-feet bgs. |
| **Estimated Groundwater** | Based on information within the EDR, groundwater in the area typically flows in a |

| | |
|---|---|
| **Flow Direction** | northeastward direction. |
| **Building Area** | No structures exist at site |
| **Year Built** | NA |
| **Number of Buildings** | 0 |
| **Number of Stories** | NA |
| **Number of Units** | NA |
| **Electricity Provider** | None |
| **Natural Gas Provider** | None |
| **Water and Sewer Supplier** | None |
| **Solid Waste/Recycling Removal Company** | None |

Site maps and figures are included in Appendix A. Site Photographs are included in Appendix B.

## 2.2 Description of Site and Improvements

The subject site exists in a rural to suburban setting in the city of Antioch, Contra Costa County, California, as vacant land south of the intersection between Lone Tree Way and Heidorn Ranch Road. The property is fenced along Heidorn Ranch Road, and bound by neighboring properties (residential and church) and an EBMUD easement/walking trail. Entry to the site is from a gravel road off of Heidorn Ranch Road. No utilities were observed at the site. The property is basically flat, vacant land with no visible structures or buildings, and several trees. Several piles of debris exist (possibly concrete rubble) in the southwest corner and northern quadrant of the site (suspected to be remnants of former structures on the site). An underground wooden-framed structure was identified in the northeastern quadrant of the site that measured approximately 4-feet by 4-feet by 3-feet deep. A 4-inch plastic pipe was found entering the structure (septic system?). Three utility poles were noted along the northeastern property line.

### *2.3 ASTM Scope Items*

*<u>CURRENT or FORMER Hazardous Materials Usage, Storage, and Disposal and Other Recognized Environmental Concerns (RECs) or Potential Environmental Concerns (PEC)</u>*

| **Hazardous Materials** | | |
|---|---|---|
| **Description** | **Container Type/Size** | **CONDITION** |
| Paints, primers, lubricants, cleaners, solvents, oils, fuels, cylinders, wastes | None Observed | No REC Identified |

| | | |
|---|---|---|
| Underground storage tanks (USTs) and Aboveground storage tanks (ASTs) | None Observed | No REC Identified |
| Drains, septic systems, sumps, interceptors, separators, clarifiers or other below-ground features | None observed currently. Historical septic system removed under permit. A subsurface vault exists in the northernmost portion of the property | PEC Identified |
| Polychlorinated Biphenyls (PCBs) | None Observed | No REC Identified |

| | | |
|---|---|---|
| (Used prior to 7/19/1979) | | |
| Surface staining on building materials and/or stained soil or pavement | None Observed | No REC Identified |
| Lead based paint and asbestos containing material | None observed currently. Historical homes demolished under permit, ACM removed. | No REC Identified |
| Poor housekeeping | None observed | No REC Identified |
| Pools of liquid, pits, ponds or lagoons | None observed | No REC Identified |
| Odors | None observed | No REC Identified |
| Drums, unidentified substance containers | None observed | No REC Identified |
| Stressed vegetation | None observed | No REC Identified |
| Solid waste, construction debris, fill material | Stockpiled debris and concrete rubble | PEC Identified |
| Discharge of wastewater or other liquid to drains or ditch, or stream | None observed | No REC Identified |

## 2.4 Conditions of Environmental Concern

Vapor Intrusion

Based on the historical usage of the site, vapor intrusion of pollution into a structure would not be considered a threat at this site.

No other conditions of environmental concerns were observed by ASE during the site visit.

## 2.5 Surrounding Properties

A general description of the usage of the adjoining properties and surrounding areas was accomplished by the environmental professional during the site visit through observations, available interviews and review of available records. This task was performed to help identify environmental concerns that may have the potential to impact the subject site.

<table>
<tr><th colspan="4"><b>Adjoining Properties</b><br>Properties that are listed in the EDR regulatory database report are discussed in Section 4.0</th></tr>
<tr><th>Name and Address</th><th>Operation</th><th>Direction</th><th>CONDITION</th></tr>
<tr><td>Varies</td><td>Residential and Retail</td><td>North</td><td>No REC Identified</td></tr>
<tr><td>Varies</td><td>Residential</td><td>West</td><td>No REC Identified</td></tr>
<tr><td>Varies</td><td>Residential and Vacant land</td><td>South</td><td>No REC Identified</td></tr>
<tr><td>Varies</td><td>Church, Residential and Retail</td><td>East</td><td>No REC Identified</td></tr>
<tr><th colspan="4"><b>Surrounding Properties</b><br>(Properties beyond adjoining properties)<br>Properties that are listed in the EDR regulatory database report are discussed in Section 4.0</th></tr>
<tr><th colspan="3">Operation</th><th>CONDITION</th></tr>
<tr><td colspan="3">Commercial, Office, Retail, Recreational and Residential</td><td>No REC Identified</td></tr>
</table>

## 2.6 Data Gaps

No significant data gaps were identified by ASE during execution of this Phase I ESA.

## 3.0 SITE HISTORY AND RESEARCH

The purpose of the historical records review is to research available records including aerial photographs, topographic and fire insurance maps, city directories, building permits, tax records, environmental lien records, local agency records, other related historical documents and interviews that will assist in the identification of past uses having led to potential RECs in connection with the subject site. The following sources were used to investigate the history of the subject site.

### 3.1 Aerial Photographs

**Aerial Photograph Review**
Aerial photographs were obtained from Environmental Data Research, Inc. (EDR).
Copies of selected aerial photographs are included in Appendix C.

| Year | Findings |
|---|---|
| 1939 | Subject site and surrounding areas all appear to be used as agricultural/row crops. No structures onsite. Lone Tree Way and Heidorn Ranch Road are visible. The Mokelumne Aqueduct is in place. The residence at 5225 Heidorn Ranch Road is visible. |
| 1950 | Subject site and surrounding areas all appear to be used as agricultural/row crops. |
| 1959 | The subject site and surrounding area appears as it did in the previous photo. |
| 1966 | The subject site and surrounding area appears as it did in the previous photo. |
| 1968 | The subject site and surrounding area appears as it did in the previous photo. |
| 1979 | The subject site and surrounding area appears as it did in the previous photo. |
| 1981 | The subject site's two southern parcels remain undeveloped, while portions of the northernmost parcels appear to be developed with a dwelling. The west and north adjacent sites remain agricultural. The southern residence at 5320 is now visible. The east adjacent site continues with its residence and cropland. The vicinity remained a mixture of suburban development and agricultural land. |
| 1993 | The subject site and surrounding area appears as it did in the previous photo. |
| 1998 | The subject site and surrounding area appears as it did in the previous photo. |
| 2005 | The subject site has no structures any longer. The church property at 5200 is now developed. Major residential development to the north and west, retail to the northeast. |
| 2006 | The subject site and surrounding area appears as it does today. |
| 2009 | The subject site and surrounding area appears as it does today. |
| 2010 | The subject site and surrounding area appears as it does today. |

### 3.2 Fire Insurance Maps (Sanborn Maps)

ASE reviewed available historical fire insurance maps (Sanborn Maps) for the subject site and surrounding areas from Environmental Data Research, Inc. (EDR).

**Sanborn Map Review, Appendix D**

| Year | Findings |
|---|---|
| NA | The subject site is not covered by Sanborn Fire Insurance Maps. |

## 3.3 Topographic Maps

**Topographic Map Review**
Topographic maps were obtained from Environmental Data Research, Inc. (EDR).
A copy of the topographic maps is included in Appendix E.

| Years | Findings |
|---|---|
| 1896, 1912, 1914, 1916, 1943, 1947, 1953, 1954, 1968, 1973, 1980 | Topo Maps for these dates were labeled MOUNT DIABLO, LONE TREE VALLEY, ANTIOCH SOUTH, BRENTWOOD and BYRON. No subject site buildings, structures or landmarks were observed on these maps. |

## 3.4 City Directories

**City Directories Review**
City Directories were obtained from Environmental Data Research, Inc. (EDR). A copy of the report is included in Appendix F.
Notes: W=West, N=North, E=East, S=South, Adj= Adjoining Property

| Findings |
|---|
| No issues were identified in the report. |

## 3.5 Agency Research and Interviews

**Agency Research and Interviews**
Copies of information/records obtained are included in Appendix G

| Name, Contact, Phone No. | Findings |
|---|---|
| City of Antioch Business Tax Office, Lisa Saunders | Phone conversation with Ms. Saunders on 6/23/14. There were no business records for site APN's. |
| City of Antioch Building Department, Gene Vigil | Email provided by Mr. Vigil on 6/24/14. There were no building department records for site APN's. |
| Contra Costa County Fire Protection Bureau<br>Jo Ann West | Phone conversation with Ms. West on 6/25/14. There were no records for the subject site. |
| Contra Costa Health Services, Hazardous Materials Program, Octavious Blocker | Email from Mr. Blocker on 6/24/14. No files for subject site. |
| California Regional Water Quality Control Board (RWQCB)<br>Ms. Melinda Wong | ASE sent an email to Ms. Wong on 6/23/14 requesting to review any files for the subject addresses. Ms. Wong responded to the ASE request by telephone on 7-17-14 stating that her agency had no files for the site. |
| California Department of Conservation<br>DOGGR Website | The Division of Oil, Gas, and Geothermal Resources online mapping services was viewed. No such wells were identified on the property. However, there are several wells in the vicinity. |
| RWQCB GeoTracker Database | ASE visited the GEOTRACKER online website. No files were listed. |
| ENVIROSTOR (DTSC) Database | The addresses of the subject site was not shown on the ENVIROSTOR database. ASE emailed a letter to the DTSC on 6/23/14 requesting to review any files for the subject addresses. The DTSC responded in a letter dated 7/10/14 that they had no files. |

| **Agency Research and Interviews**<br>Copies of information/records obtained are included in Appendix G | |
|---|---|
| **Name, Contact, Phone No.** | **Findings** |
| Environmental Questionnaire | Mr. John Wong completed the questionnaire on 6/16/14. No environmental issues were noted by Mr. Wong. A copy of the questionnaire is attached in Appendix G. |

## Interviews

Key Site Person, Developer

- ASE spoke several times in June 2014 with Mr. Doug Krah, by telephone. Mr. Krah is the site developer, assisting the Mission Peak Company, Inc. in preparing the property for development. Mr. Krah was unaware of any environmental issues at the site. He stated that he was unaware of any existing wells on the site. The 3 power poles are to be removed, and future electrical service will be buried. An EBMUD easement exists at the northern property line, where a walking trail exists.

Tenants

- None

Agency Representatives

- Due to the fact that no environmental files were present at the local regulatory agencies, no interviews were conducted with case workers that would handle the subject site addresses.

### 3.6 Previous Environmental Reports

| Previous Environmental Reports | | |
|---|---|---|
| **Title, Author and Date** | **Findings** | **CONDITION** |
| Phase I Environmental Site Assessment, 5220-5300 Heidorn Ranch Road, Antioch, CA 94513, dated July 8, 2003, by Aqua Science Engineers, Inc. | | See Note Below |

NOTE:

It was noted in a 2003 Phase I ESA, written by ASE, that historically a conventional house and mobile home with associated sheds were located on the northernmost two parcels. It was also noted that a septic system and possibly two wells existed on the property. In documents supplied to ASE, the structures were sampled for asbestos, and demolished properly under permit from the Bay Area Air Quality Management District by Delta Construction and Engineering in 2004. Delta also removed the septic system under permit from Contra Costa Health Services in 2004. Based on a conversation with Mr. Leroy Chancellor of Martell Water Systems (the well removal company) on July 1, 2014, only one well existed at the site. Mr. Chancellor provided a Well Completion Report, dated 9/27/04, detailing the drill-out of one 144’ well at 5020 Heidorn Ranch Road. This address is located directly in the middle of the subject property boundaries when viewed in Google Maps. See Appendix G for copies of records described above. All of these issues would be considered historical recognized environmental conditions (HRECs) that are not considered an REC at this time or within this report.

### 3.7 Historical Research Summary

| Historical Research Summary | | | | |
|---|---|---|---|---|
| **Period** | **Subject Site** | **CONDITION** | **Adjoining/Neighboring Properties** | **CONDITION** |
| 1930’s to Present | Agricultural | PEC Identified See Note Below | Raw land, agricultural land, residential, commercial/retail development in vicinity | No REC Identified |

NOTE:

A potential environmental concern (PEC) is noted above in the following areas:

- The site and general vicinity has been used for agricultural usage, row crops, from the early 1900’s to the 1990’s. Although there is no data to support the usage of pesticides or herbicides on the subject site, it is widely recognized in the environmental industry that toxic chemicals have historically been used on soil at agricultural properties to control pests and unwanted weeds. No sampling or sample analysis was conducted by ASE during this Phase I ESA.

## 3.8 Data Failure

A data failure exists for this Phase I in the fact that there was no historical data obtained or reviewed that could identify the historical usage of the property dating back prior to 1940.

## 4.0 REGULATORY DATABASE

The purpose of the regulatory database review is to identify environmental concerns in connection with the subject site and neighboring properties typically within a one-mile radius. ASE obtained an environmental database report from EDR. The regulatory review is performed at four jurisdiction levels: (1) federal records; (2) state and local records; (3) tribal records; and (4) EDR proprietary records. The radius distances for the various databases were selected following the standard practice ASTM E 1527-13. Based on their nature, some database distances were limited to only include the subject site and adjoining properties. The list of orphan sites (sites that could not be plotted accurately by EDR) was reviewed and sites that were identified by ASE at the site or vicinity were included in the appropriate listing. A copy of the EDR database report is included in Appendix H. The following information is based on the database report supplied by EDR.

THE SUBJECT SITE WAS NOT LISTED ON ANY OF THE EDR DATABASES LISTED BELOW.

**Regulatory Database Review**

Notes: adj=adjoining property; Neigh=neighboring property (less than 1/4 mile); >= more than; DG= down-gradient; UG= up-gradient; XG= cross-gradient; RP= responsible party; NFA= no further action; REC=Recognized Environmental Condition

| Jurisdiction/ Listing | Search Distance (miles) | Subject Site | Adj | Neigh | Comments | REC |
|---|---|---|---|---|---|---|
| **Federal Listings** | | | | | | |
| National Priority List (NPL) | 1 | 0 | 0 | 0 | | |
| Delisted NPL | 1 | 0 | 0 | 0 | | |
| CERCLIS | 1/2 | 0 | 0 | 0 | | |
| CERC-NFRAP | 1/2 | 0 | 0 | 0 | | |
| RCRA-CORRACTS | 1 | 0 | 0 | 0 | | |
| RCRA-NonGen | 1/4 | 0 | 0 | 0 | | |
| RCRA-SQG (Small Quantity Generator) | 1/4 | 0 | 0 | 0 | | |
| RCRA-CESQC | 1/4 | 0 | 0 | 0 | | |
| RESPONSE | 1 | 0 | 0 | 0 | | |
| **State and Local Listings & Additional Listings** | | | | | | |
| US Brownfields | 1/2 | 0 | 0 | 0 | | |
| ENVIROSTOR | 1 | 0 | 0 | 0 | | |
| Historical Cal-Sites | 1 | 0 | 0 | 0 | | |
| Solid Waste Landfills | 1/2 | 0 | 0 | 0 | | |

**Regulatory Database Review**

Notes: adj=adjoining property; Neigh=neighboring property (less than 1/4 mile); >= more than; DG= down-gradient; UG= up-gradient; XG= cross-gradient; RP= responsible party; NFA= no further action; REC=Recognized Environmental Condition

| **Jurisdiction/ Listing** | **Search Distance (miles)** | **Subject Site** | **Adj** | **Neigh** | **Comments** | **REC** |
|---|---|---|---|---|---|---|
| Alameda County CS | 1/2 | 0 | 0 | 0 | | |
| AST | 1/4 | 0 | 0 | 0 | | |
| LUST | 1/2 | 0 | 0 | 0 | | |
| | | | | | | |
| Spills and Investigations SLIC | 1/2 | 0 | 0 | 0 | | |
| UST and CA FID | Subject site and adj | 0 | 0 | 0 | | |
| HIST UST and SWEEPS | Subject site and adj | 0 | 0 | 0 | | |
| HIST CORTESE | 1/2 | 0 | 0 | 0 | | |
| FINDS | Subject site | 0 | 0 | 0 | | |
| EMI | Subject site | 0 | 0 | 0 | | |
| HAZNET | Subject site | 0 | ☒ | ☒ | | |
| Dry Cleaners | 1/4 | 0 | 0 | 0 | | |
| **Tribal Records** | | | | | | |
| Indian LUST | 1/2 | 0 | 0 | 0 | | |
| Indian UST | 1/2 | 0 | 0 | 0 | | |
| **EDR Proprietary Records** | | | | | | |
| Historical Dry Cleaners | 1/4 | 0 | 0 | 0 | | |
| Historical Auto Stations | 1/4 | 0 | 0 | 2 | Two sites are included in this database. Both sites existed where the residential community currently exists to the west of the site. These would not be considered a threat to the subject site. | No REC |

## 5.0 FINDINGS

The following Potential Environmental Conditions (PECs) were identified during this Phase I ESA:

- The site and general vicinity has been used for agricultural usage, row crops, from the early 1900's to the 1990's. Although there is no data to support the usage of pesticides or herbicides on the subject site, it is widely recognized in the environmental industry that toxic chemicals have historically been used on soil at agricultural properties to control pests and unwanted weeds. No sampling or sample analysis was conducted by ASE during this Phase I ESA.

- Small stockpiles of what appear to be concrete rubble exist in the southeast corner of the site and in the northernmost quadrant of the property. ASE is unable to determine the makeup of the debris or where such debris came from.

- The subsurface vault usage is unknown.

## 6.0 OPINION

It is the opinion of ASE that the conditions identified above have the potential to impact the subject site if (a) toxic chemicals were actually used historically at the site for purposes of rodent and weed control, (b) the debris is of a hazardous nature, or (c) the vault was somehow used for hazardous materials.

## 7.0 CONCLUSIONS

The following Potential Environmental Conditions (PECs) were identified during this Phase I ESA:

- The site and general vicinity has been used for agricultural usage, row crops, from the early 1900's to the 1990's. Although there is no data to support the usage of pesticides or herbicides on the subject site, it is widely recognized in the environmental industry that toxic chemicals have historically been used on soil at agricultural properties to control pests and unwanted weeds. No sampling or sample analysis was conducted by ASE during this Phase I ESA.

- Small stockpiles of what appear to be concrete rubble exist in the southeast corner of the site and in the northernmost quadrant of the property. ASE is unable to determine the makeup of the debris or where such debris came from.

- The subsurface vault usage is unknown.

## 8.0 SIGNATURE OF PROFESSIONAL

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Section 312.10 of 40 CFR, Part 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject property. I have developed and performed the “all appropriate inquiries” in conformance with the standards and practices set forth in 40 CFR, Part 312.

The qualifications of the professionals involved on this project are included in Appendix I. ASE appreciates the opportunity to have prepared this Phase I Environmental Site Assessment for our Client. Should any questions or comments arise, please feel free to call us at (925) 820-9391.

Respectfully submitted,

AQUA SCIENCE ENGINEERS, INC.

David Allen

David Allen
Vice President

## 9.0 REFERENCES

The following published reference sources were used in the preparation of this Phase I ESA:

1. EDR’s Environmental Database, Radius Map Report.
2. Geotracker, www.geotracker.swrcb.ca.gov
3. DTSC’s ENVIROSTOR webpage, www.**envirostor**.dtsc.ca.gov
4. RWQCB, San Francisco Bay Region
5. Wikipedia, www.wikepedia.org
6. State of California Department of Conservation DOGGR
7. City of Antioch Business License and Building Permit Records
8. Contra Costa Health Services-Hazmat Division
9. Contra Costa Fire Protection Bureau

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX A

## Site Maps and Figures

NORTH

NOT TO SCALE

# SITE LOCATION MAP

Heidorn Village
5220 - 5306 Heidorn Ranch Road
Antioch, California

Aqua Science Engineers

Figure 1

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX B

## Site Photographs

View looking north from entrance road on property at residential and church properties.

View looking south from entrance road on property at residence 5320.

View looking east from entrance road on property at property entrance and adjacent eastern properties.

View looking west from entrance road on property at adjacent residential community.

View looking at debris piles located in southwestern corner of site.

View looking at debris pile located in northern quadrant of site.

View of in-ground vault.

View of interior of in-ground vault.

View of miscellaneous items at 5320.

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# APPENDIX C

## Aerial Photographs

**Heidorn Ranch Road**
5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531

Inquiry Number: 3976090.9
June 23, 2014

# The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

# EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

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***Thank you for your business.***
Please contact EDR at 1-800-352-0050
with any questions or comments.

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## Date EDR Searched Historical Sources:

Aerial Photography June 23, 2014

## Target Property:

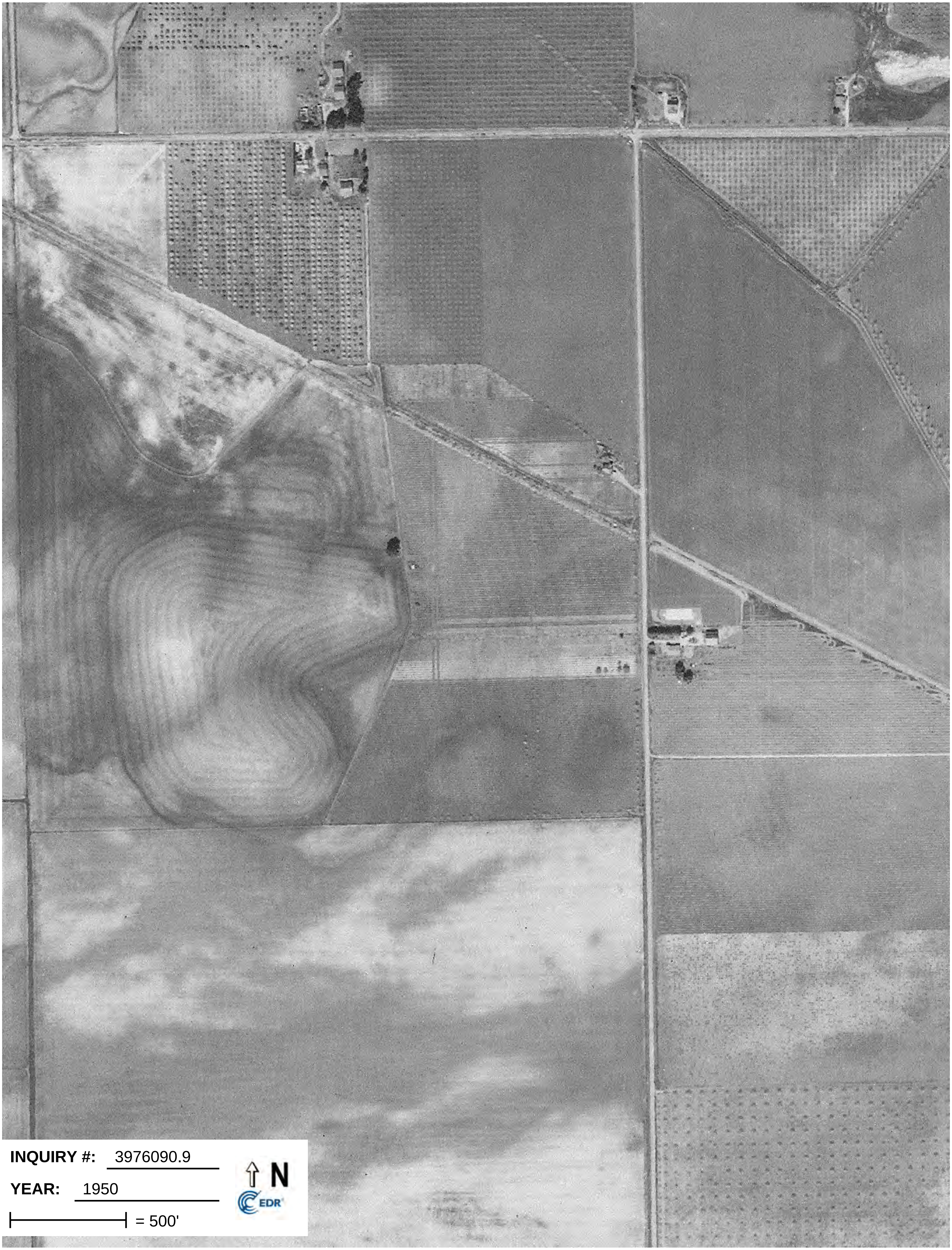
5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531

| ***Year*** | ***Scale*** | ***Details*** | ***Source*** |
|---|---|---|---|
| 1939 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1939 | EDR |
| 1950 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1950 | EDR |
| 1959 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1959 | EDR |
| 1966 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1966 | EDR |
| 1968 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1968 | EDR |
| 1979 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1979 | EDR |
| 1981 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1981 | USGS |
| 1993 | Aerial Photograph. Scale: 1"=500' | /DOQQ - acquisition dates: 1993 | EDR |
| 1998 | Aerial Photograph. Scale: 1"=500' | Flight Year: 1998<br>Best Copy Available from original source | USGS |
| 2005 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2005 | EDR |
| 2006 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2006 | EDR |
| 2009 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2009 | EDR |
| 2010 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2010 | EDR |
| 2012 | Aerial Photograph. Scale: 1"=500' | Flight Year: 2012 | EDR |

**INQUIRY #:** 3976090.9

**YEAR:** 1939

= 500'



INQUIRY #: 3976090.9
YEAR: 1950
= 500'
N
EDR

INQUIRY #: 3976090.9
YEAR: 1959
= 500'
N
EDR

**INQUIRY #:** 3976090.9

**YEAR:** 1966

**INQUIRY #:** 3976090.9

**YEAR:** 1968

= 500'

**INQUIRY #:** 3976090.9

**YEAR:** 1979

= 500'

**INQUIRY #:** 3976090.9

**YEAR:** 1981

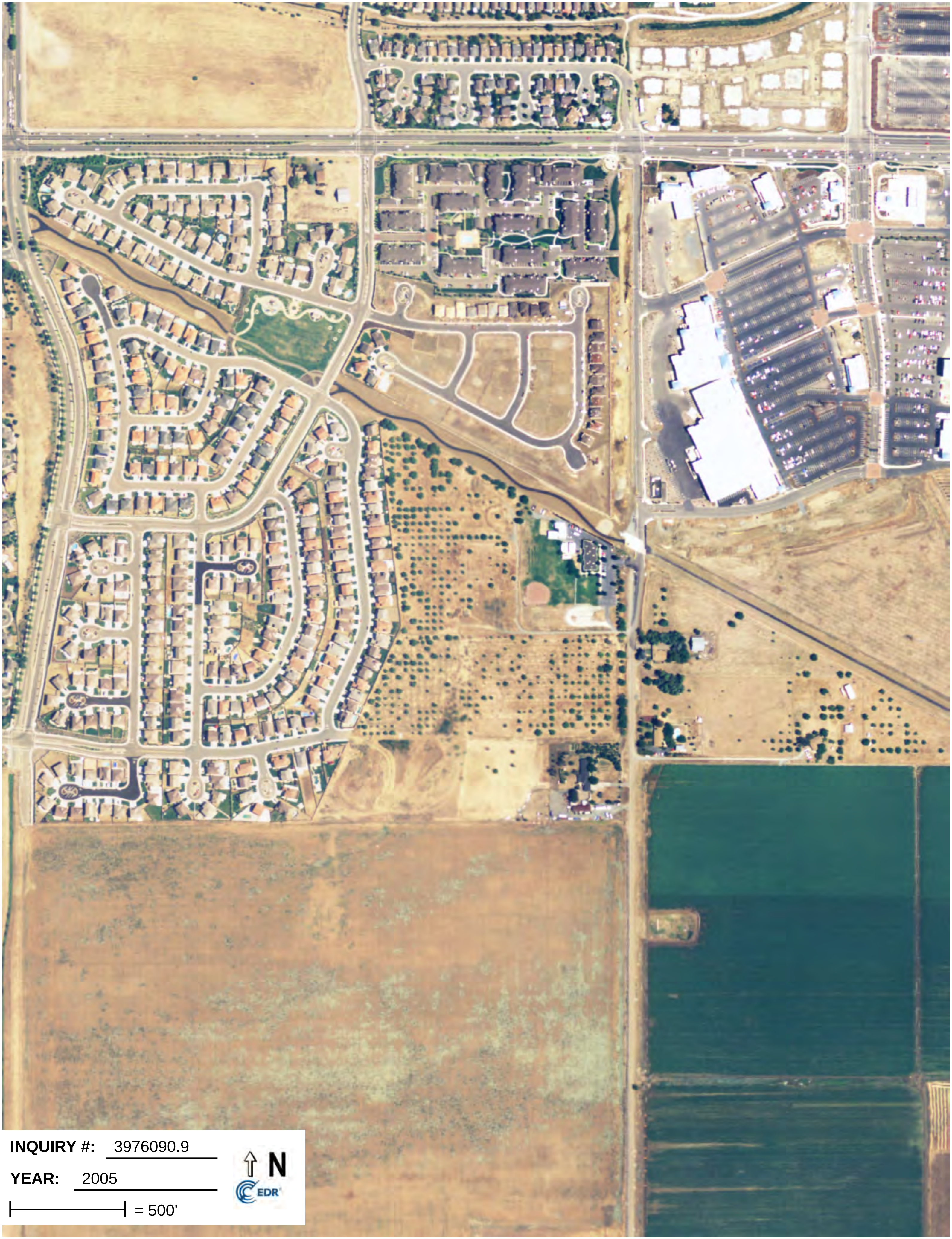
= 500'

INQUIRY #: 3976090.9
YEAR: 1993
= 500'
N

**INQUIRY #:** 3976090.9

**YEAR:** 1998

= 500'



INQUIRY #: 3976090.9
YEAR: 2005
= 500'
N
EDR

**INQUIRY #:** 3976090.9

**YEAR:** 2006

= 500'

**INQUIRY #:** 3976090.9

**YEAR:** 2009

= 500'

**INQUIRY #:** 3976090.9

**YEAR:** 2010

= 500'

N

EDR

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55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX D

## Sanborn Fire Insurance Map Report

**Heidorn Ranch Road**
5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531

Inquiry Number: 3976090.3
June 18, 2014

# Certified Sanborn® Map Report

EDR®

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

# Certified Sanborn® Map Report

6/18/14

**Site Name:**
Heidorn Ranch Road
5220 - 5300 Heidorn Ranch
Antioch, CA 94531

EDR Inquiry # 3976090.3

**Client Name:**
Aqua Science Engineers Inc.
55 Oak Court
Danville, CA 94526

Contact: Dave Allen

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Aqua Science Engineers Inc. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

## *Certified Sanborn Results:*

**Site Name:** Heidorn Ranch Road
**Address:** 5220 - 5300 Heidorn Ranch Road
**City, State, Zip:** Antioch, CA 94531
**Cross Street:**
**P.O. #** 4612
**Project:** MP-Heidorn Ranch Road
**Certification #** 7A25-4802-BE89

### UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results
Certification # 7A25-4802-BE89

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

*The Sanborn Library LLC Since 1866™*

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55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX E

## Topographic Maps

**Heidorn Ranch Road**
5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531

Inquiry Number: 3976090.4
June 20, 2014

# EDR Historical Topographic Map Report

EDR®

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

# EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

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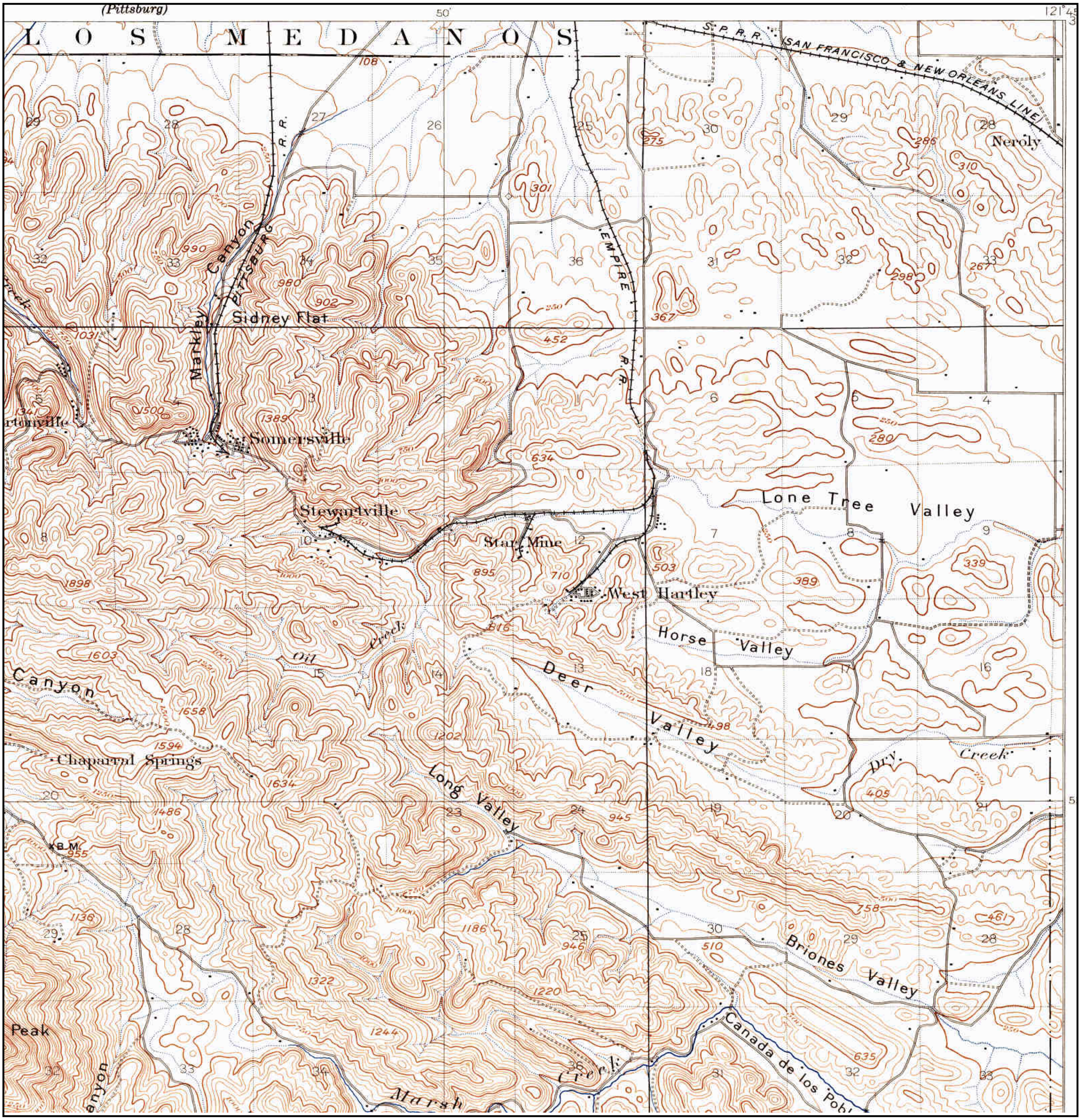
# Historical Topographic Map



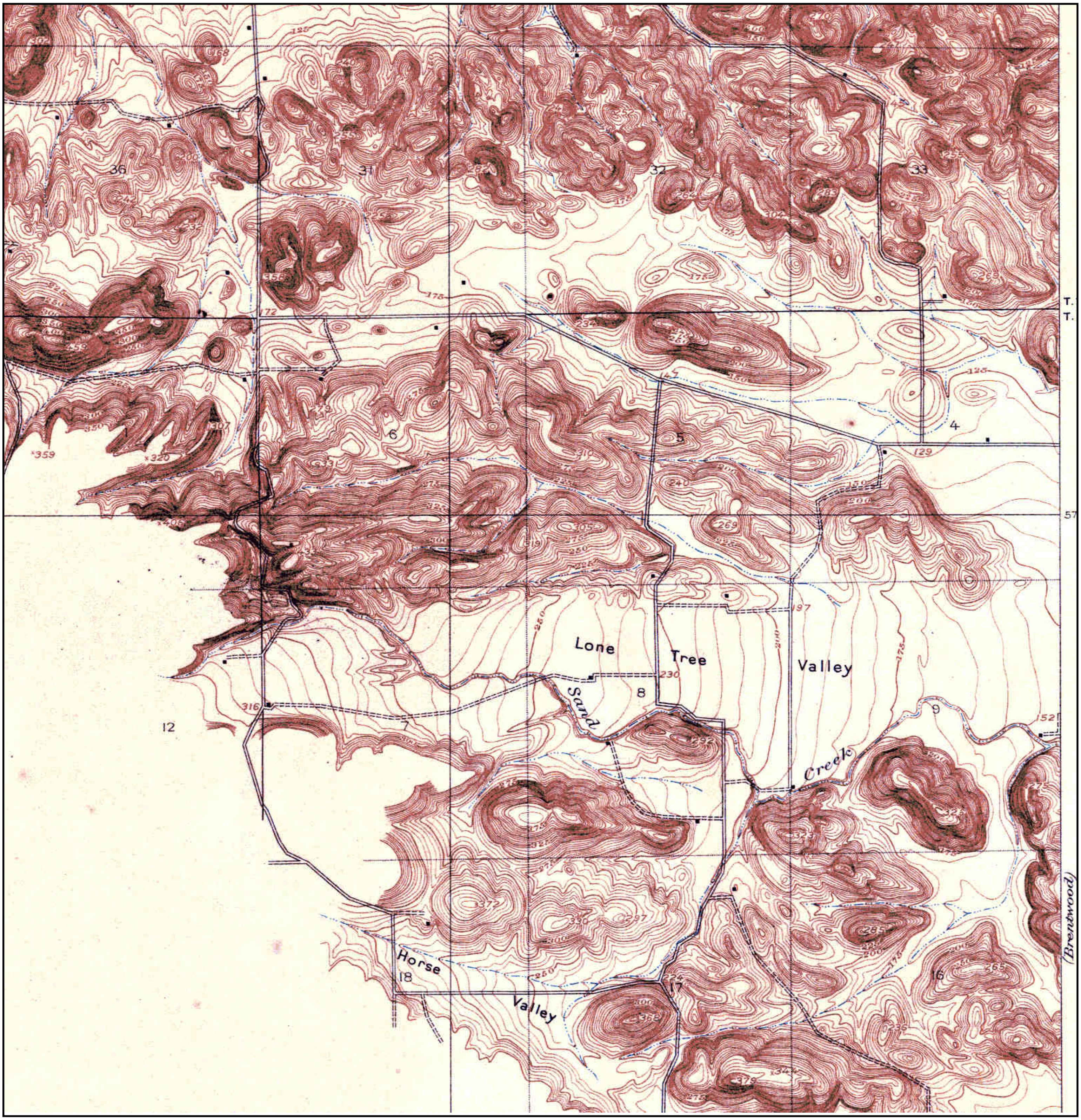
| | | |
|---|---|---|
| TARGET QUAD<br>NAME: MOUNT DIABLO<br>MAP YEAR: 1896<br><br>SERIES: 15<br>SCALE: 1:62500 | SITE NAME: Heidorn Ranch Road<br>ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531<br>LAT/LONG: 37.9561 / -121.7532 | CLIENT: Aqua Science Engineers Inc.<br>CONTACT: Dave Allen<br>INQUIRY#: 3976090.4<br>RESEARCH DATE: 06/20/2014 |

# Historical Topographic Map

| | | |
|---|---|---|
| TARGET QUAD<br>NAME: MT. DIABLO<br>MAP YEAR: 1912<br>SERIES: 15<br>SCALE: 1:62500 | SITE NAME: Heidorn Ranch Road<br>ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531<br>LAT/LONG: 37.9561 / -121.7532 | CLIENT: Aqua Science Engineers Inc.<br>CONTACT: Dave Allen<br>INQUIRY#: 3976090.4<br>RESEARCH DATE: 06/20/2014 |

N

# Historical Topographic Map



## Unsurveyed Area on the Topographic Map

N

TARGET QUAD
NAME: LONE TREE VALLEY
MAP YEAR: 1916
PRELIMINARY
SERIES: 7.5
SCALE: 1:31680

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map

N

TARGET QUAD
NAME: MT. DIABLO
MAP YEAR: 1947

SERIES: 15
SCALE: 1:50000

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map

| N ↑ | TARGET QUAD<br>NAME: ANTIOCH SOUTH<br>MAP YEAR: 1953<br><br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: Heidorn Ranch Road<br>ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531<br>LAT/LONG: 37.9561 / -121.7532 | CLIENT: Aqua Science Engineers Inc.<br>CONTACT: Dave Allen<br>INQUIRY#: 3976090.4<br>RESEARCH DATE: 06/20/2014 |
|---|---|---|---|

# Historical Topographic Map

N

TARGET QUAD
NAME: ANTIOCH SOUTH
MAP YEAR: 1968
PHOTOREVISED FROM :1953
SERIES: 7.5
SCALE: 1:24000

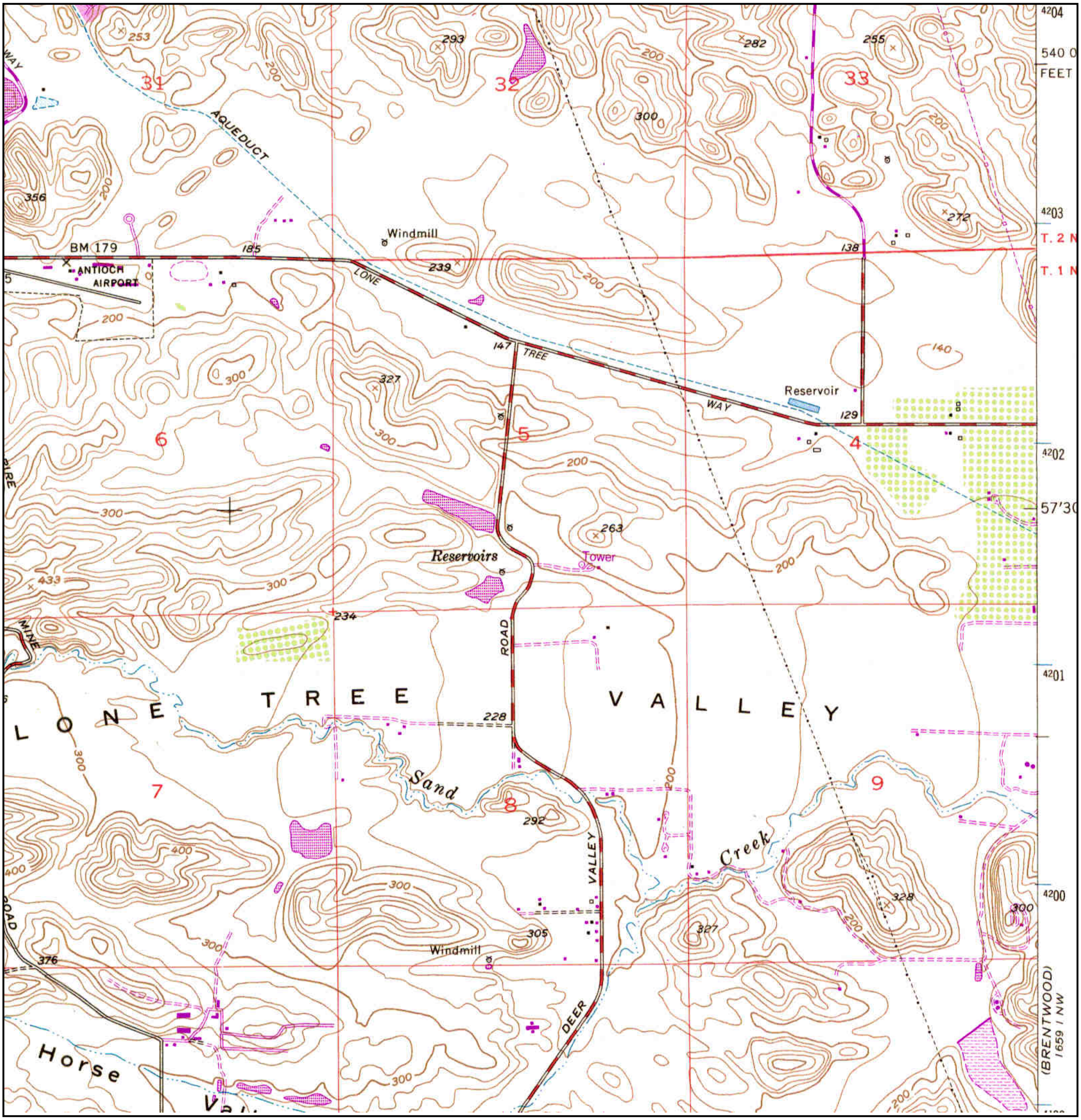
SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map

|  |  |  |  |
|---|---|---|---|
| N | TARGET QUAD<br>NAME: ANTIOCH SOUTH<br>MAP YEAR: 1973<br>PHOTOREVISED FROM :1953<br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: Heidorn Ranch Road<br>ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531<br>LAT/LONG: 37.9561 / -121.7532 | CLIENT: Aqua Science Engineers Inc.<br>CONTACT: Dave Allen<br>INQUIRY#: 3976090.4<br>RESEARCH DATE: 06/20/2014 |

## Historical Topographic Map



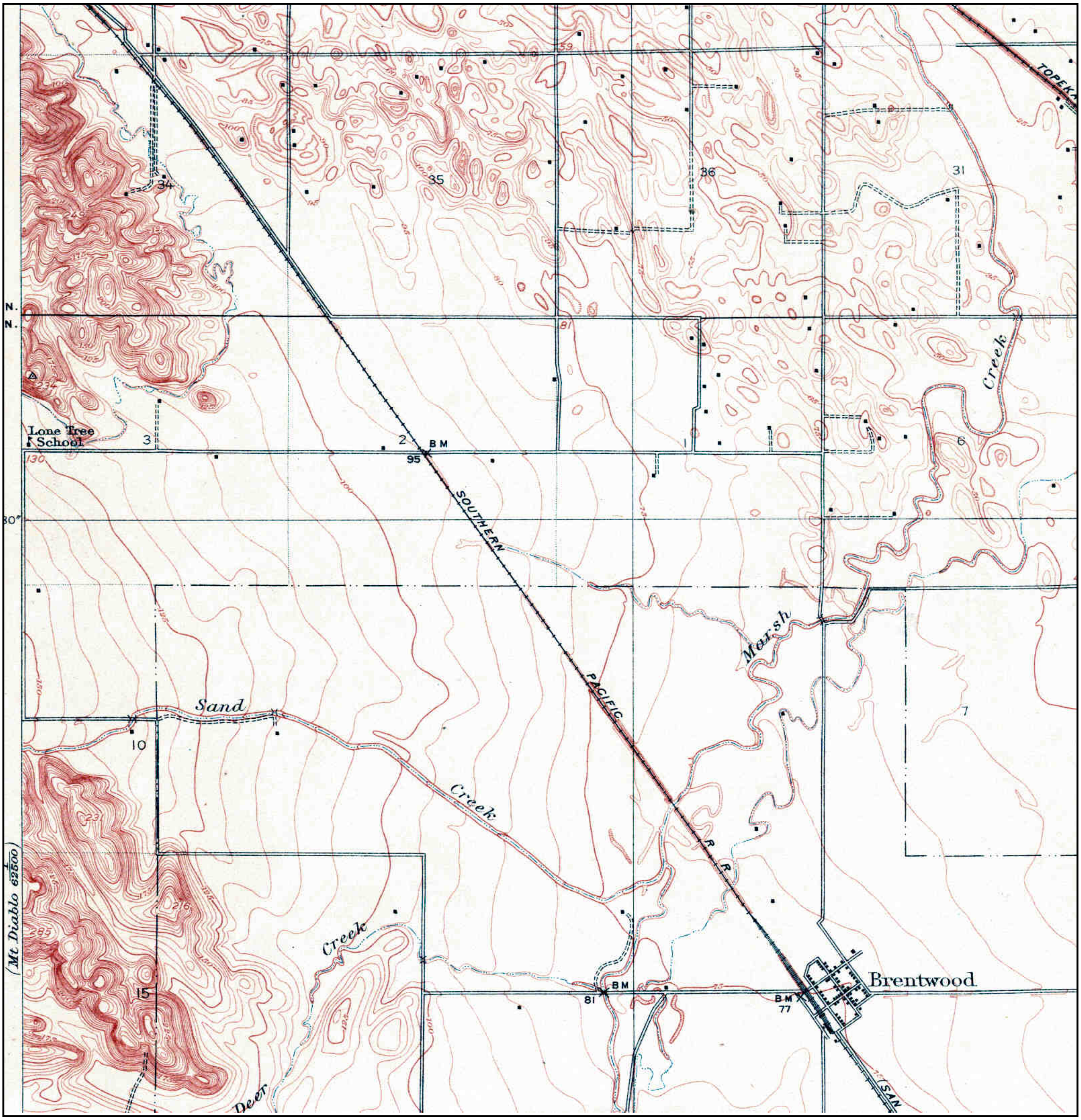
N

TARGET QUAD
NAME: ANTIOCH SOUTH
MAP YEAR: 1980
PHOTOREVISED FROM :1953
SERIES: 7.5
SCALE: 1:24000

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map



N

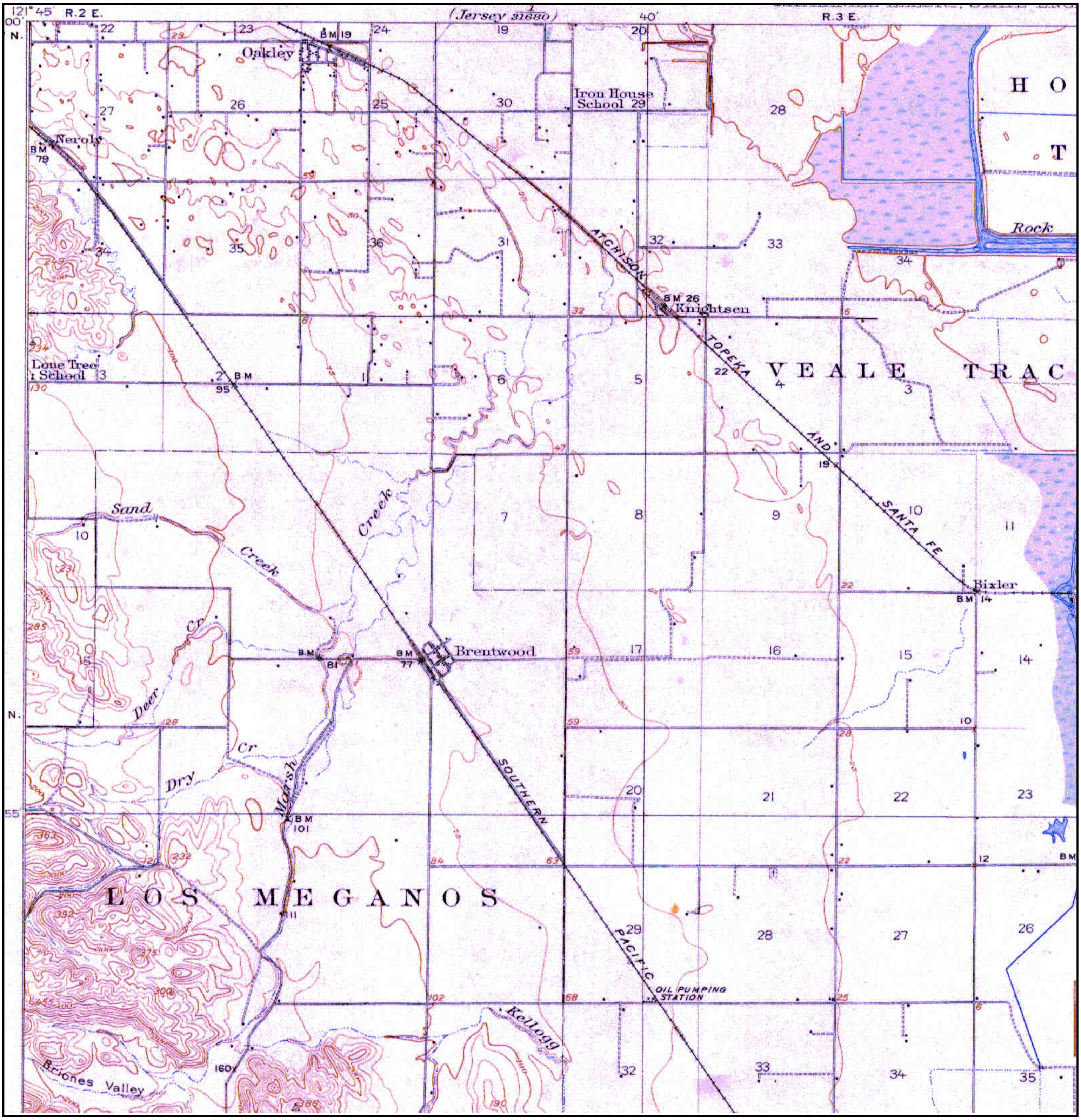
ADJOINING QUAD
NAME: BRENTWOOD
MAP YEAR: 1914

SERIES: 7.5
SCALE: 1:31680

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

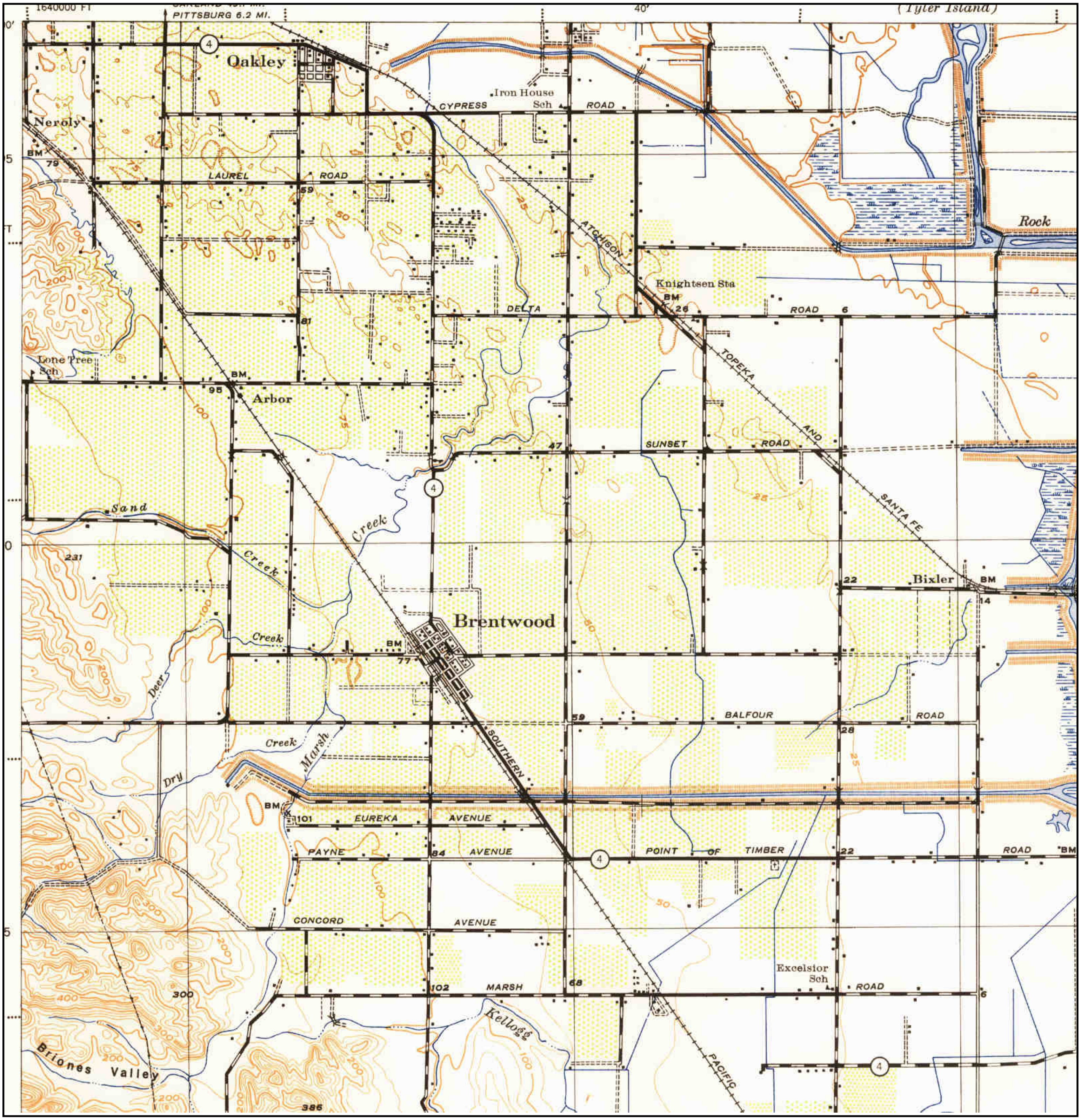
CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map



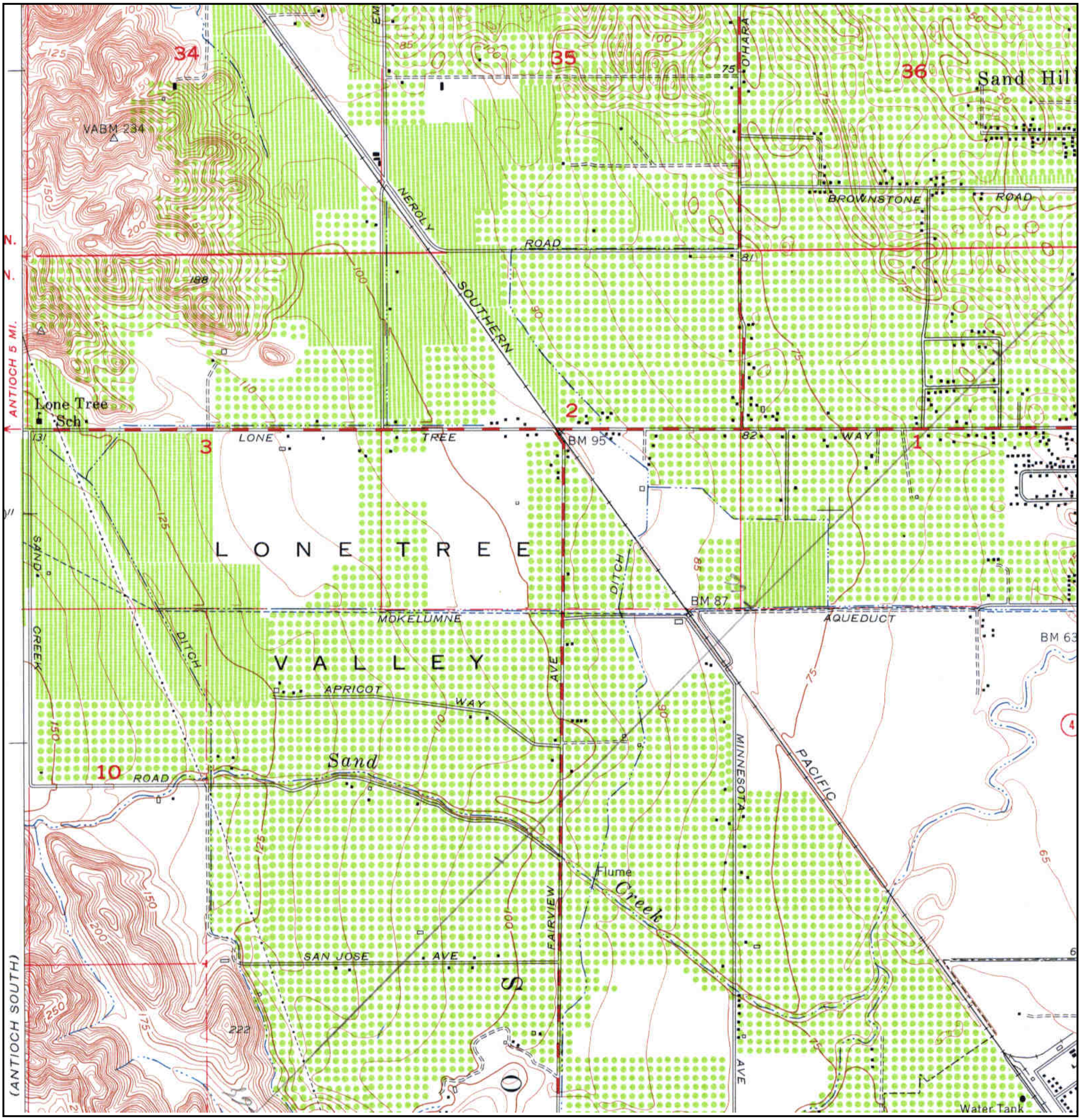
| | | | | | |
|---|---|---|---|---|---|
| N | ADJOINING QUAD | | | | |
| | NAME: BYRON | SITE NAME: | Heidorn Ranch Road | CLIENT: | Aqua Science Engineers Inc. |
| | MAP YEAR: 1916 | ADDRESS: | 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531 | CONTACT: | Dave Allen |
| | | | | INQUIRY#: | 3976090.4 |
| | SERIES: 15 | LAT/LONG: | 37.9561 / -121.7532 | RESEARCH DATE: | 06/20/2014 |
| | SCALE: 1:62500 | | | | |

# Historical Topographic Map



| N | ADJOINING QUAD | SITE NAME: Heidorn Ranch Road | CLIENT: Aqua Science Engineers Inc. |
|---|---|---|---|
| | NAME: BYRON | ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531 | CONTACT: Dave Allen |
| | MAP YEAR: 1943 | LAT/LONG: 37.9561 / -121.7532 | INQUIRY#: 3976090.4 |
| | SERIES: 15 | | RESEARCH DATE: 06/20/2014 |
| | SCALE: 1:62500 | | |

# Historical Topographic Map



N

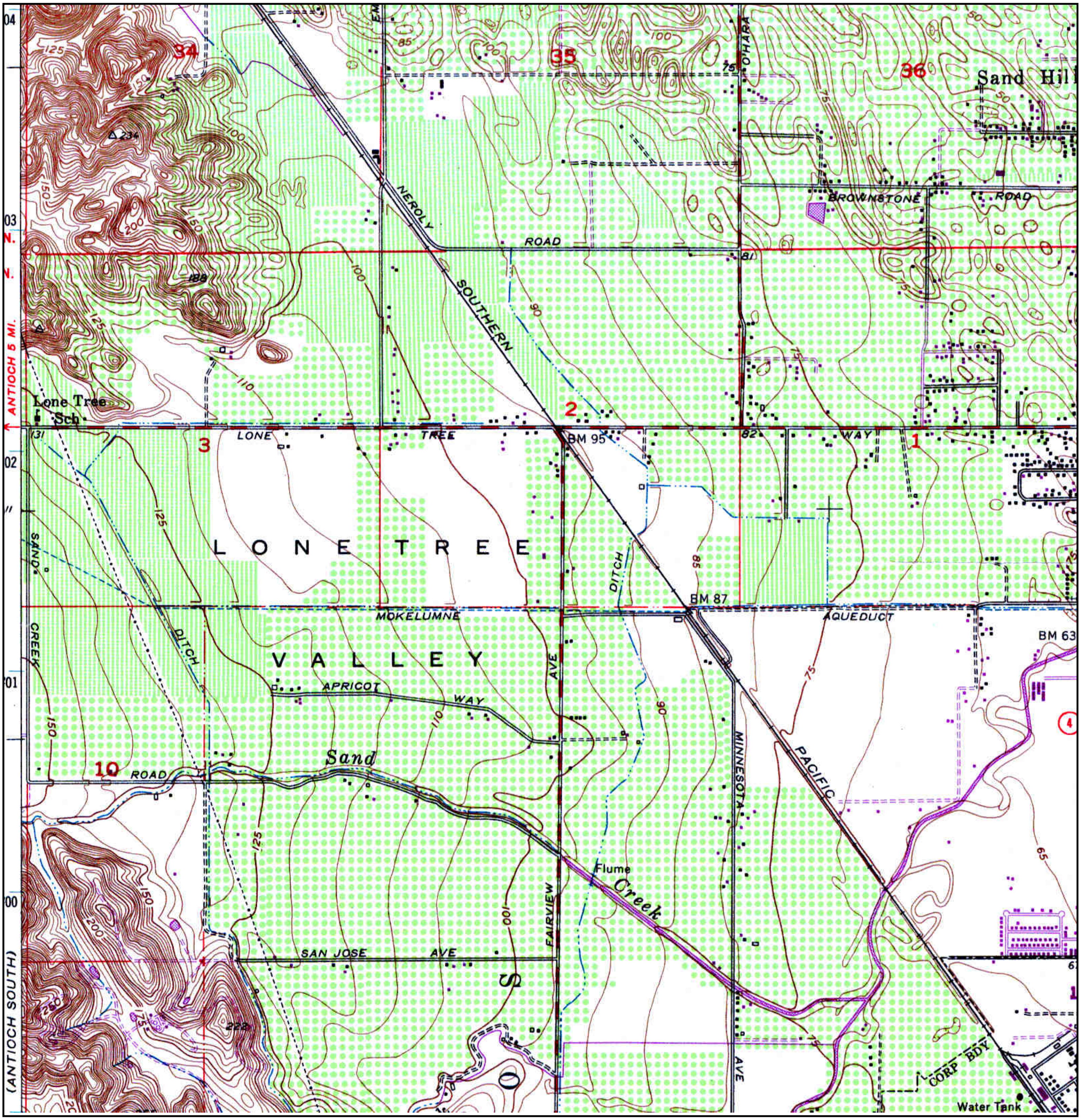
ADJOINING QUAD
NAME: BRENTWOOD
MAP YEAR: 1954

SERIES: 7.5
SCALE: 1:24000

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

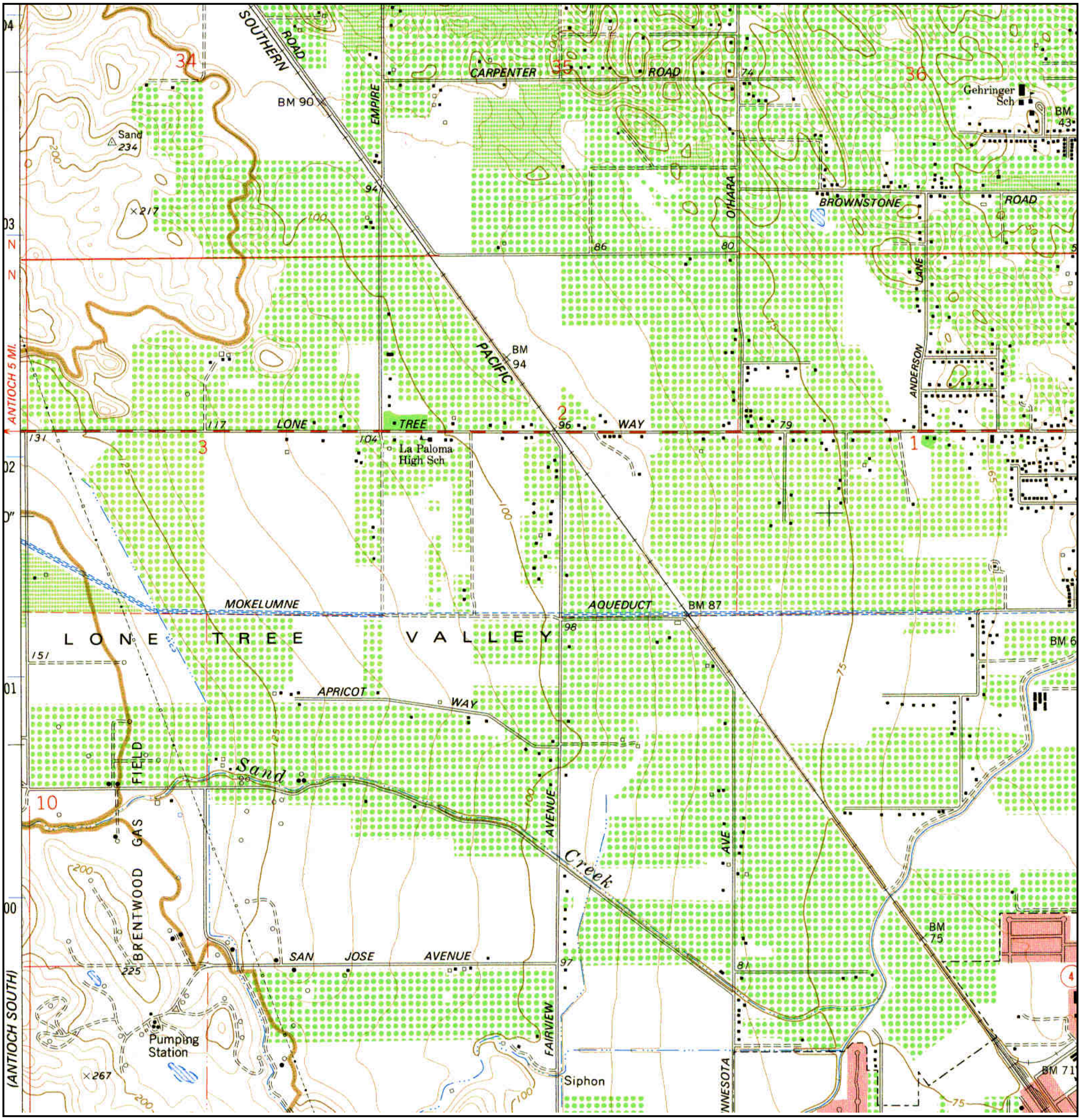
CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

# Historical Topographic Map



|  |  |  |  |
|---|---|---|---|
| N | ADJOINING QUAD<br>NAME: BRENTWOOD<br>MAP YEAR: 1968<br>PHOTOREVISED FROM :1954<br>SERIES: 7.5<br>SCALE: 1:24000 | SITE NAME: Heidorn Ranch Road<br>ADDRESS: 5220 - 5300 Heidorn Ranch Road<br>Antioch, CA 94531<br>LAT/LONG: 37.9561 / -121.7532 | CLIENT: Aqua Science Engineers Inc.<br>CONTACT: Dave Allen<br>INQUIRY#: 3976090.4<br>RESEARCH DATE: 06/20/2014 |

# Historical Topographic Map



ADJOINING QUAD
NAME: BRENTWOOD
MAP YEAR: 1978

SERIES: 7.5
SCALE: 1:24000

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531
LAT/LONG: 37.9561 / -121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY#: 3976090.4
RESEARCH DATE: 06/20/2014

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX F

## City Directory Report

**Heidorn Ranch Road**
5220 - 5300 Heidorn Ranch Road
Antioch, CA 94531

Inquiry Number: 3976090.5
June 24, 2014

# The EDR-City Directory Image Report

EDR® Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

# TABLE OF CONTENTS

## SECTION

***Thank you for your business.***
Please contact EDR at 1-800-352-0050
with any questions or comments.

### Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OR DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction orforecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

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# EXECUTIVE SUMMARY

## DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

## RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

| ***Year*** | ***Target Street*** | ***Cross Street*** | ***Source*** |
|---|---|---|---|
| 2013 | ☑ | ☐ | Cole Information Services |
| 2008 | ☑ | ☐ | Cole Information Services |
| 2003 | ☑ | ☐ | Cole Information Services |
| 1999 | ☑ | ☐ | Cole Information Services |
| 1994 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1989 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1985 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1980 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1975 | ☐ | ☐ | Haines Criss-Cross Directory |

## RECORD SOURCES

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# FINDINGS

## TARGET PROPERTY STREET

5220 - 5300 Heidorn Ranch Road
Antioch, CA   94531

| ***Year*** | ***CD Image*** | ***Source*** | |
|---|---|---|---|
| **HEIDORN RANCH RD** | | | |
| 2013 | pg A1 | Cole Information Services | |
| 2008 | pg A2 | Cole Information Services | |
| 2003 | pg A3 | Cole Information Services | |
| 1999 | pg A4 | Cole Information Services | |
| 1994 | - | Haines Criss-Cross Directory | Street not listed in Source |
| 1989 | - | Haines Criss-Cross Directory | Street not listed in Source |
| 1985 | - | Haines Criss-Cross Directory | Street not listed in Source |
| 1980 | - | Haines Criss-Cross Directory | Street not listed in Source |
| 1975 | - | Haines Criss-Cross Directory | Street not listed in Source |

# FINDINGS

## CROSS STREETS

No Cross Streets Identified

# City Directory Images

# HEIDORN RANCH RD 2013

| | |
|---|---|
| 5030 | LUCIA JOBE |
| 5200 | HERITAGE BAPTIST ACADEMY |
| | HERITAGE BAPTIST CHURCH |
| 5320 | RICHARD JOHNSON |

| Target Street | Cross Street | Source |
|---|---|---|
| ✓ | - | Cole Information Services |

# HEIDORN RANCH RD 2008

| | |
|---|---|
| 5030 | LUCIA JOBE |
| 5200 | HERITAGE BAPTIST ACADEMY |
| 5320 | RICHARD JOHNSON |

| **Target Street** | **Cross Street** | **Source** |
|---|---|---|
| ✓ | - | Cole Information Services |

# HEIDORN RANCH RD 2003

| | |
|---|---|
| 5020 | OCCUPANT UNKNOWN |
| 5030 | LUCIA JOBE |
| 5200 | HERITAGE BAPTIST ACADEMY |
| | HERITAGE BAPTIST CHURCH |
| | OCCUPANT UNKNOWN |
| 5320 | RICHARD JOHNSON |

| **Target Street** | **Cross Street** | **Source** |
|---|---|---|
| ✓ | - | Cole Information Services |

# HEIDORN RANCH RD 1999

| | |
|---|---|
| 5030 | LUCIA JOBE |
| 5320 | RICHARD JOHNSON |

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX G

## Research Records

55 Oak Court, Suite 220
Danville, CA 94526
(925) 820-9391 phone
(925) 837-4853 fax
www.aquascienceengineers.com

*Environmental and Engineering Consulting Services*

# PHASE I ENVIRONMENTAL SITE ASSESSMENT QUESTIONNAIRE

The purpose of the Environmental Site Assessment Questionnaire is to collect information regarding the subject site in accordance with ASTM Standard Practice for Environmental Assessments Designation E 1527-13. The questionnaire should be completed by the person(s) most knowledgeable with the subject site. The information in the questionnaire should be completed in a true and accurate manner to the best of the person's knowledge. If the answer to a question is not known indicate NK. If a question does not apply to the subject site, indicate NA.

**Please return the completed and signed questionnaire to ASE as soon as possible.**

## 1. OWNER/MANAGER INFORMATION

| Position | Name | Phone, Fax & Email | Time at Site |
|---|---|---|---|
| **Owner** | Mission Peak Homes Inc. | (510)354-0888 | |
| **Tenant** | N.A. | | |
| **Site Contact** | John S. Wong | (510)714-3947 | |

## 2. GENERAL SITE INFORMATION

| | |
|---|---|
| **Purpose for Conducting Phase I ESA (acquisition, refinance, etc)** | pursuit of a Tentative Map as a part of the subdivision entitlement process. |
| **Site Name** | Heidorn Village |
| **Full Street Address** | Heidorn Ranch Road |
| **City, County, State, ZIP** | Antioch CA. 94513 |
| **Assessor Parcel No.** | 056-130-013, 015, 017 + 018 |
| **Site Area** | 20 Acres |
| **Number of Buildings** | N.A. |

| | |
|---|---|
| **Number of Stories** | |
| **Individual and Total Building Square Footage** | |
| **Year(s) of Construction** | |
| **Renovation date(s)** | |
| **Number of Units/Tenant Spaces (Attach Tenant List or Rent Roll)** | |
| **Current Site Use** | |
| **Historical Site Uses** | |
| **List Previous Phase I Environmental Assessment(s) (Provide Copies of Reports)** | |
| **Electricity Provider** | |
| **Natural Gas Provider** | |
| **Propane/Heating Oil Supplier** | |
| **Potable Water Supplier** | |
| **Sanitary Sewer Provider** | |
| **Solid Waste Removal Company** | |
| **Recycling Company** | |

## 3. ENVIRONMENTAL SITE INFORMATION

| **Item** | **Are any of the following features occurring ~~or have occurred~~ at the subject site?** BW.<br>**If yes, explain below and attach available information** | **Yes** | **No** |
|---|---|---|---|
| **3.1** | Gasoline service station, auto repair, dump or landfill | | ✓ |
| **3.2** | Dry cleaning, printing, photo developing or medical activities | | ✓ |
| **3.3** | Manufacturing | | ✓ |

| **Item** | **Are any of the following features occurring or have occurred at the subject site? If yes, explain below and attach available information** | **Yes** | **No** |
|---|---|---|---|
| **3.4** | Underground storage tanks (USTs) | | ✓ |
| **3.5** | Above ground storage tanks (ASTs) | | ✓ |
| **3.6** | Electrical transformers and other potential PCB-containing equipment | | ✓ |
| **3.7** | Hydraulic equipment (elevators, escalators, truck dock levelers). Provide name of company providing maintenance | | ✓ |
| **3.8** | Chemicals storage.<br>If yes, attach list and approximate "on hand" quantities | | ✓ |
| **3.9** | Generation of Hazardous waste.<br>If yes, attach list and approximate "on hand" quantities<br>Provide names of waste removal/recycling company | | ✓ |
| **3.10** | Active or inactive water wells or groundwater monitoring wells | | ✓ |
| **3.11** | Regulated operations requiring discharge permits (i.e., air, storm water, sewer) | | ✓ |
| **3.12** | Drains, sumps, separators, interceptors, clarifiers, septic tanks, cesspools | | ✓ |
| **3.13** | Wetlands, flood zone, or other specially-designated areas | | ✓ |
| **3.14** | High radon levels, high voltage electrical power lines or pipelines | | ✓ |
| **3.15** | Asbestos-containing materials | | ✓ |
| **3.16** | Lead-based paint | | ✓ |
| **3.17** | Water intrusion and/or suspected mold conditions | | ✓ |
| **3.18** | Environmental investigations and/or remediation, related to the items listed above and/or for other reasons | | ✓ |
| **3.19** | Known or suspected conditions at the subject site or at adjoining properties that could have caused a potential environmental impact on the subject site or the environment (i.e., surface staining, leaks, spills, improper disposal or discharges, etc) | | ✓ |
| **3.20** | Be named as potential responsible party in an environmental action, or be cited by an agency or a third party | | ✓ |
| **3.21** | Is there a reduction of property value due to environmental issues? | | ✓ |
| **3.22** | Do you have specialized knowledge regarding environmental conditions at the subject site? | | ✓ |

| Item | Are any of the following features occurring or have occurred <u>at the subject site</u>? If yes, explain below and attach available information | Yes | No |
|---|---|---|---|
| **3.23** | Are there reported environmental liens or activity and use limitations (AULs) related to the subject site? | | ✓ |
| **3.24** | Is there currently or has there been historically any pesticide or herbicide usage at the subject site? | | ✓ |
| **3.25** | Has any fill material been deposited at the subject site? | | ✓ |
| **3.26** | Please use a separate piece of paper to **<u>describe any and all processes</u>** conducted at the site historically and currently. Please emphasize your answer on hazardous materials, machinery, chemical usage, etc. | | |

| Item | Additional Information (Include explanations for questions answered "yes". Use additional sheets, if necessary. Attach available documentation) |
|---|---|
| | Aqua Science Engineers INC report dated July 8, 2003 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## 4. PREVIOUS OWNERSHIP/TENANT INFORMATION

| Name | Owner or Tenant | Operations/Activities Conducted | Time Period |
|---|---|---|---|
| La Vasse, etal<br>APN-056-130-013 | owner | ASE report July 8, 2003 | |
| LaHue Family Trust<br>APN 056-130-015 | owner | 〃 | |
| Wenk Trust<br>APN 056-130-017<br>-018 | owner | 〃 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## 5. SIGNATURE

**The information provided in this questionnaire is accurate to the best of my knowledge.**

**Signature**

6-16-2014
**Date**

John S. Wong
**Print Name**

President
**Title**

Mission Peak Homes Inc.
**Company**

MISSION PEAK
CONSTRUCTION
INCORPORATED

JUL 28 2004

HIEDORN RANCH
"ANTIOCH"
ADMIN
P. G. &E.

Also
Demolition

July 26, 2004

Mr. Bruce Ghiselli
Pacific Gas & Electric
2111 Hillcrest Ave.
Anticoh, Ca. 94509

Re: Request to disconnect services 5020 Heidorn Ranch Road, Antioch CA

Dear Mr. Ghiselli,

We have recently purchased the above referenced property. We are anxious to start demolition of all existing structures and are hereby requesting to have all utility's disconnected.

We are currently in process of obtaining a demolition permit from the City of Antioch, however, we must first receive permits from Bay Area Air Quality, and the Contra Costa County Health Department prior to the City permit. I anticipate it will take approximately three to four weeks for all of this to take place. Therefore, I am requesting, if possible, to have the services disconnected by August 27, 2004.

Should you need any additional information you may contact me at 510-354-0885.

Sincerely

Stephen M. Allen
Director of Operations

Disconnect
Aug 3 2003

40480 Encyclopedia Circle, Fremont, California 94538, Telephone 510/354•0888, Facsimile 510/354•0889

G.S.

THE
MISSION PEAK
COMPANY

COPY

# LETTER OF TRANSMITTAL

To: Denise Thompson
Bay Area Air Quality District
939 Ellis Street
San Francisco, CA 94109

Date: September 9, 2004

Re: Heidron Ranch Road
Antioch

☐ Enclosed ☐ Via FAX No. Pages Including This One ____

☐ Copy of Letter ☐ Prints ☐ Plans ☐ Specs.
☐ Change Order ☐ Contract ☐ Other ____

| Copies | Date | Description |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Transmitted as checked below:

☐ For Approval ☐ For Your Use ☐ As Requested
☐ Approved as Submitted ☐ For Review & Comment
☐ Approved as Noted ☐ For Bids Due ____

Remarks: Enclosed please find the Notification Form for Demolition and a check in the amount of $43.00.

Copy To: ____ Signed: ____

40480 Encyclopedia Circle, Fremont, CA 94538
510/354.0888 • FAX 510/354.0889

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

# DEMOLITION

## REGULATION 11, Rule 2

## Notification Form

For Office Use Only
J# ____
I# ____

### Site of Demolition

Site Address: 5020 Heidron Ranch Road Cross Street: Lone Tree Way
City: Antioch Zip:
[✓ Owner]/Operator Mission Peak Construction, Inc. Phone ( 510 ) 354-0888
Specific Location of Project within Building/Address:
Check One: ☒ Single Family Dwelling ☐ Commercial ☐ Multifamily Dwelling ☐ Govt Bldg ☐ School

### Contractor/Individual Performing Demolition

Name: Company/Individual Mission Peak Construction, Inc. Contact: Steve Allen
Mailing Address: 40480 Encyclopedia Circle
City: Fremont Zip: CA Phone: ( 510 ) 354-0888
Have you previously submitted notifications for other sites? ☒ Yes ☐ No

### Description of Demolition

Is this Demolition by Fire for Fire Training purposes? ☐ yes ☐ No
Is this Demolition ordered by a Government Agency? ☐ yes ☐ No
*(Emergency only – attach copy of order)*
If not Demolition for Fire Training, check applicable method:
☒ Heavy Equipment ☐ Implosion ☒ By Hand ☐ Other ____

Dates of Demolition: (*Actual* dates must be entered, ***"ASAP"*** or ***"SOON"*** will be rejected.)
Start: Nov. 1, 2004 Completion: Dec. 1, 2004 ☐ Weekend Work? ☐ Night Work *(After 5 PM)?*

### Asbestos Survey Report

Name of company that conducted survey: David W. Sweet
Address: 714 Taylor Avenue
City: Alameda Zip: 94501 Phone: ( )
Name of person who completed the survey: David Sweet CAC/SST #: 02-3259
Is /was asbestos present? ☒ Yes ☐ No
If yes, who will remove/has removed prior to demo? R.G. Construction

### Form Preparation Information

This form prepared by: Steve Allen Title: Director of Operations
Name: Company/Individual Mission Peak Construction, Inc. Phone: ( 510 ) 354-0888
Address: 40480 Encyclopedia Circle City: Fremont State: CA Zip: 94538

*See Page Two to Complete This Form*

Required Information

**Payment must be received before J# will be assigned.** See Schedule L of Regulation 3 for appropriate fees.

Payment type: ☐ Cash ☒ Check ☐ Money Order ☐ Credit Card (*Visa, MasterCard Only*)
(*Complete attached authorization form*)

*I certify that the above information is correct and that I will comply with all of the requirements of the BAAQMD's regulations, as well as all other applicable federal, state and local requirements.*

Signature of Contractor or Person Performing Demolition:____________________

G:\\Form:Demo-01:7/25/2003

## GENERAL INFORMATION

- This notification form shall be used to notify the BAAQMD of a **demolition** operation only. Notification is required for every demolition. All boxes must be completed. Appropriate fee payment must accompany each notification. Notifications may be faxed to (415) 749-4658 or (415) 928-0338, but faxed notifications will only be accepted if accompanied by a valid credit card authorization for applicable fees.
- Notification shall be provided to the District at least 10 working days prior to commencement of demolition, or as early as possible prior to commencement of emergency demolition. The notification period will not start until a complete notification is submitted (see above).
- An Acknowledgement Letter is mailed to the contractor/person listed within 3 days of receipt of a complete notification. This should be checked for accuracy of data.
- If the job is postponed or cancelled, the District must be notified of a revision; the Acknowledgement Letter should be used to fax or mail the revision information. When cancelled, a cancellation fee will apply.
- For specifically-defined "Emergency" conditions, the 10 working day period will be waived. Notification must be made by fax, but the job number will not be issued until the applicable fees are received by a valid credit card authorization. Following authorization approval, the job number will be issued and the notification form must be completed and returned, with the job number (" J#_________") filled in.
- For 4 or fewer unit residences, the 10 working day period may be reduced to 72 hours for an additional fee.

## INSTRUCTIONS

- **SPECIFIC LOCATION OF PROJECT**: Identify where the demolition is taking place if the site contains more than one building.
- **START AND COMPLETION DATES**: The start date is the date on which demolition of the facility or structure commences. Any revision to the start or completion dates must be submitted prior to the previously notified date(s). Under no circumstances may the revised start date be earlier than the 10th working day following the postmark or fax date of the original notification. If the start date is unknown, enter an estimated start date and revise the notification when the actual start date is known, but not later than the estimated start date.
- **FIRE TRAINING**: Reg. 11-2-206 includes "intentional burning" in the definition of demolition. Notification is required, the 10 working day requirement must be met and all Asbestos-Containing Material (ACM) >1% must be removed prior to fire training. The District's Open Burning Notification form must also be filed and the applicable requirements of Regulation 5 must be met.
- **SURVEY REPORT**: Provide information showing that prior to commencement of the demolition, a survey was performed to determine the presence of Regulated ACM (RACM). Indicate if there was/was not suspected ACM.
- **GOVERNMENT ORDERED DEMOLITION**: If an "Emergency" demolition (see above) is the result of a state or local agency declaring the building a public nuisance or structurally unsound and in danger of imminent collapse, a copy of the written order must accompany this notification.

***FEES APPLICABLE TO DEMOLITION OPERATIONS (FROM REGULATION 3, SCHEDULE L)***

Demolition **conducted at a single family** dwelling is subject to the following fee:

OPERATION FEE: $43

Cancellation: $43 (100% of fee) non-refundable, for notification processing.

Demolition **conducted at a single family dwelling or multiple family dwelling with four or fewer units with 72 hours instead of 10 days prior notice (excluding emergencies)** is allowed upon payment of the following **additional** fee:

OPERATION FEE: $297

Demolition, **other than those conducted at a single family dwelling**, is subject to the following fee:

OPERATION FEE: $179

Cancellation: $120 of above amount non-refundable for notification processing.

Demolition conducted for the purpose of **fire training** is exempt from fee.

***SURVEY REQUIREMENTS FOR DEMOLITION OPERATION (FROM REGULATION 11, RULE 2)***

**303.8 Surveys**: Except for ordered demolitions, prior to commencement of any demolition or renovation, the owner or operator shall thoroughly survey the affected structure or portion thereof for the presence of asbestos-containing material, including Category I and Category II nonfriable asbestos-containing material. The survey shall be performed by a person who is certified by the Division of Occupational Safety and Health, and who has taken and passed an EPA-approved Building Inspector course and who conforms to the procedures outlined in the course. The survey shall include sampling and the results of laboratory analysis of the asbestos content of all suspected asbestos-containing materials. This survey shall be made available, upon request by the APCO, prior to the commencement of any RACM removal or any demolition. This subsection shall not apply if the owner or operator asserts that the material to be renovated is RACM and will be handled in accordance with the provisions of Sections 11-2-303, 304 and 401. The requirement for certification by the Division of Occupational Safety and Health shall not apply to in-house health professionals within a specific nonasbestos related company who perform occasional surveys only for that company as part of their regular job responsibilities

8.1 When a structure, or portion thereof, is demolished under an ordered demolition, the survey must be done prior to, during, or after the demolition but prior to loading or removal of any demolition debris. If the debris contains regulated asbestos-containing material, all of the debris shall be treated as asbestos-containing waste material pursuant to Section 11-2-304.

8.2 For renovation or demolition of residential buildings having four or fewer dwelling units, a survey is not required. A sample and test of the material will be required only when any of the following will be removed or disturbed: heating, ventilation, air conditioning ducting and systems; acoustic ceiling material or acoustic plaster; textured or skim coated wall surfaces, cement siding or stucco, or resilient flooring. Where the material is found to contain greater than 1 percent asbestos and is friable, the material must be handled in accordance with Section 11-2-303.

MISSION PEAK HOMES, INC.

Vendor: 5360 BAY AREA AIR QUALITY MANAGEMEN Check Date: 09/09/2004 14

| DATE | DESCRIPTION | AMOUNT | DEDUCTION | NE |
|---|---|---|---|---|
| 09/08/2004 | 090804 DEMO PERMIT | 43.00 | .00 | |

| DATE | CONTROL NUMBER | TOTALS → | | | | |
|---|---|---|---|---|---|---|
| 09/09/2004 | | | | 43.00 | .00 | |

**MISSION PEAK HOMES, INC.**
40480 ENCYCLOPEDIA CIRCLE
FREMONT, CA 94538
(510) 354-0888

HERITAGE
BANK EAST BAY
A DIVISION OF HERITAGE BANK OF COMMERCE
3077 Stevenson Blvd, Fremont, CA 94538

14

14288

90-4285/1211

**PAY** **FORTY-THREE DOLLARS EXACTLY**

TO THE
ORDER OF

DATE 09/09/2004

CONTROL NO.

AMOUNT ********$43.

BAY AREA AIR QUALITY MANAGEMEN

⑈014288⑈ ⑆121142287⑆ 001307511⑈

Demolition

# ASBESTOS DEMOLITION SURVEY REPORT

*for*

**5020 Hendron Ranch Road**
**Antioch, California**

*Prepared for:*

**Mission Peak Construction, Inc.**
**40480 Encyclopedia Circle**
**Fremont, CA 94538**

*Prepared By:*

**David W. Sweet, C.A.C.**
**714 Taylor Avenue**
**Alameda, California**

September 7, 2004

* * *

DWS Job No: 350.008

Prepared By: David W. Sweet

David W. Sweet, C.A.C.
*Certified Asbestos Consultant*
Certification No. 02-3259

# Table of Contents

# Section 1

# Introduction

David W. Sweet, C.A.C. (DWS) performed a survey of the structures located at **5020 Hendron Ranch Road, Antioch, California**, to identify asbestos-containing building materials (ACBM). This report identifies the locations and asbestos content of friable and non-friable ACBM. This report was requested for the purpose of identifying ACBM which must be removed prior to the demolition of the building.

This survey addresses friable and non-friable suspect asbestos-containing building materials.

> Friable materials include: materials that can be crumbled, pulverized or reduced to powder, when dry, by hand pressure, such as spray-applied acoustical ceiling tile and damaged thermal systems insulation.
>
> Non-friable materials can become friable by: being rendered to a crumbled, pulverized or powdered state, when dry, by crushing, sanding, sawing, shot-blasting, severe weathering or by other mechanically induced means.

This report is prepared for the express use and benefit of **Mission Peak Construction, Inc.**, its agents and employees. The information in this report or portions thereof may be required to be included in notifications to employees, contractors or other visitors to the building. This report is not intended to be used by the Owner or its agents as a specification or work plan for any of the work suggested or recommended in this report.

This report is based upon conditions and practices observed at the property and information made available to DWS. This report does not purport to identify all hazards or unsafe practices, nor to indicate that other hazards or unsafe practices do not exist at the premises.

Reasonable effort is made by DWS to locate and sample suspect materials. However, for any facility the existence of unique or concealed asbestos-containing materials and debris is a possibility. In addition, sampling and laboratory analysis constraints typically hinder the investigation. DWS does not warrant, guarantee, or profess to have the ability to locate or identify all asbestos-containing materials in a facility. This report is intended to be used in planning for construction or demolition. This report is not intended to be a construction document.

Removal cost estimates for the ACBM identified at the property have not been included in this report.

On **August 30, 2004**, David W. Sweet, C.A.C., an independent Certified Asbestos Consultant performed an asbestos survey of the building in accordance with the U.S.

EPA National Emission Standards for Hazardous Air Pollutants (NESHAPS).

# Section 2

## Bulk Sampling Protocol & Analytical Methods

Bulk samples of suspect asbestos-containing materials were obtained using standard industrial hygiene techniques to minimize fiber release.

DWS bases the sampling strategy for suspect friable surfacing materials on the guidelines outlined in the EPA publication Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials, and the procedures outlined in 40 CFR 763, Subpart E (AHERA). For non-friable suspect materials, AHERA requires the building inspector to determine the appropriate number of samples to obtain and analyze. Usually one to three (1-3) samples of materials are collected.

For each homogenous material identified by visual inspection as suspect material, random samples are obtained. Every sample must be reported negative if the material is to be considered non-asbestos containing.

The bulk samples were delivered to an independent laboratory that participates in the bulk sample proficiency analysis program conducted by the United States Environmental Protection Agency and is accredited by the National Voluntary Laboratory Program (NVLAP). The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining to estimate the percent of asbestos composition by volume. Samples in which asbestiform minerals are observed, but exist in concentrations of less than one percent (<1%), are designated as present in Trace amounts; all other samples are designated as asbestos-containing with the appropriate percent of asbestos noted.

# Section 3

## Summary of Findings

The following is a list of materials which were tested for the presence of asbestos at the property located at **5020 Hendron Ranch Road, Antioch, California**. Each is sorted by building unit at various locations throughout the property. A complete description of sampled ACBM is included in Section 7.

| Suspect Material Collected | Material Location | Asbestos Present |
|---|---|---|
| Stucco | Exterior Walls | NO |
| Ceramic Roof Tile | Roof | NO |
| Linoleum | Kitchen | YES |
| Drywall w/Texturing & Joint Tape Compound | Walls & Ceilings Throughout | NO |
| Linoleum | Bathroom | YES |
| Acoustical Sprayed-on Ceiling Material | Ceilings | NO |
| Linoleum | Master Bathroom | YES |
| Ceramic Tile & Grout | Kitchen | NO |
| Drywall w/Joint Tape Compound | Garage | NO |

**Friable ACBM:**

| | | |
|---|---|---|
| (RACM) | ➢ Linoleum Flooring | (Approx. 450 sq. ft.) |

**Non-Friable ACBM:**

| | |
|---|---|
| (Category I) | N/A |
| (Category II) | N/A |

**< 1% Asbestos or Trace:** N/A

# Section 4

## Recommendations

Asbestos is a hazardous substance. Its condition, handling and disposal are regulated by federal, state, and local agencies. Asbestos-containing materials (ACM) generally do not pose a health threat unless the asbestos fibers are disturbed, become airborne, and are inhaled. Contractors working in the facility must be informed of the type and location of ACM. Abatement of ACM, including non-friable ACM, must be performed by a licensed, certified, and registered abatement contractor in accordance with OSHA and local regulations and should be overseen by a CAL OSHA Certified Asbestos Consultant (CAC) or Site Surveillance Technician (SST). An operations and maintenance program need not be implemented since the buildings are scheduled for demolition.

# Section 5

# Conclusions

Pursuant to this Asbestos Demolition Survey, there were a total of **eleven (11)** separate suspect materials identified and **sixteen (16)** samples collected.

The linoleum flooring products throughout the structure are all RACM, friable in nature, and are required to be removed by a Qualified Asbestos Contractor licensed in the State of California prior to demolition.

# Section 6

## Sample Request Forms - Chain of Custody

Chain of Custody Form

MICRO ANALYTICAL LABORATORIES, IN
5900 Hollis St., Suite M, Emeryville, CA 94608
(510) 653-0824 · (510) 653-1361 · FAX

Log in # 62912

Name / Client / Address: DWS

Project: ~~[illegible]~~ 5020 Hemnon Ranch RD. Antioch CA.

Tel.

Job No.

Fax

E-mail

Asbestos (TEM) AHERA Yamate II NIOSH 7402 Other

Asbestos [✓ PLM] PCM

Lead Only: Total Lead STLC TCLP

Metals (Specify): Total Metals STLC TCLP

Mold, Non-Viable: Tape Lift Air-O-Cell Other

Other (Specify)

Number of Samples

Turn-Around Time: 24 Hrs

Matrix Type: Bulk Dust Paint Soil Wipe Air Water Other

| Micro ID # (For Lab Use Only) | Client Sample ID# | Description | Date Sampled | Time Sampled Start / Stop / Total Minutes | Average LPM | Total Liters | Filter Pore Size |
|---|---|---|---|---|---|---|---|
| 62912-01 | 08304-01 | Exterior Stucco | 08/30/04 | | | | |
| -02 | 08304-02 | Exterior Stucco | | | | | |
| -03 | 08304-03 | Exterior Stucco | | | | | |
| -04 | 08304-04 | Roof Ceramic Tile | | | | | |
| -05 | 08304-05 | Linoleum in Kitchen | | | | | |
| -06 | 083004-06 | Drywall w/ Joint Tape and Texture | | | | | |
| -07 | 083004-07 | Drywall w/ Joint Tape and Texture | | | | | |
| -08 | 083004-08 | Texture on Walls | | | | | |
| | | VOID | | | | | |
| -09 | 083004-~~8~~ -09 | Linoleum in Restroom | ↓ | | | | |

Instructions / Comments: ☐ Fax ☐ E-mail

Sample Return: [✓ YES] NO If "YES" is checked, samples will be returned to the client or archived at Micro Analytical if required.
If "NO" is checked, solid samples may be disposed of within three months (one week for liquid samples, lab suspensions, and digestates).

David Sweet
Sampler's Signature / Name

Note to Lab: If any samples are not acceptable, record reasons for rejection.

Relinquished By: David Sweet Date / Time Drop Box / Courier Received By 8/31/04 3:10 pm Date / Time

Relinquished By Date / Time Received By Date / Time

Chain of Custody Form

**MICRO ANALYTICAL LABORATORIES, IN**
5900 Hollis St., Suite M, Emeryville, CA 94608
(510) 653-0824 · (510) 653-1361 · FAX

Log in # 62912

Name / Client / Address: DWS

Project: 5020 HEIMDRON RANCH RD. Antioch CA

Tel.

Job No

Fax

E-mail

Asbestos (TEM): AHERA Yamate II NIOSH 7402 Other

Asbestos: [✓ PLM] PCM

Lead Only: Total Lead STLC TCLP

Metals (Specify): Total Metals STLC TCLP

Mold, Non-Viable: Tape Lift Air-O-Cell Other

Other (Specify)

Number of Samples

Turn-Around Time: 24 HRS

Matrix Type: Bulk Dust Paint Soil Wipe Air Water Other

| Micro ID # (For Lab Use Only) | Client Sample ID# | Description | Date Sampled | Time Sampled Start / Stop / Total Minutes | Average LPM | Total Liters | Filter Pore Size |
|---|---|---|---|---|---|---|---|
| 62912-10 | 08304-10 | Accoustical Sprayon Ceiling | 08/30/04 | | | | |
| -11 | -11 | ↓ | | | | | |
| -12 | -12 | | | | | | |
| -13 | 08304-13 | Linoleum in Rest Room | | | | | |
| -14 | 08304-14 | Ceramic Tile Adhesive Rest Room Wall | | | | | |
| -15 | 08304-15 | Ceramic Tile Grout - Kitchen Wall | | | | | |
| -16 | 08304-16 | Drywall with Joint Tape Garage Walls | ↓ | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Instructions / Comments: ☐ Fax ☐ E-mail

Sample Return: YES NO If "YES" is checked, samples will be returned to the client or archived at Micro Analytical if required.
If "NO" is checked, solid samples may be disposed of within three months (one week for liquid samples, lab suspensions, and digestates).

Dave Sweet

Sampler's Signature / Name

Note to Lab: If any samples are not acceptable, record reasons for rejection.

Dave Sweet

Relinquished By Date / Time Drop Box / Courier Received By 8/31/04 3:10pm Date / Time

Relinquished By Date / Time Received By Date / Time

# Section 7

## Laboratory Sampling Results

# MICRO ANALYTICAL LABORATORIES, INC.

## BULK ASBESTOS ANALYSIS - PLM (EPA/600/R-93/116, 1993)

1073

Dave Sweet
714 Taylor Avenue
Alameda, CA 94501

PROJECT:
5020 HEINDRON RANCH ROAD
ANTIOCH, CA

| | |
|---|---|
| Micro Log In | 62912 |
| Total Samples | 16 |
| Date Sampled | 08/30/2004 |
| Date Received | 08/31/2004 |
| Date Analyzed | 08/31/2004 |

| SAMPLE INFORMATION | ASBESTOS INFORMATION<br>QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES | DOMINANT OTHER MATERIALS |
|---|---|---|
| Client: 08304-01<br>Micro: 62912-01 Analyst: GR<br>EXTERIOR STUCCO | BEIGE STUCCO: NONE DETECTED<br>GRAY STUCCO: NONE DETECTED | CARBONATE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-02<br>Micro: 62912-02 Analyst: GR<br>EXTERIOR STUCCO | WHITE STUCCO: NONE DETECTED<br>GRAY STUCCO: NONE DETECTED | CARBONATE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-03<br>Micro: 62912-03 Analyst: GR<br>EXTERIOR STUCCO | WHITE STUCCO: NONE DETECTED<br>GRAY STUCCO: NONE DETECTED | CARBONATE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-04<br>Micro: 62912-04 Analyst: GR<br>ROOF CERAMIC TILE | NONE DETECTED | ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-05<br>Micro: 62912-05 Analyst: GR<br>LINOLEUM IN KITCHEN | LINOLEUM: NONE DETECTED<br>BACKING AND MASTIC: 40% CHRYSOTILE | 15 % CELLULOSE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |

Technical Supervisor: 8/31/2004
Baojia Ke, Ph. D. Date Reported

NOTES: Weight % cannot be determined by PLM estimation or point counts. Asbestos fibers with diameter below ~1 µm may not be detected by PLM. The absence of asbestos in dust or debris (including wipe or microvacuum), and in some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Only dominant non-asbestos materials are indicated. This report must not be interpreted as a conclusive identification of non-asbestos (fibrous or not). Preparation (all samples): grinding, milling, teasing bundles apart; drying, if needed, by hotplate. Acid dissolution, ashing, or other matrix reduction techniques may be applied to some samples, residue asbestos % is corrected for amount of matrix removed. Various sample interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Notes are made if point counting is used, otherwise, asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (<<1%) may not be reliable or reproducible by PLM. Lower quantitation limit (reporting limit) of PLM estimation is 1%. The 95% UCL and LCL (Upper and Lower Confidence Limits) represent the highest and lowest expected concentrations for an asbestos point count based on reported concentration and Poisson statistics. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos by weight; however, reliable determination of asbestos weight percent at this level cannot be done by PLM, and TEM is recommended. Layers of heterogeneous samples are analyzed separately, asbestos percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. Composite asbestos percentages on multilayered samples are applicable only to layered wall systems (wallboard, joint compound, and related materials); compositing is based on clients' descriptions of a material as "joint compound". Clients are solely responsible for identification and description of bulk materials listed on field forms. Laboratory sample descriptions may differ from descriptions given by the client. *Quality Control (QC) Codes: A = results confirmed (within acceptance limits), B = no asbestos detected in lab blank (SRM 1866a Fibrous Glass or equivalent); R = all materials confirmed after multiple result resolutions. NIST / NVLAP Accreditation Lab Code #101072-0. California ELAP Certification #1037. EPA test method is based on the EPA Interim Method (1982), with several improvements in analytical techniques. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report must not be reproduced except in full, with approval of Micro Analytical Laboratories.

# MICRO ANALYTICAL LABORATORIES, INC.

Page 2 of 4

## BULK ASBESTOS ANALYSIS - PLM (EPA/600/R-93/116, 1993)

1073

Dave Sweet
714 Taylor Avenue
Alameda, CA 94501

PROJECT:
5020 HEINDRON RANCH ROAD
ANTIOCH, CA

Micro Log In 62912
Total Samples 16
Date Sampled 08/30/2004
Date Received 08/31/2004
Date Analyzed 08/31/2004

| SAMPLE INFORMATION | ASBESTOS INFORMATION<br>QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES | DOMINANT OTHER MATERIALS |
|---|---|---|
| Client: 08304-06<br>Micro: 62912-06 Analyst: GR AF<br>DRYWALL WITH JOINT TAPE AND TEXTURE | QC*: A<br>DRYWALL: NONE DETECTED<br>TEXTURE: NONE DETECTED<br>PAINT: NONE DETECTED<br>NO JOINT COMPOUND / TAPE IN THE SAMPLE | 20 % CELLULOSE<br>GYPSUM<br>CARBONATE |
| Client: 08304-07<br>Micro: 62912-07 Analyst: GR<br>DRYWALL WITH JOINT TAPE AND TEXTURE | DRYWALL: NONE DETECTED<br>JOINT COMPOUND / TEXTURE: NONE DETECTED<br>PAINT: NONE DETECTED<br>JOINT COMPOUND & TEXTURE ARE INDISTINGUISHABLE | 30 % CELLULOSE<br>GYPSUM<br>CARBONATE |
| Client: 08304-08<br>Micro: 62912-08 Analyst: GR<br>TEXTURE ON WALLS | DRYWALL: NONE DETECTED<br>TEXTURE: NONE DETECTED<br>PAINT: NONE DETECTED | 30 % CELLULOSE<br>GYPSUM<br>CARBONATE |
| Client: 08304-09<br>Micro: 62912-09 Analyst: GR<br>LINOLEUM IN RESTROOM | LINOLEUM: NONE DETECTED<br>BACKING AND MASTIC: 40% CHRYSOTILE | 15 % CELLULOSE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-10<br>Micro: 62912-10 Analyst: GR AF<br>ACOUSTICAL SPRAY ON CEILING | QC*: A<br>NONE DETECTED | 5 % CELLULOSE<br>10 % POLYETHYLENE<br>CARBONATE<br>SYNTHETIC MATERIAL<br>PAINT |

Technical Supervisor: __________ 9/1/2004
Baojia Ke, Ph. D. Date Reported

NOTES: Weight % cannot be determined by PLM estimation or point counts. Asbestos fibers with diameter below ~1 µm may not be detected by PLM. The absence of asbestos in dust or debris (including wipe or microvacuum), and in some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Only dominant non-asbestos materials are indicated. This report must not be interpreted as a conclusive identification of non-asbestos (fibrous or not). Preparation (all samples): grinding, milling; teasing bundles apart, drying, if needed, by hotplate. Acid dissolution, ashing, or other matrix reduction techniques may be applied to some samples; residue asbestos % is corrected for amount of matrix removed. Various sample interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Notes are made if point counting is used; otherwise, asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (<<1%) may not be reliable or reproducible by PLM. Lower quantitation limit (reporting limit) of PLM estimation is 1%. The 95% UCL and LCL (Upper and Lower Confidence Limits) represent the highest and lowest expected concentrations for an asbestos point count, based on reported concentration and Poisson statistics. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos by weight; however, reliable determination of asbestos weight percent at this level cannot be done by PLM, and TEM is recommended. Layers of heterogeneous samples are analyzed separately, asbestos percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. Composite asbestos percentages on multilayered samples are applicable only to layered wall systems (wallboard, joint compound, and related materials), compositing is based on clients' descriptions of a material as "joint compound". Clients are solely responsible for identification and description of bulk materials listed on field forms. Laboratory sample descriptions may differ from descriptions given by the client. *Quality Control (QC) Codes: A = results confirmed (within acceptance limits); B = no asbestos detected in lab blank (SRM 1866a Fibrous Glass or equivalent); R = all materials confirmed after multiple result resolutions. NIST / NVLAP Accreditation Lab Code: #101872-0. California ELAP Certification #1037. EPA test method is based on the EPA Interim Method (1982), with several improvements in analytical techniques. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report must not be reproduced except in full, with approval of Micro Analytical Laboratories

# MICRO ANALYTICAL LABORATORIES, INC.

## BULK ASBESTOS ANALYSIS - PLM (EPA/600/R-93/116, 1993)

1073

Dave Sweet
714 Taylor Avenue
Alameda, CA 94501

PROJECT:
5020 HEINDRON RANCH ROAD
ANTIOCH, CA

Micro Log In 62912
Total Samples 16
Date Sampled 08/30/2004
Date Received 08/31/2004
Date Analyzed 08/31/2004

| SAMPLE INFORMATION | ASBESTOS INFORMATION<br>QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES | DOMINANT OTHER MATERIALS |
|---|---|---|
| Client: 08304-11<br>Micro: 62912-11 Analyst: GR<br>ACOUSTICAL SPRAY ON CEILING | NONE DETECTED | 5 % CELLULOSE<br>10 % POLYETHYLENE<br>CARBONATE<br>SYNTHETIC MATERIAL<br>PAINT |
| Client: 08304-12<br>Micro: 62912-12 Analyst: GR<br>ACOUSTICAL SPRAY ON CEILING | NONE DETECTED | 5 % CELLULOSE<br>10 % POLYETHYLENE<br>CARBONATE<br>SYNTHETIC MATERIAL<br>PAINT |
| Client: 08304-13<br>Micro: 62912-13 Analyst: GR<br>LINOLEUM IN RESTROOM | LINOLEUM: NONE DETECTED<br>BACKING AND MASTIC: 40% CHRYSOTILE | 5 % CELLULOSE<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |
| Client: 08304-14<br>Micro: 62912-14 Analyst: GR<br>CERAMIC TILE ADHESIVE<br>RESTROOM WALL | CERAMIC TILE: NONE DETECTED<br>WHITE / BEIGE / ADHESIVE : NONE DETECTED | CARBONATE<br>SYNTHETIC MATERIAL<br>GLASS FRAGMENTS |
| Client: 08304-15<br>Micro: 62912-15 Analyst: GR<br>CERAMIC TILE / GROUT<br>KITCHEN WALL | BROWN GROUT: NONE DETECTED<br>NO CERAMIC TILE IN THE SAMPLE | ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |

Technical Supervisor: 9/1/2004
Baojia Ke, Ph. D. Date Reported

NOTES: Weight % cannot be determined by PLM estimation or point counts. Asbestos fibers with diameter below ~1 µm may not be detected by PLM. The absence of asbestos in dust or debris (including wipe or microvacuum), and in some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Only dominant non-asbestos materials are indicated. This report must not be interpreted as a conclusive identification of non-asbestos (fibrous or not). Preparation (all samples): grinding, milling, teasing bundles apart, drying if needed, by hotplate. Acid dissolution, ashing, or other matrix reduction techniques may be applied to some samples; residue asbestos % is corrected for amount of matrix removed. Various sample interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Notes are made if point counting is used; otherwise, asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (<<1%) may not be reliable or reproducible by PLM. Lower quantitation limit (reporting limit) of PLM estimation is 1%. The 95% UCL and LCL (Upper and Lower Confidence Limits) represent the highest and lowest expected concentrations for an asbestos point count, based on reported concentration and Poisson statistics. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos by weight; however, reliable determination of asbestos weight percent at this level cannot be done by PLM, and TEM is recommended. Layers of heterogeneous samples are analyzed separately, asbestos percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. Composite asbestos percentages on multilayered samples are applicable only to layered wall systems (wallboard, joint compound, and related materials); compositing is based on clients' descriptions of a material as "joint compound". Clients are solely responsible for identification and description of bulk materials listed on field forms. Laboratory sample descriptions may differ from descriptions given by the client. *Quality Control (QC) Codes: A = results confirmed (within acceptance limits); B = no asbestos detected in lab blank (SRM 1866a Fibrous Glass or equivalent); R = all materials confirmed after multiple result resolutions. NIST / NVLAP Accreditation Lab Code #101872-0. California ELAP Certification #1037. EPA test method is based on the EPA Interim Method (1982), with several improvements in analytical techniques. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report must not be reproduced except in full, with approval of Micro Analytical Laboratories.

# MICRO ANALYTICAL LABORATORIES, INC.

## BULK ASBESTOS ANALYSIS - PLM (EPA/600/R-93/116, 1993)

1073

Dave Sweet
714 Taylor Avenue
Alameda, CA 94501

PROJECT:
**5020 HEINDRON RANCH ROAD**
**ANTIOCH, CA**

| | |
|---|---|
| Micro Log In | 62912 |
| Total Samples | 16 |
| Date Sampled | 08/30/2004 |
| Date Received | 08/31/2004 |
| Date Analyzed | 08/31/2004 |

### ASBESTOS INFORMATION

| SAMPLE INFORMATION | QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES | DOMINANT OTHER MATERIALS |
|---|---|---|
| Client: 08304-16 | | 30 % CELLULOSE |
| Micro: 62912-16 Analyst: GR<br>DRYWALL WITH JOINT TAPE<br>GARAGE WALLS | DRYWALL: NONE DETECTED<br>JOINT COMPOUND: NONE DETECTED<br>PAINT: NONE DETECTED | GYPSUM<br>ROCK FRAGMENTS<br>SYNTHETIC MATERIAL |

Technical Supervisor: ______________ 8/31/2004
Baojia Ke, Ph. D. Date Reported

NOTES Weight % cannot be determined by PLM estimation or point counts. Asbestos fibers with diameter below ~ 1 um may not be detected by PLM. The absence of asbestos in dust or debris (including wipe or microvacuum), and in some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Only dominant non-asbestos materials are indicated. This report must not be interpreted as a conclusive identification of non-asbestos (fibrous or not). Preparation (all samples): grinding, milling; teasing bundles apart; drying, if needed, by hotplate. Acid dissolution, ashing, or other matrix reduction techniques may be applied to some samples; residue asbestos % is corrected for amount of matrix removed. Various sample interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Notes are made if point counting is used, otherwise, asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (<<1%) may not be reliable or reproducible by PLM. Lower quantitation limit (reporting limit) of PLM estimation is 1%. The 95% UCL and LCL (Upper and Lower Confidence Limits) represent the highest and lowest expected concentrations for an asbestos point count, based on reported concentration and Poisson statistics. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos by weight; however, reliable determination of asbestos weight percent at this level cannot be done by PLM, and TEM is recommended. Layers of heterogeneous samples are analyzed separately; asbestos percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. Composite asbestos percentages on multilayered samples are applicable only to layered wall systems (wallboard, joint compound, and related materials). compositing is based on clients' descriptions of a material as "joint compound". Clients are solely responsible for identification and description of bulk materials listed on field forms. Laboratory sample descriptions may differ from descriptions given by the client. *Quality Control (QC) Codes: A = results confirmed (within acceptance limits); B = no asbestos detected in lab blank (SRM 1866a Fibrous Glass or equivalent); R = all materials confirmed after multiple result resolutions. NIST / NVLAP Accreditation Lab Code: #101872-0. California ELAP Certification #1037. EPA test method is based on the EPA Interim Method (1982), with several improvements in analytical techniques. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report must not be reproduced except in full, with approval of Micro Analytical Laboratories.

Antioch
Demolition

Mission Peak Construction, Inc.
40480 Encyclopedia Circle
Fremont, Ca. 94538

December 1, 2004

Delta Construction & Engineering Inc.
3870 Oakley Road
Antioch, Ca. 94509

Steve
Here are copies of the finals on 5020 Heidorn. Let me know if you need the originals or more information.

Duanne Shoemake
DCE

DEC 0 6 2004

**BUILDING PERMIT**
Inspection (925) 779-7066

( 'Y HALL THIRD & H STREETS
P.O. Box 5007 ANTIOCH CA 94531-5007
Office (925) 779-7065

Business License _____YES _____NO
**PERMIT #:** B0410-0096

| | |
|---|---|
| Job Address | 5020 HEIDORN RANCH RD |
| Assessor's Parcel # | 056130013 |
| Tract # | Lot # |
| Property Owner(s) | The Mission Peak Company |
| Mailing Address | 40480 Encyclopedia Circle<br>FREMONT, CA 94538 |
| Contractor | Delta Construction and Enginee |
| Mailing Address | P.O. Box 222<br>OAKLEY, CA 94561 |
| License # | 10369 |
| Project Description | |

Demo old farm house

Setbacks: Front Rear Left Right

## LICENSED CONTRACTOR DECLARATION

I hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

Lic. Class Lic. Number
Date Contractor 10369
10/13/2

## OWNER-BUILDER DECLARATION

I hereby affirm under penalty of perjury that I am exempt from the Contractors' State License Law for the following reason (Section 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for the permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractors' State License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500).):

[ ] I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Section 7044, Business and Professions Code: The Contractors' State License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself through his or her own employees, provided that such improvements are not intended or offered for sale. If however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he or she did not build or improve for the purpose of sale.).

[ ] I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Section 7044, Business and Professions Code: The Contractors' State License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors' State License Law.).

[ ] I am exempt under Sec. ________________________ B.& P.C. for this reason:

Date 10/13/2004 Owner ______________________________

## WORKERS' COMPENSATION DECLARATION

I hereby affirm under penalty of perjury one of the following declarations:

[ ] I have and will maintain a certificate of consent to self insure for workers' compensation, as provided for by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued.

[ ] I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My workers' compensation insurance carrier and policy number are:

Policy No:
Company:

(This section need not be completed if the permit value is for one hundred dollars ($100) or less.)

[ ] I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the workers' compensation laws of California, and agree that, if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with these provisions.

Date 10/13/2004 Applicant ______________________________

WARNING: FAILURE TO SECURE WORKERS' COMPENSATION COVERAGE IS UNLAWFUL, AND SHALL SUBJECT AN EMPLOYER TO CRIMINAL PENALTIES AND CIVIL FINES UP TO ONE HUNDRED THOUSAND DOLLARS (100,000), IN ADDITION TO THE COST OF COMPENSATION, DAMAGES AS PROVIDED IN SECTION 3706 OF THE LABOR CODE, INTEREST, AND ATTORNEY'S FEES.

## VALUATION

| | |
|---|---|
| Living Sq. Ft. | 0 |
| Garage Sq. Ft. | 0 |
| Porch Sq. Ft. | 0 |
| Total Value: | $20,000.00 |

## FEES

| | | |
|---|---|---|
| 170b | aa-Building Permit | $321.25 |
| 720c | ac-SMIP Commercial | $4.20 |
| 170T | ac-Technology Fee | $6.43 |
| 170a | ad-Accessibility Fee(non res) | $3.21 |
| 170ec | ad-Energy Inspection Fee | $3.21 |
| | Total Fees | $338.30 |
| | Balance Due | $338.30 |

## INSPECTIONS

| | | | |
|---|---|---|---|
| Foundation | | Plumbing | |
| Under floor | | Mechanical | |
| Insulation | UF W | Electrical | |
| Frame | | Other | |
| Shear | | FINAL | 11-24-04 |

I certify that I have read this application and state that the information given is true and correct. I agree to comply with all local ordinances and state laws relating to building construction and I make this statement under penalty of law. I hereby authorize representatives of this City/County to enter upon the above-mentioned property for inspection purposes. This permit will expire by limitation if work is not started in 180 days or if work is abandoned for more than 180 days. **Do not conceal or cover any construction until the work is inspected and the inspection is recorded on the permit.**

SIGNED______________________ 10/13/2004 ______________________
APPLICANT DATE BUILDING OFFICIAL

White – Office Pink – Assessor Yellow – Job Green – Finance

CONTRA COSTA
HEALTH SERVICES

CONTRA COSTA
ENVIRONMENTAL HEALTH DIVISION
2120 DIAMOND BOULEVARD, SUITE 200
CONCORD, CA 94520
(925) 646-5225
www.cocoeh.org

# Well Permit

WP0002878

OCT 01 2004

PR Number: 20459

PE Number: 4368

Date Received: 10 AUG 04

Permit Number: 04-0210

Permit Approved/Issued by: ______________________ Date Issued: 8/20/04

Environmental Health Specialist

| | | | |
|---|---|---|---|
| NEW WELL | ( ) SOIL BORINGS | [✓ WELL ABANDONMENT] | REPAIR |

The issuance of this permit by Contra Costa County Environmental Health Division does not guarantee a satisfactory and an indefinite operation of any well. Permit expires in 180 calendar days from date of approval. Permits are non-transferable, and can be suspended or revoked. If more time is required for the project, a time extension may be granted if reasons warrant it in writing.

## PROJECT SITE INFORMATION

Site Address: 5020 HEIDORN RANCH RD., ANTIOCH

APN: 056-130-013

Lot/Parcel #:

Subdivision #:

Minor Subdivision #:

## DRILLER / CONSULTANT INFORMATION

Driller: MARTELL WATER SYSTEMS

Contact Person: LEROY CHANCELLOR

Phone #: 925-432-4282

FAX#: 925-432-8149

Consultant:

Contact Person:

Phone #:

FAX#:

## LEGAL OWNER INFORMATION

Legal Owner Name: MISSION PEAK COMPANY

Owner Address: 40460 ENCYLOPEDIA CIR

City/State/Zip: FREMONT, CA 94538

Phone #:

Alternate Phone #:

Contact the Contra Costa County Environmental Health Division appointment desk and obtain a confirmed appointment time and date prior to any drilling construction or destruction of a well. ***Voice mail messages are not acceptable.*** The appointment desk sends confirmation via telephone or fax.

Well drillers must posses a valid C-57 license and must have on file a performance bond of $5,000.00 with Contra Costa County before commencing with any well construction, destruction or repairs.

WELL PERMIT CONDITIONS:

1. Proper annular seals and surface construction features are to be installed and required water analyses completed within 30 days of commencing drilling.
2. Monitoring well/soil boring shall be destroyed pursuant to County regulations within 30 days of completing monitoring activities.
3. Other: ______________________

Final Approval by: ______________________ Date: 10/5/04

(08/02)

CONTRA COSTA
HEALTH SERVICES

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ENVIRONMENTAL HEALTH DIVISION
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CONCORD, CA 94520
(925) 646-5225
www.cocoeh.org

EH
AUG 0 6 2004
REC'D

Septic System

# SEPTIC SYSTEM PERMIT APPLICATION

**Type of Work**
- ☐ New Conv / Alt (12,15)
- ☐ Repair (19)
- ☐ Expansion (11)
- ☐ Alternative Replacement (20)
- ☐ Conventional Replacement (14)
- ☒ Abandonment (21)
- ☐ Plan Check (41)
- ☐ Other________

**Type of Building**
- ☐ Single-Family Dwelling
- ☐ Multiple-Family Dwelling
- ☐ Commercial
- ☐ Industrial
- ☐ Other________

**Projected Sewage Flow**
- ☐ No. of Bedrooms ____
- ☐ No. of Employees ____
- ☐ No. of Seats ____
- ☐ Other________

**Water Supply**
- ☐ Off-site Public Water
- ☐ On-site Public Water

Name of Supplier________
- ☐ Private Well

Number of Wells________

**(ATTACH PLOT PLAN – for instructions see "The Septic System Permit Process" handout)**

**PLEASE PRINT CLEARLY. *REQUIRED FIELDS MUST BE COMPLETED.**

*Legal Owner's Name: Mission Peak Company
*Legal Owner Address: 40460 Encylopedia Circle
*City/ State/ Zip: Fremont CA 94538
Country:
*Owner Telephone: 510 354 0885
*Owner Billing Address (if different from above):
Site Name (if different from above):
Assessor's Parcel #: 056 130 013-8
Subdivision/Minor Subdivision #:
*Site Address (if different from above): 5020 Heidorn Ranch Road
Lot/Parcel #:
*Contractor's Name: Delta Construction & Engineering. INC
*Site Telephone: 925-980-0956
*Contractor's Address: 3870 Oakley Rd, Antioch CA 94509
*Contractor's License #: A410369
*Contact Person's Telepone: 925-980 0956

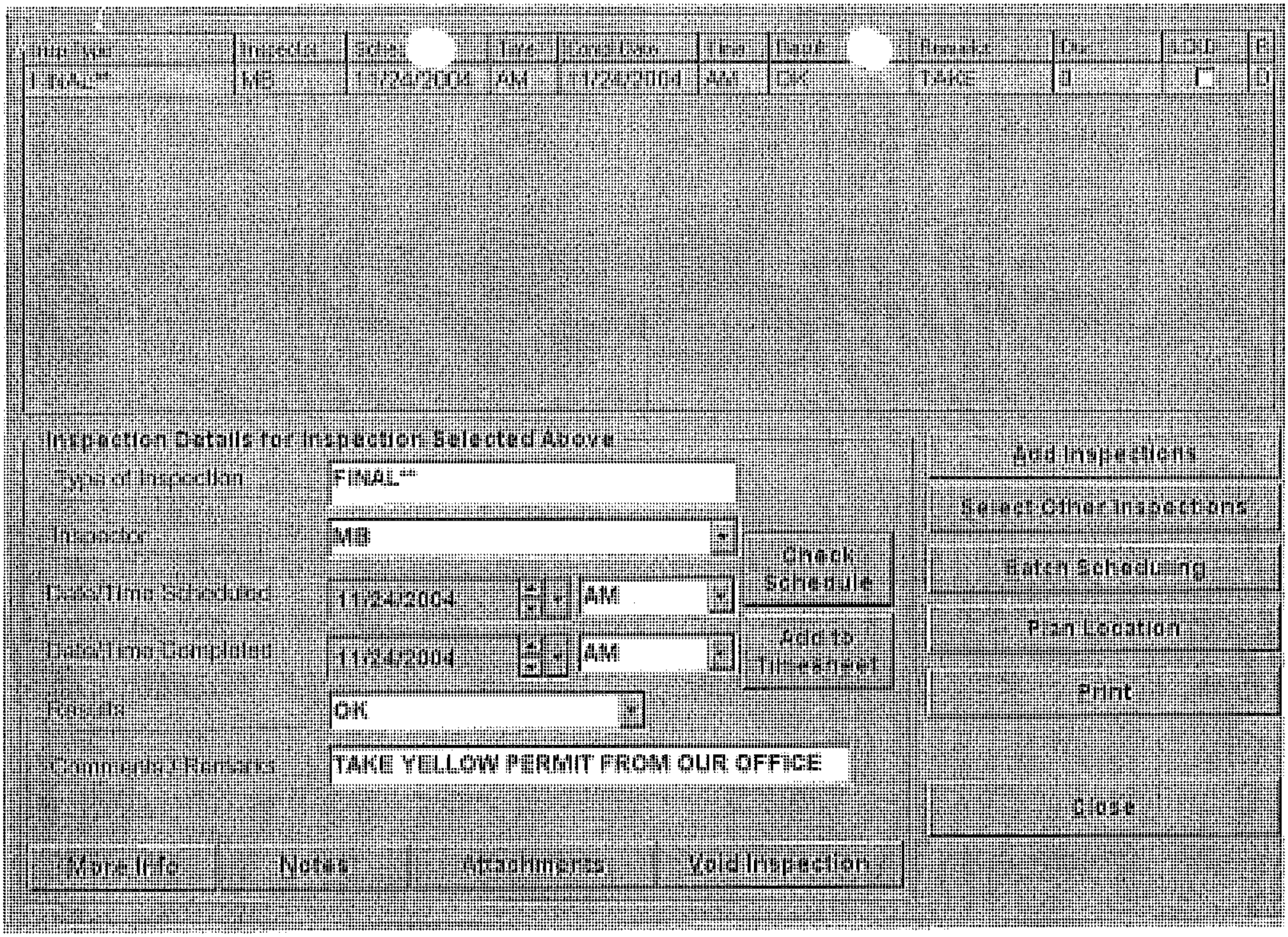
I hereby certify that the above information and submitted plans are true and correct and that the proposed work will comply with all permit conditions and applicable laws and regulations. I agree to obtain all required inspections, maintain a copy of the approved permit and plans at the job site until final approval, and obtain written authorization prior to deviating from the approved permit or plans, or placing the well in service. The issuance of this permit by Contra Costa Environmental Health Division does not guarantee a satisfactory and an indefinite operation of any septic system.

Signature of Owner/Agent ________ Date ________

Duane
Signature of Contractor
Date 8-6-04

**FOR OFFICE USE ONLY**

| | | | | |
|---|---|---|---|---|
| Facility ID#: | PR#: | P/E: 42-21 | Census Tract: | REHS: LM |
| Amount Due: $ 242 Amount Paid: $ 242 | | Receipt #: 6113614 | | Received By: DMW |
| Check #: 1808 CASH / Credit Card: MC__ VISA__ | | Date Received: 8-6-04 | | Supervisor: SQ |



| Insp Type | Inspector | Sched | Time | Compl Date | Time | Result | Remarks | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|---|---|
| FINAL** | MB | 11/24/2004 | AM | 11/24/2004 | AM | OK | TAKE | 0 | ☐ | 0 |

Inspection Details for Inspection Selected Above

Type of Inspection: FINAL**

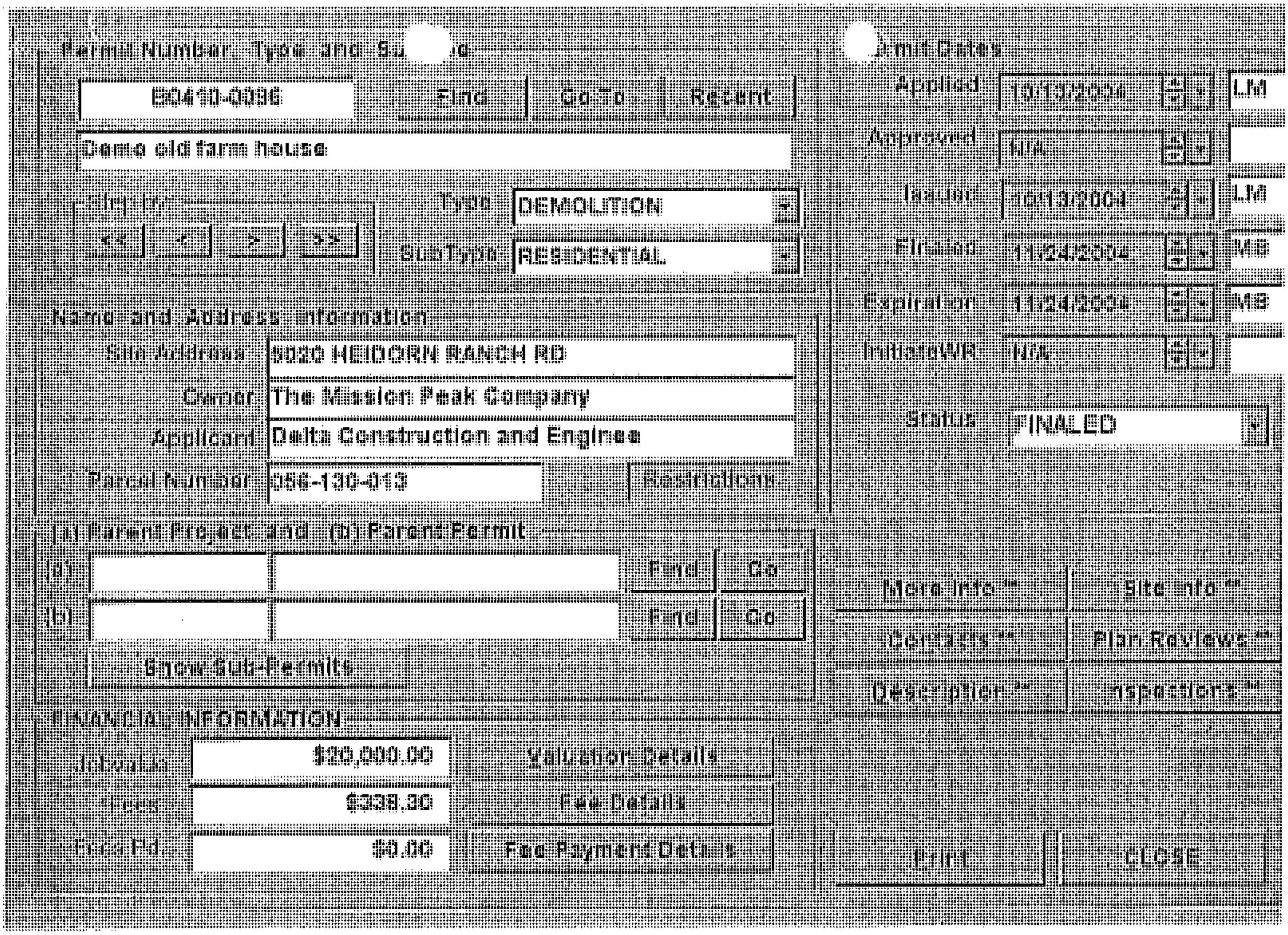
Inspector: MB

Date/Time Scheduled: 11/24/2004 AM

Date/Time Completed: 11/24/2004 AM

Result: OK

Comments / Remarks: TAKE YELLOW PERMIT FROM OUR OFFICE



B0410-0096

Demo old farm house

Type: DEMOLITION

SubType: RESIDENTIAL

Name and Address Information

Site Address: 5020 HEIDORN RANCH RD

Owner: The Mission Peak Company

Applicant: Delta Construction and Enginee

Parcel Number: 056-130-013

FINANCIAL INFORMATION

Job Value: $20,000.00

Fees: $338.30

Fees Pd.: $0.00

Applied: 10/13/2004 LM

Approved: N/A

Issued: 10/13/2004 LM

Finaled: 11/24/2004 MB

Expiration: 11/24/2004 MB

InitiatedWR: N/A

Status: FINALED

12.1.04 C. Wiesn
Bldg. Sec.
City of Antioch

STATE OF CALIFORNIA

# WELL COMPLETION REPORT

No. 0964841

DWR USE ONLY --- DO NOT FILL IN

STATE WELL NO. STATION NO.

LATITUDE LONGITUDE

APN / TRS / OTHER

OWNER'S WELL No.

Date Work Began 9/1/04 Ended 9/3/04

Local Permit Agency Contra Costa County

Permit No. 04-0210 Permit Date 8/20/2004

## GEOLOGIC LOG

ORIENTATION VERTICAL Degree of Angle ..........

DEPTH FROM SURFACE DEPTH TO FIRST WATER ..........(ft.) BELOW SURFACE

| Ft. | Ft. | DESCRIPTION |
|---|---|---|
| | | Well Destruction |
| | | 6" PVC x 144' Wekk |
| | | |
| | | |
| | | - Cleaned Out Well by Bailing |
| | | - Rip casing from bottom with Mills Knife and |
| | | Pumped Neat Cement to fill well |
| | | - Excavated & Removed casing to 5' + B.G.L |
| | | - Backfilled with Native Soil |

TOTAL DEPTH OF BORING (Feet)

TOTAL DEPTH OF COMPLETED WELL 144 (Feet)

## WELL OWNER

Mission Peak Company
40460 Encyclopedia Circ.
Fremont CA 94538

## WELL LOCATION

Address 5020 Heidorn Ranch Rd.

City Antioch County Contra Cosra

Apn Book 056 Page 130 Parcel 013

or

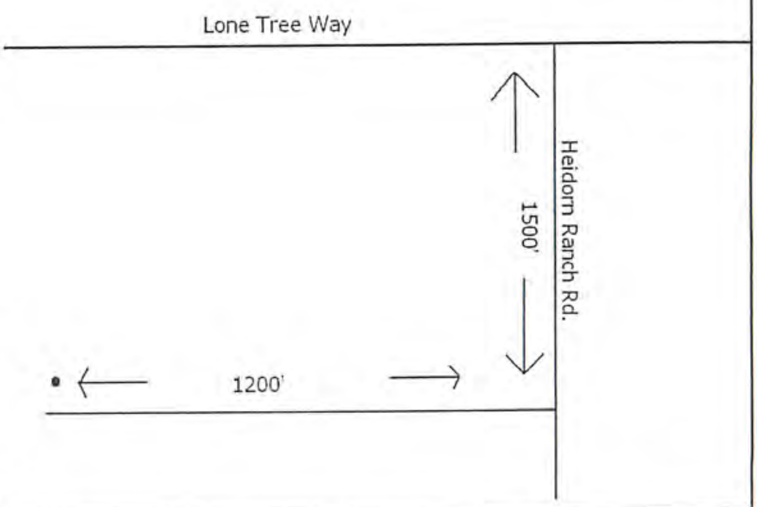
Township ........S Range ........E Section ........ ........1/4 ........1/4

or

Latitude ........ ........ ........ NORTH Longitude ........ ........ ........ WEST

Deg. Min. Sec. Deg. Min. Sec.

## LOCATION SKETCH



ACTIVITY Destruction PLANNED USE(S) Domestic Water

DRILLING METHOD N/A FLUID N/A

DEPTH OF STATIC WATER LEVEL 35' (Ft.) & DATE MEASURED ..........

ESTIMATED YIELD * ........(G.P.M.) & TEST TYPE ..........

TEST LEGENTH. ........ (Hrs.) TOTAL DRAWDOWN .......... (FT.)

*May not be representative of a well's long-term yield.

## CASING

| DEPTH FROM SURFACE Ft. | To Ft. | BORE-HOLE DIA. | TYPE | Material / Grade | Dia. | Gage | Slot size |
|---|---|---|---|---|---|---|---|
| 0 | 144' | UNKN. | | PVC | 6 | | |

## ANNULAR MATERIAL

| DEPTH FROM SURFACE Ft. | To Ft. | Seal Material | Filter Pack (Type / Size) | |
|---|---|---|---|---|
| 144 | 0 | Cement | | |

Attachments

no Geologic Log

no Well Construction Diagram

no Geophysical Logs

no Soil Water Chemical Analyses

no Other

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Martell Water Systems, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1818 Loveridge Rd. Pittsburg CA 94565

Signed 9/27/04 510952

WELL DRILLER / AUTHORIZED REPRESENTATIVE DATE SIGNED C- 57 LICENSE NUMBER

**From:** Octavius.Blocker@hsd.cccounty.us
**Subject:** Records Request for1990 Olivera Rd
**Date:** May 24, 2013 at 10:01 AM
**To:** dallen@aquascienceengineers.com

---

Hello,

I have checked our database for the address you mentioned and have come up empty  Let me know if you have any other questions.

Octavius Blocker, Senior Clerk
Contra Costa Health Services
Hazardous Materials Program
4585 Pacheco Blvd., Suite 100
Martinez, CA 94553

Phone (925) 335-3200
Fax (925) 646-2073
Email octavius.blocker@hsd.cccounty.us

**From:** **Vigil, Gene** gvigil@ci.antioch.ca.us
**Subject:** Permits
**Date:** June 24, 2014 at 10:29 AM
**To:** dallen@aquascienceengineers.com

---

Dave,
There are NO permits issued for the address range 5220-5306 Heidorn Ranch Rd, Antioch CA.

***Gene Vigil***
***Building Inspector***
***(925)779-6162***

***City offices are closed every friday.  We thank you for your understanding.***
***The community development department has the following hours.***
***8:00am – 11:30am:     Full service counter hours***
***12:00pm – 1:00pm:    Closed for lunch***
***1:00pm – 5:00pm:      By appointment only***

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX H

## Regulatory Research Database Report

**Heidorn Ranch Road**
5220 - 5300 Heidorn Ranch Road
Antioch, CA  94531

Inquiry Number: 3976090.2s
June 18, 2014

# The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

# TABLE OF CONTENTS

**SECTION** **PAGE**

## GEOCHECK ADDENDUM

***Thank you for your business.***
Please contact EDR at 1-800-352-0050
with any questions or comments.

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# EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

## TARGET PROPERTY INFORMATION

### ADDRESS

5220 - 5300 HEIDORN RANCH ROAD
ANTIOCH, CA 94531

### COORDINATES

| | |
|---|---|
| Latitude (North): | 37.9561000 - 37˚ 57' 21.96'' |
| Longitude (West): | 121.7532000 - 121˚ 45' 11.52'' |
| Universal Tranverse Mercator: | Zone 10 |
| UTM X (Meters): | 609535.8 |
| UTM Y (Meters): | 4201472.0 |
| Elevation: | 151 ft. above sea level |

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

| | |
|---|---|
| Target Property Map: | 37121-H7 ANTIOCH SOUTH, CA |
| Most Recent Revision: | 1980 |
| East Map: | 37121-H6 BRENTWOOD, CA |
| Most Recent Revision: | 1978 |

### AERIAL PHOTOGRAPHY IN THIS REPORT

| | |
|---|---|
| Photo Year: | 2012 |
| Source: | USDA |

## TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

## DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

## STANDARD ENVIRONMENTAL RECORDS

### *Federal NPL site list*

| | |
|---|---|
| NPL | National Priority List |

# EXECUTIVE SUMMARY

| | |
|---|---|
| Proposed NPL | Proposed National Priority List Sites |
| NPL LIENS | Federal Superfund Liens |

### *Federal Delisted NPL site list*

| | |
|---|---|
| Delisted NPL | National Priority List Deletions |

### *Federal CERCLIS list*

| | |
|---|---|
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| FEDERAL FACILITY | Federal Facility Site Information listing |

### *Federal CERCLIS NFRAP site List*

| | |
|---|---|
| CERC-NFRAP | CERCLIS No Further Remedial Action Planned |

### *Federal RCRA CORRACTS facilities list*

| | |
|---|---|
| CORRACTS | Corrective Action Report |

### *Federal RCRA non-CORRACTS TSD facilities list*

| | |
|---|---|
| RCRA-TSDF | RCRA - Treatment, Storage and Disposal |

### *Federal RCRA generators list*

| | |
|---|---|
| RCRA-LQG | RCRA - Large Quantity Generators |
| RCRA-SQG | RCRA - Small Quantity Generators |
| RCRA-CESQG | RCRA - Conditionally Exempt Small Quantity Generator |

### *Federal institutional controls / engineering controls registries*

| | |
|---|---|
| US ENG CONTROLS | Engineering Controls Sites List |
| US INST CONTROL | Sites with Institutional Controls |
| LUCIS | Land Use Control Information System |

### *Federal ERNS list*

| | |
|---|---|
| ERNS | Emergency Response Notification System |

### *State- and tribal - equivalent NPL*

| | |
|---|---|
| RESPONSE | State Response Sites |

### *State- and tribal - equivalent CERCLIS*

| | |
|---|---|
| ENVIROSTOR | EnviroStor Database |

### *State and tribal landfill and/or solid waste disposal site lists*

| | |
|---|---|
| SWF/LF | Solid Waste Information System |

### *State and tribal leaking storage tank lists*

| | |
|---|---|
| LUST | Geotracker’s Leaking Underground Fuel Tank Report |

| | |
|---|---|
| INDIAN LUST | Leaking Underground Storage Tanks on Indian Land |

### *State and tribal registered storage tank lists*

| | |
|---|---|
| UST | Active UST Facilities |
| AST | Aboveground Petroleum Storage Tank Facilities |
| INDIAN UST | Underground Storage Tanks on Indian Land |
| FEMA UST | Underground Storage Tank Listing |

### *State and tribal voluntary cleanup sites*

| | |
|---|---|
| VCP | Voluntary Cleanup Program Properties |
| INDIAN VCP | Voluntary Cleanup Priority Listing |

## ADDITIONAL ENVIRONMENTAL RECORDS

### *Local Brownfield lists*

| | |
|---|---|
| US BROWNFIELDS | A Listing of Brownfields Sites |

### *Local Lists of Landfill / Solid Waste Disposal Sites*

| | |
|---|---|
| ODI | Open Dump Inventory |
| DEBRIS REGION 9 | Torres Martinez Reservation Illegal Dump Site Locations |
| WMUDS/SWAT | Waste Management Unit Database |
| HAULERS | Registered Waste Tire Haulers Listing |
| INDIAN ODI | Report on the Status of Open Dumps on Indian Lands |

### *Local Lists of Hazardous waste / Contaminated Sites*

| | |
|---|---|
| US CDL | Clandestine Drug Labs |
| HIST Cal-Sites | Historical Calsites Database |
| SCH | School Property Evaluation Program |
| Toxic Pits | Toxic Pits Cleanup Act Sites |
| CDL | Clandestine Drug Labs |
| US HIST CDL | National Clandestine Laboratory Register |

### *Local Lists of Registered Storage Tanks*

| | |
|---|---|
| CA FID UST | Facility Inventory Database |
| HIST UST | Hazardous Substance Storage Container Database |
| SWEEPS UST | SWEEPS UST Listing |

### *Local Land Records*

| | |
|---|---|
| LIENS 2 | CERCLA Lien Information |
| LIENS | Environmental Liens Listing |
| DEED | Deed Restriction Listing |

### *Records of Emergency Release Reports*

| | |
|---|---|
| HMIRS | Hazardous Materials Information Reporting System |
| CHMIRS | California Hazardous Material Incident Report System |
| LDS | Land Disposal Sites Listing |

| | |
|---|---|
| MCS | Military Cleanup Sites Listing |
| SPILLS 90 | SPILLS 90 data from FirstSearch |

***Other Ascertainable Records***

| | |
|---|---|
| RCRA NonGen / NLR | RCRA - Non Generators / No Longer Regulated |
| DOT OPS | Incident and Accident Data |
| DOD | Department of Defense Sites |
| FUDS | Formerly Used Defense Sites |
| CONSENT | Superfund (CERCLA) Consent Decrees |
| ROD | Records Of Decision |
| UMTRA | Uranium Mill Tailings Sites |
| US MINES | Mines Master Index File |
| TRIS | Toxic Chemical Release Inventory System |
| TSCA | Toxic Substances Control Act |
| FTTS | FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act) |
| HIST FTTS | FIFRA/TSCA Tracking System Administrative Case Listing |
| SSTS | Section 7 Tracking Systems |
| ICIS | Integrated Compliance Information System |
| PADS | PCB Activity Database System |
| MLTS | Material Licensing Tracking System |
| RADINFO | Radiation Information Database |
| FINDS | Facility Index System/Facility Registry System |
| RAATS | RCRA Administrative Action Tracking System |
| RMP | Risk Management Plans |
| CA BOND EXP. PLAN | Bond Expenditure Plan |
| NPDES | NPDES Permits Listing |
| UIC | UIC Listing |
| Cortese | "Cortese" Hazardous Waste & Substances Sites List |
| HIST CORTESE | Hazardous Waste & Substance Site List |
| CUPA Listings | CUPA Resources List |
| Notify 65 | Proposition 65 Records |
| DRYCLEANERS | Cleaner Facilities |
| WIP | Well Investigation Program Case List |
| ENF | Enforcement Action Listing |
| HAZNET | Facility and Manifest Data |
| EMI | Emissions Inventory Data |
| INDIAN RESERV | Indian Reservations |
| SCRD DRYCLEANERS | State Coalition for Remediation of Drycleaners Listing |
| 2020 COR ACTION | 2020 Corrective Action Program List |
| LEAD SMELTERS | Lead Smelter Sites |
| PRP | Potentially Responsible Parties |
| US AIRS | Aerometric Information Retrieval System Facility Subsystem |
| WDS | Waste Discharge System |
| US FIN ASSUR | Financial Assurance Information |
| PCB TRANSFORMER | PCB Transformer Registration Database |
| Financial Assurance | Financial Assurance Information Listing |
| COAL ASH EPA | Coal Combustion Residues Surface Impoundments List |
| MWMP | Medical Waste Management Program Listing |
| COAL ASH DOE | Steam-Electric Plant Operation Data |
| HWT | Registered Hazardous Waste Transporter Database |
| HWP | EnviroStor Permitted Facilities Listing |
| PROC | Certified Processors Database |
| EPA WATCH LIST | EPA WATCH LIST |

# EXECUTIVE SUMMARY

## EDR HIGH RISK HISTORICAL RECORDS

### *EDR Exclusive Records*

| | |
|---|---|
| EDR MGP | EDR Proprietary Manufactured Gas Plants |
| EDR US Hist Cleaners | EDR Exclusive Historic Dry Cleaners |

## EDR RECOVERED GOVERNMENT ARCHIVES

### *Exclusive Recovered Govt. Archives*

| | |
|---|---|
| RGA LF | Recovered Government Archive Solid Waste Facilities List |
| RGA LUST | Recovered Government Archive Leaking Underground Storage Tank |

## SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

## STANDARD ENVIRONMENTAL RECORDS

### *State and tribal leaking storage tank lists*

SLIC: SLIC Region comes from the California Regional Water Quality Control Board.

A review of the SLIC list, as provided by EDR, and dated 05/01/2014 has revealed that there is 1 SLIC site within approximately 0.5 miles of the target property.

| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| ***SHELL YARD***<br>Facility Status: Completed - Case Closed | ***3052 HEIDORN RANCH RD*** | ***SSE 1/4 - 1/2 (0.462 mi.)*** | ***6*** | ***9*** |

## ADDITIONAL ENVIRONMENTAL RECORDS

### *Local Lists of Landfill / Solid Waste Disposal Sites*

SWRCY: A listing of recycling facilities in California.

A review of the SWRCY list, as provided by EDR, and dated 03/17/2014 has revealed that there is 1

SWRCY site within approximately 0.5 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| REPLANET LLC | 5451 LONE TREE WAY | NNE 1/4 - 1/2 (0.332 mi.) | 5 | 9 |

### *Other Ascertainable Records*

CONTRA COSTA CO. SITE LIST: Lists includes sites from the Underground Tank Program, Hazardous Waste Generator Program & Business Plan 12185 Program

A review of the CONTRA COSTA CO. SITE LIST list, as provided by EDR, and dated 02/24/2014 has revealed that there are 2 CONTRA COSTA CO. SITE LIST sites within approximately 0.25 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| HEIDRON FARM | 5200 LONE TREE WY | NNW 1/8 - 1/4 (0.224 mi.) | 3 | 8 |
| MICHAELS STORE #5706 | 5501 LONE TREE WY | NE 1/8 - 1/4 (0.230 mi.) | 4 | 8 |

## EDR HIGH RISK HISTORICAL RECORDS

### *EDR Exclusive Records*

EDR US Hist Auto Stat: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 2 EDR US Hist Auto Stat sites within approximately 0.25 miles of the target property.

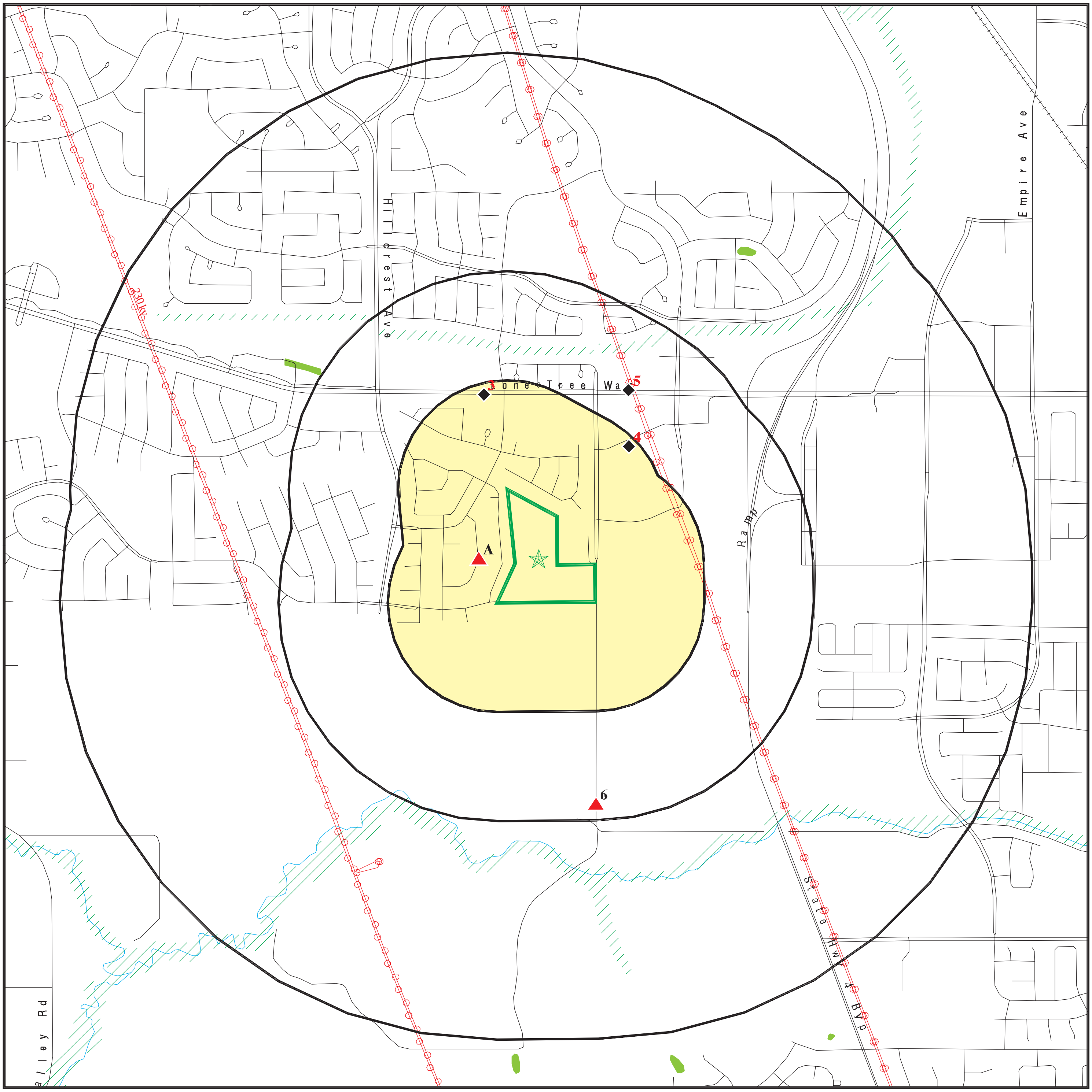
| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| Not reported | 5466 BENTTREE WAY | WSW 0 - 1/8 (0.077 mi.) | A1 | 8 |
| Not reported | 5446 BENTTREE WAY | W 0 - 1/8 (0.080 mi.) | A2 | 8 |

# EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 20 records.

| Site Name | Database(s) |
|---|---|
| PREWETT RANCH UNIT 2 | NPDES |
| PREWETT RANCH | NPDES |
| NORMAN’S BRENTWOOD NURSERY | CA FID UST, CONTRA COSTA CO. SITE LIST, SWEEPS UST |
| MANGINI BROS | HIST UST, SWEEPS UST |
| DELTA FENCE CO., INC. | SWEEPS UST |
| BILL BRANDT FORD, INC. | CA FID UST, CONTRA COSTA CO. SITE LIST, SWEEPS UST |
| SAVERS GAS | CA FID UST, SWEEPS UST |
| LADD, L. JORDAN | SWEEPS UST |
| SANTA FE PACIFIC PIPELINE PARTNERS | CERC-NFRAP |
| MANGINI BROS | UST, CONTRA COSTA CO. SITE LIST |
| LADD, L. JORDAN | UST, CONTRA COSTA CO. SITE LIST |
| L. JORDAN LADD | HIST UST |
| CALIFORNIA ORGANICS | RCRA NonGen / NLR, FINDS |
| MAGNET HIGH SCHOOL SITE | SCH, ENVIROSTOR |
| CHEVRON SS# 96946 | CONTRA COSTA CO. SITE LIST |
| PG&E LONE TREE SUBSTATION | CONTRA COSTA CO. SITE LIST |
| VERIZON WIRELESS/BRENTWOOD WEST | CONTRA COSTA CO. SITE LIST |
| AT&T MOBILITY/BRENTWOOD (45459) | CONTRA COSTA CO. SITE LIST |
| CITY OF BRENTWOOD PW PUMP STATION/ | CONTRA COSTA CO. SITE LIST |
| VERIZON WIRELESS/BRENTWOOD WEST | CONTRA COSTA CO. SITE LIST |

# OVERVIEW MAP - 3976090.2s

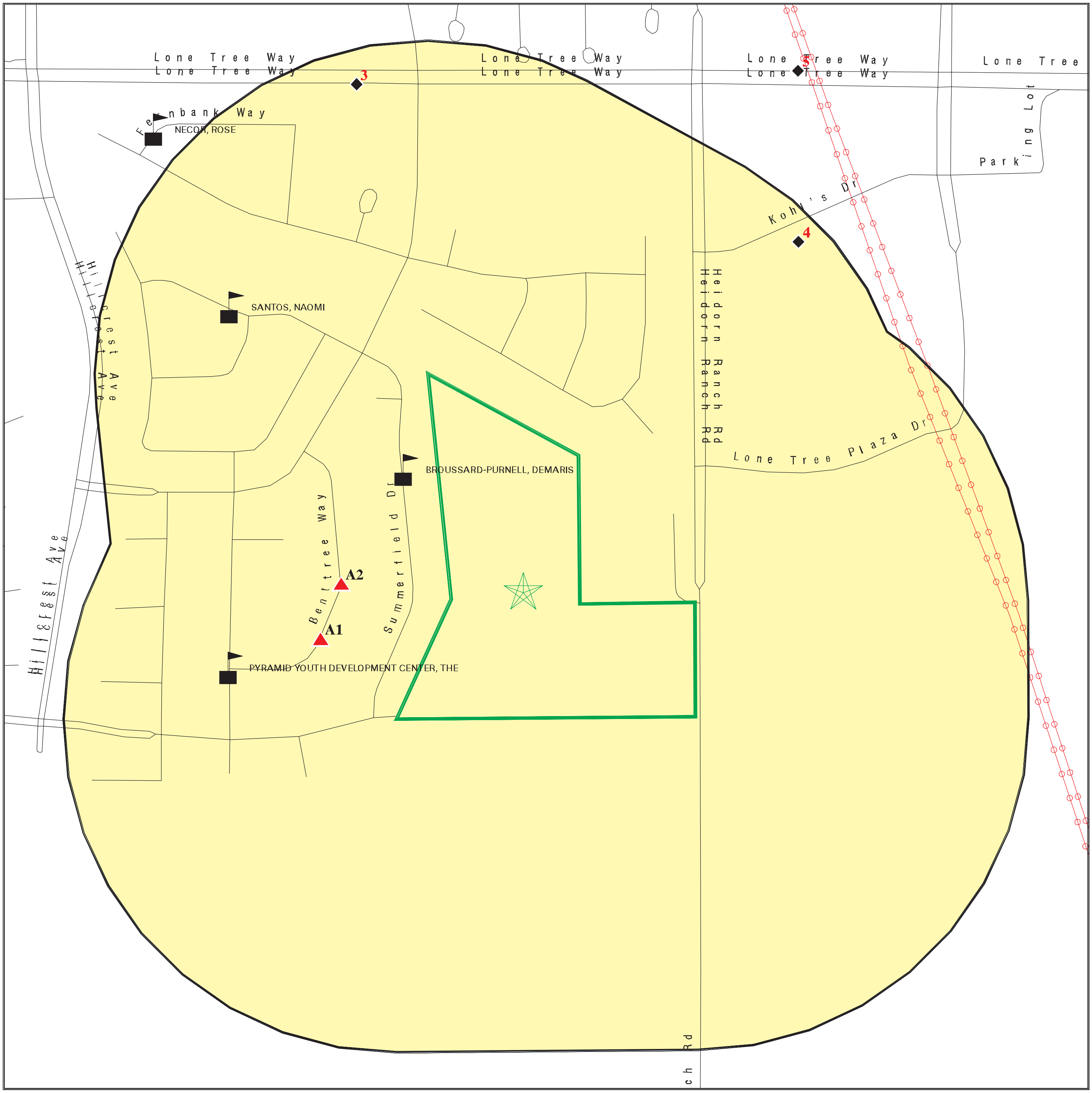


- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- Oil & Gas pipelines from USGS
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- 🟩 National Wetland Inventory
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

| | | | |
|---|---|---|---|
| SITE NAME: | Heidorn Ranch Road | CLIENT: | Aqua Science Engineers Inc. |
| ADDRESS: | 5220 - 5300 Heidorn Ranch Road<br>Antioch CA 94531 | CONTACT: | Dave Allen |
| | | INQUIRY #: | 3976090.2s |
| LAT/LONG: | 37.9561 / 121.7532 | DATE: | June 18, 2014 2:59 pm |

# DETAIL MAP - 3976090.2s



- Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Dept. Defense Sites
- ▨ Indian Reservations BIA
- Power transmission lines
- Oil & Gas pipelines from USGS
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- ▦ Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch CA 94531
LAT/LONG: 37.9561 / 121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY #: 3976090.2s
DATE: June 18, 2014 3:02 pm

# MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|---|---|---|---|---|---|---|---|
| **STANDARD ENVIRONMENTAL RECORDS** | | | | | | | | |
| ***Federal NPL site list*** | | | | | | | | |
| NPL | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| Proposed NPL | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| NPL LIENS | TP | | NR | NR | NR | NR | NR | 0 |
| ***Federal Delisted NPL site list*** | | | | | | | | |
| Delisted NPL | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| ***Federal CERCLIS list*** | | | | | | | | |
| CERCLIS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| FEDERAL FACILITY | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Federal CERCLIS NFRAP site List*** | | | | | | | | |
| CERC-NFRAP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Federal RCRA CORRACTS facilities list*** | | | | | | | | |
| CORRACTS | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| ***Federal RCRA non-CORRACTS TSD facilities list*** | | | | | | | | |
| RCRA-TSDF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Federal RCRA generators list*** | | | | | | | | |
| RCRA-LQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-SQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| RCRA-CESQG | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ***Federal institutional controls / engineering controls registries*** | | | | | | | | |
| US ENG CONTROLS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US INST CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| LUCIS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Federal ERNS list*** | | | | | | | | |
| ERNS | TP | | NR | NR | NR | NR | NR | 0 |
| ***State- and tribal - equivalent NPL*** | | | | | | | | |
| RESPONSE | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| ***State- and tribal - equivalent CERCLIS*** | | | | | | | | |
| ENVIROSTOR | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| ***State and tribal landfill and/or solid waste disposal site lists*** | | | | | | | | |
| SWF/LF | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***State and tribal leaking storage tank lists*** | | | | | | | | |
| LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |

# MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|---|---|---|---|---|---|---|---|
| SLIC | 0.500 | | 0 | 0 | 1 | NR | NR | 1 |
| INDIAN LUST | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***State and tribal registered storage tank lists*** | | | | | | | | |
| UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| AST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| INDIAN UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| FEMA UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ***State and tribal voluntary cleanup sites*** | | | | | | | | |
| VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| INDIAN VCP | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| **ADDITIONAL ENVIRONMENTAL RECORDS** | | | | | | | | |
| ***Local Brownfield lists*** | | | | | | | | |
| US BROWNFIELDS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Local Lists of Landfill / Solid Waste Disposal Sites*** | | | | | | | | |
| ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| DEBRIS REGION 9 | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| WMUDS/SWAT | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| SWRCY | 0.500 | | 0 | 0 | 1 | NR | NR | 1 |
| HAULERS | TP | | NR | NR | NR | NR | NR | 0 |
| INDIAN ODI | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Local Lists of Hazardous waste / Contaminated Sites*** | | | | | | | | |
| US CDL | TP | | NR | NR | NR | NR | NR | 0 |
| HIST Cal-Sites | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| SCH | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| Toxic Pits | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| CDL | TP | | NR | NR | NR | NR | NR | 0 |
| US HIST CDL | TP | | NR | NR | NR | NR | NR | 0 |
| ***Local Lists of Registered Storage Tanks*** | | | | | | | | |
| CA FID UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| HIST UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| SWEEPS UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ***Local Land Records*** | | | | | | | | |
| LIENS 2 | TP | | NR | NR | NR | NR | NR | 0 |
| LIENS | TP | | NR | NR | NR | NR | NR | 0 |
| DEED | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Records of Emergency Release Reports*** | | | | | | | | |
| HMIRS | TP | | NR | NR | NR | NR | NR | 0 |
| CHMIRS | TP | | NR | NR | NR | NR | NR | 0 |
| LDS | TP | | NR | NR | NR | NR | NR | 0 |

# MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|---|---|---|---|---|---|---|---|
| MCS | TP | | NR | NR | NR | NR | NR | 0 |
| SPILLS 90 | TP | | NR | NR | NR | NR | NR | 0 |
| ***Other Ascertainable Records*** | | | | | | | | |
| RCRA NonGen / NLR | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| DOT OPS | TP | | NR | NR | NR | NR | NR | 0 |
| DOD | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| FUDS | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| CONSENT | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| ROD | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| UMTRA | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| US MINES | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| TRIS | TP | | NR | NR | NR | NR | NR | 0 |
| TSCA | TP | | NR | NR | NR | NR | NR | 0 |
| FTTS | TP | | NR | NR | NR | NR | NR | 0 |
| HIST FTTS | TP | | NR | NR | NR | NR | NR | 0 |
| SSTS | TP | | NR | NR | NR | NR | NR | 0 |
| ICIS | TP | | NR | NR | NR | NR | NR | 0 |
| PADS | TP | | NR | NR | NR | NR | NR | 0 |
| MLTS | TP | | NR | NR | NR | NR | NR | 0 |
| RADINFO | TP | | NR | NR | NR | NR | NR | 0 |
| FINDS | TP | | NR | NR | NR | NR | NR | 0 |
| RAATS | TP | | NR | NR | NR | NR | NR | 0 |
| RMP | TP | | NR | NR | NR | NR | NR | 0 |
| CA BOND EXP. PLAN | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| NPDES | TP | | NR | NR | NR | NR | NR | 0 |
| UIC | TP | | NR | NR | NR | NR | NR | 0 |
| Cortese | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| HIST CORTESE | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| CONTRA COSTA CO. SITE LIST | 0.250 | | 0 | 2 | NR | NR | NR | 2 |
| CUPA Listings | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| Notify 65 | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| DRYCLEANERS | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| WIP | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ENF | TP | | NR | NR | NR | NR | NR | 0 |
| HAZNET | TP | | NR | NR | NR | NR | NR | 0 |
| EMI | TP | | NR | NR | NR | NR | NR | 0 |
| INDIAN RESERV | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| SCRD DRYCLEANERS | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| 2020 COR ACTION | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| LEAD SMELTERS | TP | | NR | NR | NR | NR | NR | 0 |
| PRP | TP | | NR | NR | NR | NR | NR | 0 |
| US AIRS | TP | | NR | NR | NR | NR | NR | 0 |
| WDS | TP | | NR | NR | NR | NR | NR | 0 |
| US FIN ASSUR | TP | | NR | NR | NR | NR | NR | 0 |
| PCB TRANSFORMER | TP | | NR | NR | NR | NR | NR | 0 |
| Financial Assurance | TP | | NR | NR | NR | NR | NR | 0 |
| COAL ASH EPA | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| MWMP | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| COAL ASH DOE | TP | | NR | NR | NR | NR | NR | 0 |
| HWT | 0.250 | | 0 | 0 | NR | NR | NR | 0 |

# MAP FINDINGS SUMMARY

| Database | Search Distance (Miles) | Target Property | < 1/8 | 1/8 - 1/4 | 1/4 - 1/2 | 1/2 - 1 | > 1 | Total Plotted |
|---|---|---|---|---|---|---|---|---|
| HWP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| PROC | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| EPA WATCH LIST | TP | | NR | NR | NR | NR | NR | 0 |
| **EDR HIGH RISK HISTORICAL RECORDS** | | | | | | | | |
| ***EDR Exclusive Records*** | | | | | | | | |
| EDR MGP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| EDR US Hist Auto Stat | 0.250 | | 2 | 0 | NR | NR | NR | 2 |
| EDR US Hist Cleaners | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| **EDR RECOVERED GOVERNMENT ARCHIVES** | | | | | | | | |
| ***Exclusive Recovered Govt. Archives*** | | | | | | | | |
| RGA LF | TP | | NR | NR | NR | NR | NR | 0 |
| RGA LUST | TP | | NR | NR | NR | NR | NR | 0 |

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

| Map ID<br>Direction<br>Distance<br>Elevation | Site | Database(s) | EDR ID Number<br>EPA ID Number |
|---|---|---|---|
| **A1**<br>**WSW**<br>**< 1/8**<br>**0.077 mi.**<br>**406 ft.** | **5466 BENTTREE WAY**<br>**ANTIOCH, CA 94531**<br>**Site 1 of 2 in cluster A** | **EDR US Hist Auto Stat** | **1015548620**<br>**N/A** |

**Relative:** **Higher**

**Actual:** **183 ft.**

EDR Historical Auto Stations:

| | |
|---|---|
| Name: | K & G AUTO BODY SHOP |
| Year: | 2006 |
| Address: | 5466 BENTTREE WAY |

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| Map ID<br>Direction<br>Distance<br>Elevation | Site | Database(s) | EDR ID Number<br>EPA ID Number |
|---|---|---|---|
| **A2**<br>**West**<br>**< 1/8**<br>**0.080 mi.**<br>**422 ft.** | **5446 BENTTREE WAY**<br>**ANTIOCH, CA 94531**<br>**Site 2 of 2 in cluster A** | **EDR US Hist Auto Stat** | **1015547991**<br>**N/A** |

**Relative:** **Higher**

**Actual:** **185 ft.**

EDR Historical Auto Stations:

| | |
|---|---|
| Name: | D & H AUTO BODY SHOP |
| Year: | 2004 |
| Address: | 5446 BENTTREE WAY |

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| Map ID<br>Direction<br>Distance<br>Elevation | Site | Database(s) | EDR ID Number<br>EPA ID Number |
|---|---|---|---|
| **3**<br>**NNW**<br>**1/8-1/4**<br>**0.224 mi.**<br>**1181 ft.** | **HEIDRON FARM**<br>**5200 LONE TREE WY**<br>**ANTIOCH, CA 94531** | **CONTRA COSTA CO. SITE LIST** | **S101294046**<br>**N/A** |

**Relative:** **Lower**

**Actual:** **134 ft.**

CONTRA COSTA CO. SITE LIST:

| | |
|---|---|
| Facility ID: | 07000722928 |
| Billing Status: | INACTIVE, NON-BILLABLE |
| Program Status: | CONTRA COSTA CO. SITE LIST |
| Program/Elements: | UNDERGROUND STORAGE TANK SITE |
| Region: | CONTRA COSTA |

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| Map ID<br>Direction<br>Distance<br>Elevation | Site | Database(s) | EDR ID Number<br>EPA ID Number |
|---|---|---|---|
| **4**<br>**NE**<br>**1/8-1/4**<br>**0.230 mi.**<br>**1216 ft.** | **MICHAELS STORE #5706**<br>**5501 LONE TREE WY**<br>**BRENTWOOD, CA 94513** | **CONTRA COSTA CO. SITE LIST** | **S111859594**<br>**N/A** |

**Relative:** **Lower**

**Actual:** **135 ft.**

CONTRA COSTA CO. SITE LIST:

| | |
|---|---|
| Facility ID: | 07000774508 |
| Billing Status: | ACTIVE, BILLABLE |
| Program Status: | CONTRA COSTA CO. SITE LIST |
| Program/Elements: | HWG: REPORTED ZERO |
| Region: | CONTRA COSTA |

| | | | |
|---|---|---|---|
| **5**<br>**NNE**<br>**1/4-1/2**<br>**0.332 mi.**<br>**1754 ft.** | **REPLANET LLC**<br>**5451 LONE TREE WAY**<br>**BRENTWOOD, CA 94513** | **SWRCY** | **S108418450**<br>**N/A** |

**Relative:**
**Lower**

**Actual:**
**131 ft.**

SWRCY:

| | |
|---|---|
| Reg Id: | 158581 |
| Cert Id: | RC158581.001 |
| Mailing Address: | 9910 E 6th St |
| Mailing City: | Rancho Cucamonga |
| Mailing State: | CA |
| Mailing Zip Code: | 91730 |
| Website: | http://www.replanetusa.com |
| Phone Number: | (951) 520-1700 |
| Grand Father: | N |
| Rural: | N |
| Operation Begin Date: | 05/01/2012 |
| Aluminium: | Y |
| Glass: | Y |
| Plastic: | Y |
| Bimetal: | Y |
| Agency: | N/A |
| Monday Hours Of Operation: | CLOSED |
| Tuesday Hours Of Operation: | 10:00 am - 4:30 pm; Closed 1:00 pm - 1:30 pm |
| Wednesday Hours Of Operation: | 10:00 am - 4:30 pm; Closed 1:00 pm - 1:30 pm |
| Thursday Hours Of Operation: | 10:00 am - 4:30 pm; Closed 1:00 pm - 1:30 pm |
| Friday Hours Of Operation: | 10:00 am - 4:30 pm; Closed 1:00 pm - 1:30 pm |
| Saturday Hours Of Operation: | 10:00 am - 4:30 pm; Closed 1:00 pm - 1:30 pm |
| Sunday Hours Of Operation: | CLOSED |
| Cert Status: | Operational |
| Organization ID: | 151891 |
| Organization Name: | rePLANET LLC |
| Agency Reg ID: | N/A |
| Operation End Date: | Not reported |

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| | | | |
|---|---|---|---|
| **6**<br>**SSE**<br>**1/4-1/2**<br>**0.462 mi.**<br>**2438 ft.** | **SHELL YARD**<br>**3052 HEIDORN RANCH RD**<br>**ANTIOCH, CA 94531** | **SLIC**<br>**CDL** | **S106230276**<br>**N/A** |

**Relative:**
**Higher**

**Actual:**
**153 ft.**

SLIC:

| | |
|---|---|
| Region: | STATE |
| **Facility Status:** | **Completed - Case Closed** |
| Status Date: | 02/17/2011 |
| Global Id: | SL0601369421 |
| Lead Agency: | CENTRAL VALLEY RWQCB (REGION 5S) |
| Lead Agency Case Number: | Not reported |
| Latitude: | 37.94806 |
| Longitude: | -121.751851 |
| Case Type: | Cleanup Program Site |
| Case Worker: | KAS |
| Local Agency: | Not reported |
| RB Case Number: | SL0601369421 |
| File Location: | Regional Board |
| Potential Media Affected: | Aquifer used for drinking water supply |
| Potential Contaminants of Concern: | * Petroleum - Automotive gasolines, * Petroleum - Diesel fuels, * Petroleum - Waste oil |
| Site History: | The Site is at the intersection of Heidorn Ranch Road and Sand Creek |

**SHELL YARD (Continued)** **S106230276**

Road in Antioch. The 10-acre lot was formerly used as an office and maintenance yard for pipeline operations, with secondary use as a support area for oil and gas production operations. The Site is bounded on all sides by agricultural fields.

Click here to access the California GeoTracker records for this facility:

SLIC REG 5:

| | |
|---|---|
| Region: | 5 |
| Facility Status: | Preliminary Assessment |
| Unit: | Facility is a Spill or site |
| Pollutant: | TPH g,d, BTEX |
| Lead Agency: | MES |
| Date Filed: | / / |
| Report Date: | / / |
| Date Added: | Not reported |
| Date Closed: | Not reported |

CDL:

| | |
|---|---|
| Facility ID: | 200011134 |
| Date: | 11/26/2000 |
| Lab Type: | Abandoned Drug Lab Waste (A) - location away from an actual illegal drug lab where drug lab waste and/or equipment were abandoned. |

Count: 20 records.

# ORPHAN SUMMARY

| City | EDR ID | Site Name | Site Address | Zip | Database(s) |
|---|---|---|---|---|---|
| ANTIOCH | S106666501 | CHEVRON SS# 96946 | BRIDGEHEAD RD & HWY 4 | 94531 | CONTRA COSTA CO. SITE LIST |
| ANTIOCH | S116165425 | MAGNET HIGH SCHOOL SITE | DEER VALLEY ROAD/LONE TREE WAY | 94531 | SCH, ENVIROSTOR |
| ANTIOCH | S109548490 | PG&E LONE TREE SUBSTATION | HEIDORN RANCH RD | 94531 | CONTRA COSTA CO. SITE LIST |
| ANTIOCH | 1000252416 | CALIFORNIA ORGANICS | 445 A OLD HWY 4 | | RCRA NonGen / NLR, FINDS |
| BRENTWOOD | S101580870 | NORMAN'S BRENTWOOD NURSERY | RR 3 BOX 526 HWY 4 | 94513 | CA FID UST, CONTRA COSTA CO. SITE LIST, SWEEPS UST |
| BRENTWOOD | U003784124 | MANGINI BROS | HWY 4 | 94513 | UST, CONTRA COSTA CO. SITE LIST |
| BRENTWOOD | U001596363 | MANGINI BROS | HIGHWAY 4 | 94513 | HIST UST, SWEEPS UST |
| BRENTWOOD | S108974760 | VERIZON WIRELESS/BRENTWOOD WEST | HWY 4 & SAN JOSE AVE | 94513 | CONTRA COSTA CO. SITE LIST |
| BRENTWOOD | S106925285 | DELTA FENCE CO., INC. | HIGHWAY 4 | 94513 | SWEEPS UST |
| BRENTWOOD | S101623515 | BILL BRANDT FORD, INC. | 1245 HIGHWAY 4 | 94513 | CA FID UST, CONTRA COSTA CO. SITE LIST, SWEEPS UST |
| BRENTWOOD | S101580795 | SAVERS GAS | 2323 HIGHWAY 4 | 94513 | CA FID UST, SWEEPS UST |
| BRENTWOOD | S109420875 | AT&T MOBILITY/BRENTWOOD (45459) | BALFOUR RD & HWY 4 BYPASS | 94513 | CONTRA COSTA CO. SITE LIST |
| BRENTWOOD | U003784169 | LADD, L. JORDAN | BYRON HWY | 94513 | UST, CONTRA COSTA CO. SITE LIST |
| BRENTWOOD | U001596356 | L. JORDAN LADD | BYRON HIGHWAY AT | 94513 | HIST UST |
| BRENTWOOD | S106928458 | LADD, L. JORDAN | BYRON HIGHWAY AT | 94513 | SWEEPS UST |
| BRENTWOOD | 1003879687 | SANTA FE PACIFIC PIPELINE PARTNERS | SE CORNER OF BALFOUR RD & FAIR | 94513 | CERC-NFRAP |
| BRENTWOOD | S107591823 | CITY OF BRENTWOOD PW PUMP STATION/ | 5531 HEIDORN RANCH RD | 94513 | CONTRA COSTA CO. SITE LIST |
| BRENTWOOD | S111459854 | PREWETT RANCH UNIT 2 | LONE TREE WAY EAST TILTON LANE | 94513 | NPDES |
| BRENTWOOD | S111292481 | PREWETT RANCH | LONE TREE WAY E OF TILTON LANE | 94513 | NPDES |
| BRENTWOOD | S109548463 | VERIZON WIRELESS/BRENTWOOD WEST | SAN JOSE AVE & HWY 4 BYPA | 94513 | CONTRA COSTA CO. SITE LIST |

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

**Number of Days to Update:** Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

## STANDARD ENVIRONMENTAL RECORDS

### *Federal NPL site list*

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 06/10/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 06/10/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

***Federal Delisted NPL site list***

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 01/28/2014
Number of Days to Update: 78

Source: EPA
Telephone: N/A
Last EDR Contact: 06/10/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

***Federal CERCLIS list***

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 05/29/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 05/31/2013
Date Data Arrived at EDR: 07/08/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 151

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/11/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Varies

***Federal CERCLIS NFRAP site List***

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 11/11/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 94

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 05/29/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Quarterly

***Federal RCRA CORRACTS facilities list***

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

***Federal RCRA non-CORRACTS TSD facilities list***

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

***Federal RCRA generators list***

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

***Federal institutional controls / engineering controls registries***

US ENG CONTROLS:  Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

| | |
|---|---|
| Date of Government Version: 12/17/2013 | Source:  Environmental Protection Agency |
| Date Data Arrived at EDR: 01/14/2014 | Telephone:  703-603-0695 |
| Date Made Active in Reports: 01/28/2014 | Last EDR Contact: 06/05/2014 |
| Number of Days to Update: 14 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Varies |

US INST CONTROL:  Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

| | |
|---|---|
| Date of Government Version: 12/17/2013 | Source:  Environmental Protection Agency |
| Date Data Arrived at EDR: 01/14/2014 | Telephone:  703-603-0695 |
| Date Made Active in Reports: 01/28/2014 | Last EDR Contact: 06/05/2014 |
| Number of Days to Update: 14 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Varies |

LUCIS:  Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

| | |
|---|---|
| Date of Government Version: 02/26/2014 | Source:  Department of the Navy |
| Date Data Arrived at EDR: 02/28/2014 | Telephone:  843-820-7326 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 05/19/2014 |
| Number of Days to Update: 55 | Next Scheduled EDR Contact: 09/01/2014 |
| | Data Release Frequency: Varies |

***Federal ERNS list***

ERNS:  Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

| | |
|---|---|
| Date of Government Version: 09/30/2013 | Source:  National Response Center, United States Coast Guard |
| Date Data Arrived at EDR: 10/01/2013 | Telephone:  202-267-2180 |
| Date Made Active in Reports: 12/06/2013 | Last EDR Contact: 06/06/2014 |
| Number of Days to Update: 66 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Annually |

***State- and tribal - equivalent NPL***

RESPONSE:  State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

| | |
|---|---|
| Date of Government Version: 05/05/2014 | Source:  Department of Toxic Substances Control |
| Date Data Arrived at EDR: 05/06/2014 | Telephone:  916-323-3400 |
| Date Made Active in Reports: 05/19/2014 | Last EDR Contact: 06/06/2014 |
| Number of Days to Update: 13 | Next Scheduled EDR Contact: 08/18/2014 |
| | Data Release Frequency: Quarterly |

***State- and tribal - equivalent CERCLIS***

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 05/05/2014
Date Data Arrived at EDR: 05/06/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 13

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 06/06/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Quarterly

### *State and tribal landfill and/or solid waste disposal site lists*

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inventory of solid waste disposal facilities or landfills. These may be active or inactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/19/2014
Date Data Arrived at EDR: 05/20/2014
Date Made Active in Reports: 05/22/2014
Number of Days to Update: 2

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/20/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Quarterly

### *State and tribal leaking storage tank lists*

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST: Geotracker's Leaking Underground Fuel Tank Report

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/01/2014
Date Made Active in Reports: 05/13/2014
Number of Days to Update: 12

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 06/17/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Quarterly

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board’s LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board’s LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC: Statewide SLIC Cases

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/01/2014
Date Made Active in Reports: 05/13/2014
Number of Days to Update: 12

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 11/17/2004 | Source: Region Water Quality Control Board Los Angeles Region (4) |
| Date Data Arrived at EDR: 11/18/2004 | Telephone: 213-576-6600 |
| Date Made Active in Reports: 01/04/2005 | Last EDR Contact: 07/01/2011 |
| Number of Days to Update: 47 | Next Scheduled EDR Contact: 10/17/2011 |
| | Data Release Frequency: Varies |

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 04/01/2005 | Source: Regional Water Quality Control Board Central Valley Region (5) |
| Date Data Arrived at EDR: 04/05/2005 | Telephone: 916-464-3291 |
| Date Made Active in Reports: 04/21/2005 | Last EDR Contact: 09/12/2011 |
| Number of Days to Update: 16 | Next Scheduled EDR Contact: 12/26/2011 |
| | Data Release Frequency: Semi-Annually |

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 05/24/2005 | Source: Regional Water Quality Control Board, Victorville Branch |
| Date Data Arrived at EDR: 05/25/2005 | Telephone: 619-241-6583 |
| Date Made Active in Reports: 06/16/2005 | Last EDR Contact: 08/15/2011 |
| Number of Days to Update: 22 | Next Scheduled EDR Contact: 11/28/2011 |
| | Data Release Frequency: Semi-Annually |

SLIC REG 6L: SLIC Sites

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 09/07/2004 | Source: California Regional Water Quality Control Board, Lahontan Region |
| Date Data Arrived at EDR: 09/07/2004 | Telephone: 530-542-5574 |
| Date Made Active in Reports: 10/12/2004 | Last EDR Contact: 08/15/2011 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 11/28/2011 |
| | Data Release Frequency: No Update Planned |

SLIC REG 7: SLIC List

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 11/24/2004 | Source: California Regional Quality Control Board, Colorado River Basin Region |
| Date Data Arrived at EDR: 11/29/2004 | Telephone: 760-346-7491 |
| Date Made Active in Reports: 01/04/2005 | Last EDR Contact: 08/01/2011 |
| Number of Days to Update: 36 | Next Scheduled EDR Contact: 11/14/2011 |
| | Data Release Frequency: No Update Planned |

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

| | |
|---|---|
| Date of Government Version: 04/03/2008 | Source: California Region Water Quality Control Board Santa Ana Region (8) |
| Date Data Arrived at EDR: 04/03/2008 | Telephone: 951-782-3298 |
| Date Made Active in Reports: 04/14/2008 | Last EDR Contact: 09/12/2011 |
| Number of Days to Update: 11 | Next Scheduled EDR Contact: 12/26/2011 |
| | Data Release Frequency: Semi-Annually |

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/06/2013
Date Data Arrived at EDR: 11/07/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 29

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/13/2014
Date Data Arrived at EDR: 02/14/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 10

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 184

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/02/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 11/21/2013
Date Data Arrived at EDR: 11/26/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 90

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/22/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 02/20/2014
Date Data Arrived at EDR: 02/21/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 62

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 59

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 02/21/2014
Next Scheduled EDR Contact: 05/12/2014
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

***State and tribal registered storage tank lists***

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 03/17/2014
Date Data Arrived at EDR: 03/19/2014
Date Made Active in Reports: 04/25/2014
Number of Days to Update: 37

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/17/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 21

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 04/07/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 271

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/02/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 11/21/2013
Date Data Arrived at EDR: 11/26/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 90

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/22/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 02/13/2014
Date Data Arrived at EDR: 02/14/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 10

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 01/29/2014
Date Data Arrived at EDR: 01/29/2014
Date Made Active in Reports: 03/12/2014
Number of Days to Update: 42

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/27/2014
Next Scheduled EDR Contact: 05/12/2014
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 02/20/2014
Date Data Arrived at EDR: 02/21/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 62

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 07/29/2013
Date Data Arrived at EDR: 08/01/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 92

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 07/29/2013
Date Data Arrived at EDR: 07/30/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 129

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

FEMA UST:  Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source:  FEMA
Telephone:  202-646-5797
Last EDR Contact: 04/15/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Varies

***State and tribal voluntary cleanup sites***

INDIAN VCP R1:  Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/17/2013
Date Data Arrived at EDR: 10/01/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 66

Source:  EPA, Region 1
Telephone:  617-918-1102
Last EDR Contact: 04/01/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Varies

INDIAN VCP R7:  Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source:  EPA, Region 7
Telephone:  913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP:  Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 05/05/2014
Date Data Arrived at EDR: 05/06/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 13

Source:  Department of Toxic Substances Control
Telephone:  916-323-3400
Last EDR Contact: 06/06/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Quarterly

## ADDITIONAL ENVIRONMENTAL RECORDS

***Local Brownfield lists***

US BROWNFIELDS:  A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/20/2014
Date Data Arrived at EDR: 03/20/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 20

Source:  Environmental Protection Agency
Telephone:  202-566-2777
Last EDR Contact: 03/20/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: Semi-Annually

***Local Lists of Landfill / Solid Waste Disposal Sites***

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

| | |
|---|---|
| Date of Government Version: 06/30/1985 | Source: Environmental Protection Agency |
| Date Data Arrived at EDR: 08/09/2004 | Telephone: 800-424-9346 |
| Date Made Active in Reports: 09/17/2004 | Last EDR Contact: 06/09/2004 |
| Number of Days to Update: 39 | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: No Update Planned |

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

| | |
|---|---|
| Date of Government Version: 01/12/2009 | Source: EPA, Region 9 |
| Date Data Arrived at EDR: 05/07/2009 | Telephone: 415-947-4219 |
| Date Made Active in Reports: 09/21/2009 | Last EDR Contact: 04/28/2014 |
| Number of Days to Update: 137 | Next Scheduled EDR Contact: 08/11/2014 |
| | Data Release Frequency: No Update Planned |

WMUDS/SWAT: Waste Management Unit Database

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

| | |
|---|---|
| Date of Government Version: 04/01/2000 | Source: State Water Resources Control Board |
| Date Data Arrived at EDR: 04/10/2000 | Telephone: 916-227-4448 |
| Date Made Active in Reports: 05/10/2000 | Last EDR Contact: 05/07/2014 |
| Number of Days to Update: 30 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: No Update Planned |

SWRCY: Recycler Database

A listing of recycling facilities in California.

| | |
|---|---|
| Date of Government Version: 03/17/2014 | Source: Department of Conservation |
| Date Data Arrived at EDR: 03/18/2014 | Telephone: 916-323-3836 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 06/17/2014 |
| Number of Days to Update: 37 | Next Scheduled EDR Contact: 09/29/2014 |
| | Data Release Frequency: Quarterly |

HAULERS: Registered Waste Tire Haulers Listing

A listing of registered waste tire haulers.

| | |
|---|---|
| Date of Government Version: 02/18/2014 | Source: Integrated Waste Management Board |
| Date Data Arrived at EDR: 02/20/2014 | Telephone: 916-341-6422 |
| Date Made Active in Reports: 03/27/2014 | Last EDR Contact: 05/19/2014 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 09/01/2014 |
| | Data Release Frequency: Varies |

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

| | |
|---|---|
| Date of Government Version: 12/31/1998 | Source: Environmental Protection Agency |
| Date Data Arrived at EDR: 12/03/2007 | Telephone: 703-308-8245 |
| Date Made Active in Reports: 01/24/2008 | Last EDR Contact: 05/02/2014 |
| Number of Days to Update: 52 | Next Scheduled EDR Contact: 08/18/2014 |
| | Data Release Frequency: Varies |

***Local Lists of Hazardous waste / Contaminated Sites***

US CDL:  Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 12/04/2013
Date Data Arrived at EDR: 12/10/2013
Date Made Active in Reports: 02/13/2014
Number of Days to Update: 65

Source:  Drug Enforcement Administration
Telephone:  202-307-1000
Last EDR Contact: 06/04/2014
Next Scheduled EDR Contact: 09/15/2014
Data Release Frequency: Quarterly

HIST CAL-SITES:  Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source:  Department of Toxic Substance Control
Telephone:  916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH:  School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 05/05/2014
Date Data Arrived at EDR: 05/06/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 13

Source:  Department of Toxic Substances Control
Telephone:  916-323-3400
Last EDR Contact: 06/06/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Quarterly

TOXIC PITS:  Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source:  State Water Resources Control Board
Telephone:  916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

CDL:  Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/28/2014
Date Made Active in Reports: 03/20/2014
Number of Days to Update: 20

Source:  Department of Toxic Substances Control
Telephone:  916-255-6504
Last EDR Contact: 04/10/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 06/04/2014
Next Scheduled EDR Contact: 09/15/2014
Data Release Frequency: No Update Planned

***Local Lists of Registered Storage Tanks***

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 8

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 06/02/2014
Next Scheduled EDR Contact: 09/15/2014
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990’s. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

***Local Land Records***

LIENS 2: CERCLA Lien Information

A Federal CERCLA (’Superfund’) lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 05/05/2014
Date Data Arrived at EDR: 05/06/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 13

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 06/09/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Varies

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program’s oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder’s office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 03/10/2014
Date Data Arrived at EDR: 03/11/2014
Date Made Active in Reports: 04/10/2014
Number of Days to Update: 30

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 06/11/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Semi-Annually

***Records of Emergency Release Reports***

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 01/03/2014
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 52

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 04/01/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Annually

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 02/04/2014
Date Data Arrived at EDR: 04/29/2014
Date Made Active in Reports: 05/09/2014
Number of Days to Update: 10

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 04/29/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/01/2014
Date Made Active in Reports: 05/13/2014
Number of Days to Update: 12

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/01/2014
Date Made Active in Reports: 05/13/2014
Number of Days to Update: 12

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/17/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

***Other Ascertainable Records***

RCRA NonGen / NLR: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/11/2014
Date Data Arrived at EDR: 03/13/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/13/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/06/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

| | |
|---|---|
| Date of Government Version: 12/31/2012 | Source: U.S. Army Corps of Engineers |
| Date Data Arrived at EDR: 02/28/2014 | Telephone: 202-528-4285 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 06/04/2014 |
| Number of Days to Update: 55 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Varies |

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

| | |
|---|---|
| Date of Government Version: 12/31/2013 | Source: Department of Justice, Consent Decree Library |
| Date Data Arrived at EDR: 01/24/2014 | Telephone: Varies |
| Date Made Active in Reports: 02/24/2014 | Last EDR Contact: 06/13/2014 |
| Number of Days to Update: 31 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Varies |

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

| | |
|---|---|
| Date of Government Version: 11/25/2013 | Source: EPA |
| Date Data Arrived at EDR: 12/12/2013 | Telephone: 703-416-0223 |
| Date Made Active in Reports: 02/24/2014 | Last EDR Contact: 06/10/2014 |
| Number of Days to Update: 74 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Annually |

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

| | |
|---|---|
| Date of Government Version: 09/14/2010 | Source: Department of Energy |
| Date Data Arrived at EDR: 10/07/2011 | Telephone: 505-845-0011 |
| Date Made Active in Reports: 03/01/2012 | Last EDR Contact: 02/25/2014 |
| Number of Days to Update: 146 | Next Scheduled EDR Contact: 06/09/2014 |
| | Data Release Frequency: Varies |

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

| | |
|---|---|
| Date of Government Version: 08/01/2013 | Source: Department of Labor, Mine Safety and Health Administration |
| Date Data Arrived at EDR: 09/05/2013 | Telephone: 303-231-5959 |
| Date Made Active in Reports: 10/03/2013 | Last EDR Contact: 06/06/2014 |
| Number of Days to Update: 28 | Next Scheduled EDR Contact: 09/15/2014 |
| | Data Release Frequency: Semi-Annually |

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

| | |
|---|---|
| Date of Government Version: 12/31/2011 | Source: EPA |
| Date Data Arrived at EDR: 07/31/2013 | Telephone: 202-566-0250 |
| Date Made Active in Reports: 09/13/2013 | Last EDR Contact: 05/30/2014 |
| Number of Days to Update: 44 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Annually |

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/28/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/22/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/22/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/29/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 11/10/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 10/09/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB’s who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2013
Date Data Arrived at EDR: 07/17/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 107

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 07/22/2013
Date Data Arrived at EDR: 08/02/2013
Date Made Active in Reports: 11/01/2013
Number of Days to Update: 91

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 06/05/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/09/2014
Date Data Arrived at EDR: 01/10/2014
Date Made Active in Reports: 03/12/2014
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/09/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and ’pointers’ to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 11/18/2013
Date Data Arrived at EDR: 02/27/2014
Date Made Active in Reports: 03/12/2014
Number of Days to Update: 13

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/13/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

| | |
|---|---|
| Date of Government Version: 04/17/1995 | Source: EPA |
| Date Data Arrived at EDR: 07/03/1995 | Telephone: 202-564-4104 |
| Date Made Active in Reports: 08/07/1995 | Last EDR Contact: 06/02/2008 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 09/01/2008 |
| | Data Release Frequency: No Update Planned |

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

| | |
|---|---|
| Date of Government Version: 11/01/2013 | Source: Environmental Protection Agency |
| Date Data Arrived at EDR: 12/12/2013 | Telephone: 202-564-8600 |
| Date Made Active in Reports: 02/13/2014 | Last EDR Contact: 04/28/2014 |
| Number of Days to Update: 63 | Next Scheduled EDR Contact: 08/11/2014 |
| | Data Release Frequency: Varies |

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

| | |
|---|---|
| Date of Government Version: 12/31/2011 | Source: EPA/NTIS |
| Date Data Arrived at EDR: 02/26/2013 | Telephone: 800-424-9346 |
| Date Made Active in Reports: 04/19/2013 | Last EDR Contact: 05/30/2014 |
| Number of Days to Update: 52 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Biennially |

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

| | |
|---|---|
| Date of Government Version: 01/01/1989 | Source: Department of Health Services |
| Date Data Arrived at EDR: 07/27/1994 | Telephone: 916-255-2118 |
| Date Made Active in Reports: 08/02/1994 | Last EDR Contact: 05/31/1994 |
| Number of Days to Update: 6 | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: No Update Planned |

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

| | |
|---|---|
| Date of Government Version: 05/19/2014 | Source: State Water Resources Control Board |
| Date Data Arrived at EDR: 05/20/2014 | Telephone: 916-445-9379 |
| Date Made Active in Reports: 05/28/2014 | Last EDR Contact: 05/20/2014 |
| Number of Days to Update: 8 | Next Scheduled EDR Contact: 09/01/2014 |
| | Data Release Frequency: Quarterly |

UIC: UIC Listing

A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

| | |
|---|---|
| Date of Government Version: 01/15/2014 | Source: Deaprtment of Conservation |
| Date Data Arrived at EDR: 03/18/2014 | Telephone: 916-445-2408 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 03/18/2014 |
| Number of Days to Update: 37 | Next Scheduled EDR Contact: 06/30/2014 |
| | Data Release Frequency: Varies |

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

| | |
|---|---|
| Date of Government Version: 03/31/2014 | Source: CAL EPA/Office of Emergency Information |
| Date Data Arrived at EDR: 04/02/2014 | Telephone: 916-323-3400 |
| Date Made Active in Reports: 04/29/2014 | Last EDR Contact: 04/01/2014 |
| Number of Days to Update: 27 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Quarterly |

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

| | |
|---|---|
| Date of Government Version: 04/01/2001 | Source: Department of Toxic Substances Control |
| Date Data Arrived at EDR: 01/22/2009 | Telephone: 916-323-3400 |
| Date Made Active in Reports: 04/08/2009 | Last EDR Contact: 01/22/2009 |
| Number of Days to Update: 76 | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: No Update Planned |

NOTIFY 65: Proposition 65 Records

Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

| | |
|---|---|
| Date of Government Version: 10/21/1993 | Source: State Water Resources Control Board |
| Date Data Arrived at EDR: 11/01/1993 | Telephone: 916-445-3846 |
| Date Made Active in Reports: 11/19/1993 | Last EDR Contact: 06/17/2014 |
| Number of Days to Update: 18 | Next Scheduled EDR Contact: 10/06/2014 |
| | Data Release Frequency: No Update Planned |

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner’s agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

| | |
|---|---|
| Date of Government Version: 09/10/2013 | Source: Department of Toxic Substance Control |
| Date Data Arrived at EDR: 09/11/2013 | Telephone: 916-327-4498 |
| Date Made Active in Reports: 10/16/2013 | Last EDR Contact: 06/09/2014 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Annually |

WIP: Well Investigation Program Case List

Well Investigation Program case in the San Gabriel and San Fernando Valley area.

| | |
|---|---|
| Date of Government Version: 07/03/2009 | Source: Los Angeles Water Quality Control Board |
| Date Data Arrived at EDR: 07/21/2009 | Telephone: 213-576-6726 |
| Date Made Active in Reports: 08/03/2009 | Last EDR Contact: 03/31/2014 |
| Number of Days to Update: 13 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Varies |

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 02/25/2014
Date Data Arrived at EDR: 02/27/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 19

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 07/16/2013
Date Made Active in Reports: 08/26/2013
Number of Days to Update: 41

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 03/25/2014
Date Made Active in Reports: 04/28/2014
Number of Days to Update: 34

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 03/25/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 04/21/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Varies

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/16/2014
Next Scheduled EDR Contact: 08/25/2014
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 01/29/2013
Date Data Arrived at EDR: 02/14/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/04/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 04/15/2013
Date Data Arrived at EDR: 07/03/2013
Date Made Active in Reports: 09/13/2013
Number of Days to Update: 72

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 04/04/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

WDS: Waste Discharge System

Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/22/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Quarterly

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: N/A

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/23/2013
Date Data Arrived at EDR: 11/06/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 30

Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 03/31/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/23/2013
Date Data Arrived at EDR: 11/06/2013
Date Made Active in Reports: 12/06/2013
Number of Days to Update: 30

Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 03/31/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Annually

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 02/25/2014
Date Data Arrived at EDR: 02/27/2014
Date Made Active in Reports: 04/09/2014
Number of Days to Update: 41

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 05/16/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/19/2014
Date Data Arrived at EDR: 05/20/2014
Date Made Active in Reports: 05/22/2014
Number of Days to Update: 2

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/19/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/02/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 05/05/2014
Date Data Arrived at EDR: 05/14/2014
Date Made Active in Reports: 05/22/2014
Number of Days to Update: 8

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/11/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Varies

MWMP: Medical Waste Management Program Listing

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

| | |
|---|---|
| Date of Government Version: 02/21/2014 | Source: Department of Public Health |
| Date Data Arrived at EDR: 03/12/2014 | Telephone: 916-558-1784 |
| Date Made Active in Reports: 04/14/2014 | Last EDR Contact: 06/09/2014 |
| Number of Days to Update: 33 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Varies |

COAL ASH DOE: Sleam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

| | |
|---|---|
| Date of Government Version: 12/31/2005 | Source: Department of Energy |
| Date Data Arrived at EDR: 08/07/2009 | Telephone: 202-586-8719 |
| Date Made Active in Reports: 10/22/2009 | Last EDR Contact: 04/18/2014 |
| Number of Days to Update: 76 | Next Scheduled EDR Contact: 07/28/2014 |
| | Data Release Frequency: Varies |

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

| | |
|---|---|
| Date of Government Version: 04/14/2014 | Source: Department of Toxic Substances Control |
| Date Data Arrived at EDR: 04/15/2014 | Telephone: 916-440-7145 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 04/15/2014 |
| Number of Days to Update: 9 | Next Scheduled EDR Contact: 07/28/2014 |
| | Data Release Frequency: Quarterly |

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

| | |
|---|---|
| Date of Government Version: 02/24/2014 | Source: Department of Toxic Substances Control |
| Date Data Arrived at EDR: 02/25/2014 | Telephone: 916-323-3400 |
| Date Made Active in Reports: 03/18/2014 | Last EDR Contact: 05/28/2014 |
| Number of Days to Update: 21 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Quarterly |

PROC: Certified Processors Database

A listing of certified processors.

| | |
|---|---|
| Date of Government Version: 03/17/2014 | Source: Department of Conservation |
| Date Data Arrived at EDR: 03/18/2014 | Telephone: 916-323-3836 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 06/17/2014 |
| Number of Days to Update: 37 | Next Scheduled EDR Contact: 09/29/2014 |
| | Data Release Frequency: Quarterly |

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

| | |
|---|---|
| Date of Government Version: 06/30/2013 | Source: Environmental Protection Agency |
| Date Data Arrived at EDR: 08/13/2013 | Telephone: 617-520-3000 |
| Date Made Active in Reports: 09/13/2013 | Last EDR Contact: 05/16/2014 |
| Number of Days to Update: 31 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: Quarterly |

## EDR HIGH RISK HISTORICAL RECORDS

### *EDR Exclusive Records*

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

| | |
|---|---|
| Date of Government Version: N/A | Source: EDR, Inc. |
| Date Data Arrived at EDR: N/A | Telephone: N/A |
| Date Made Active in Reports: N/A | Last EDR Contact: N/A |
| Number of Days to Update: N/A | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: No Update Planned |

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

| | |
|---|---|
| Date of Government Version: N/A | Source: EDR, Inc. |
| Date Data Arrived at EDR: N/A | Telephone: N/A |
| Date Made Active in Reports: N/A | Last EDR Contact: N/A |
| Number of Days to Update: N/A | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

| | |
|---|---|
| Date of Government Version: N/A | Source: EDR, Inc. |
| Date Data Arrived at EDR: N/A | Telephone: N/A |
| Date Made Active in Reports: N/A | Last EDR Contact: N/A |
| Number of Days to Update: N/A | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

EDR US Hist Cleaners: EDR Proprietary Historic Dry Cleaners - Cole

| | |
|---|---|
| Date of Government Version: N/A | Source: N/A |
| Date Data Arrived at EDR: N/A | Telephone: N/A |
| Date Made Active in Reports: N/A | Last EDR Contact: N/A |
| Number of Days to Update: N/A | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

EDR US Hist Auto Stat: EDR Proprietary Historic Gas Stations - Cole

| | |
|---|---|
| Date of Government Version: N/A | Source: N/A |
| Date Data Arrived at EDR: N/A | Telephone: N/A |
| Date Made Active in Reports: N/A | Last EDR Contact: N/A |
| Number of Days to Update: N/A | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

## EDR RECOVERED GOVERNMENT ARCHIVES

### *Exclusive Recovered Govt. Archives*

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

| | |
|---|---|
| Date of Government Version: N/A | Source: Department of Resources Recycling and Recovery |
| Date Data Arrived at EDR: 07/01/2013 | Telephone: N/A |
| Date Made Active in Reports: 01/13/2014 | Last EDR Contact: 06/01/2012 |
| Number of Days to Update: 196 | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

| | |
|---|---|
| Date of Government Version: N/A | Source: State Water Resources Control Board |
| Date Data Arrived at EDR: 07/01/2013 | Telephone: N/A |
| Date Made Active in Reports: 12/30/2013 | Last EDR Contact: 06/01/2012 |
| Number of Days to Update: 182 | Next Scheduled EDR Contact: N/A |
| | Data Release Frequency: Varies |

## COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

| | |
|---|---|
| Date of Government Version: 04/22/2014 | Source: Alameda County Environmental Health Services |
| Date Data Arrived at EDR: 04/24/2014 | Telephone: 510-567-6700 |
| Date Made Active in Reports: 05/09/2014 | Last EDR Contact: 03/31/2014 |
| Number of Days to Update: 15 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Semi-Annually |

Underground Tanks

Underground storage tank sites located in Alameda county.

| | |
|---|---|
| Date of Government Version: 04/22/2014 | Source: Alameda County Environmental Health Services |
| Date Data Arrived at EDR: 04/24/2014 | Telephone: 510-567-6700 |
| Date Made Active in Reports: 05/12/2014 | Last EDR Contact: 03/31/2014 |
| Number of Days to Update: 18 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Semi-Annually |

AMADOR COUNTY:

CUPA Facility List
Cupa Facility List

Date of Government Version: 03/24/2014
Date Data Arrived at EDR: 03/24/2014
Date Made Active in Reports: 04/30/2014
Number of Days to Update: 37

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 06/09/2014
Next Scheduled EDR Contact: 09/22/2014
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing
Cupa facility list.

Date of Government Version: 08/01/2013
Date Data Arrived at EDR: 08/02/2013
Date Made Active in Reports: 08/22/2013
Number of Days to Update: 20

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 04/10/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 04/03/2014
Date Made Active in Reports: 04/29/2014
Number of Days to Update: 26

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 03/31/2014
Next Scheduled EDR Contact: 07/14/2014
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 12/05/2013
Date Data Arrived at EDR: 12/05/2013
Date Made Active in Reports: 01/27/2014
Number of Days to Update: 53

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 05/30/2014
Next Scheduled EDR Contact: 08/25/2014
Data Release Frequency: Varies

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 02/24/2014
Date Data Arrived at EDR: 02/25/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 21

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 05/05/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

| | |
|---|---|
| Date of Government Version: 05/05/2014 | Source: Del Norte County Environmental Health Division |
| Date Data Arrived at EDR: 05/06/2014 | Telephone: 707-465-0426 |
| Date Made Active in Reports: 05/13/2014 | Last EDR Contact: 05/05/2014 |
| Number of Days to Update: 7 | Next Scheduled EDR Contact: 08/18/2014 |
| | Data Release Frequency: Varies |

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

| | |
|---|---|
| Date of Government Version: 02/20/2014 | Source: El Dorado County Environmental Management Department |
| Date Data Arrived at EDR: 02/21/2014 | Telephone: 530-621-6623 |
| Date Made Active in Reports: 03/20/2014 | Last EDR Contact: 05/05/2014 |
| Number of Days to Update: 27 | Next Scheduled EDR Contact: 08/18/2014 |
| | Data Release Frequency: Varies |

FRESNO COUNTY:

CUPA Resources List
Certified Unified Program Agency. CUPA’s are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

| | |
|---|---|
| Date of Government Version: 03/31/2014 | Source: Dept. of Community Health |
| Date Data Arrived at EDR: 04/15/2014 | Telephone: 559-445-3271 |
| Date Made Active in Reports: 05/01/2014 | Last EDR Contact: 04/14/2014 |
| Number of Days to Update: 16 | Next Scheduled EDR Contact: 07/28/2014 |
| | Data Release Frequency: Semi-Annually |

HUMBOLDT COUNTY:

CUPA Facility List
CUPA facility list.

| | |
|---|---|
| Date of Government Version: 03/20/2014 | Source: Humboldt County Environmental Health |
| Date Data Arrived at EDR: 03/21/2014 | Telephone: N/A |
| Date Made Active in Reports: 04/28/2014 | Last EDR Contact: 05/22/2014 |
| Number of Days to Update: 38 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

IMPERIAL COUNTY:

CUPA Facility List
Cupa facility list.

| | |
|---|---|
| Date of Government Version: 04/28/2014 | Source: San Diego Border Field Office |
| Date Data Arrived at EDR: 04/30/2014 | Telephone: 760-339-2777 |
| Date Made Active in Reports: 05/13/2014 | Last EDR Contact: 04/28/2014 |
| Number of Days to Update: 13 | Next Scheduled EDR Contact: 08/11/2014 |
| | Data Release Frequency: Varies |

INYO COUNTY:

CUPA Facility List

Cupa facility list.

Date of Government Version: 09/10/2013
Date Data Arrived at EDR: 09/11/2013
Date Made Active in Reports: 10/14/2013
Number of Days to Update: 33

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/22/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing

Kern County Sites and Tanks Listing.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 09/30/2010
Number of Days to Update: 29

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 05/12/2014
Next Scheduled EDR Contact: 08/25/2014
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 02/25/2014
Date Data Arrived at EDR: 02/27/2014
Date Made Active in Reports: 03/20/2014
Number of Days to Update: 21

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/27/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 04/22/2014
Date Data Arrived at EDR: 04/24/2014
Date Made Active in Reports: 05/13/2014
Number of Days to Update: 19

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 04/21/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern

San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 03/24/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 12/06/2013
Date Data Arrived at EDR: 01/28/2014
Date Made Active in Reports: 03/17/2014
Number of Days to Update: 48

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 04/02/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/21/2014
Date Data Arrived at EDR: 04/22/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 27

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 04/22/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 03/05/2009
Date Data Arrived at EDR: 03/10/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 29

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 04/17/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 01/07/2014
Date Data Arrived at EDR: 02/25/2014
Date Made Active in Reports: 03/25/2014
Number of Days to Update: 28

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 04/17/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 04/23/2014
Date Data Arrived at EDR: 04/25/2014
Date Made Active in Reports: 05/22/2014
Number of Days to Update: 27

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 04/21/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 02/25/2014
Date Data Arrived at EDR: 02/27/2014
Date Made Active in Reports: 04/14/2014
Number of Days to Update: 46

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 01/13/2014
Date Data Arrived at EDR: 03/27/2014
Date Made Active in Reports: 04/28/2014
Number of Days to Update: 32

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 04/14/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

| | |
|---|---|
| Date of Government Version: 03/26/2014 | Source: Madera County Environmental Health |
| Date Data Arrived at EDR: 03/27/2014 | Telephone: 559-675-7823 |
| Date Made Active in Reports: 04/29/2014 | Last EDR Contact: 05/02/2014 |
| Number of Days to Update: 33 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

MARIN COUNTY:

Underground Storage Tank Sites

Currently permitted USTs in Marin County.

| | |
|---|---|
| Date of Government Version: 01/03/2014 | Source: Public Works Department Waste Management |
| Date Data Arrived at EDR: 01/09/2014 | Telephone: 415-499-6647 |
| Date Made Active in Reports: 02/12/2014 | Last EDR Contact: 04/07/2014 |
| Number of Days to Update: 34 | Next Scheduled EDR Contact: 07/21/2014 |
| | Data Release Frequency: Semi-Annually |

MERCED COUNTY:

CUPA Facility List

CUPA facility list.

| | |
|---|---|
| Date of Government Version: 03/10/2014 | Source: Merced County Environmental Health |
| Date Data Arrived at EDR: 03/11/2014 | Telephone: 209-381-1094 |
| Date Made Active in Reports: 04/10/2014 | Last EDR Contact: 05/27/2014 |
| Number of Days to Update: 30 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

MONO COUNTY:

CUPA Facility List

CUPA Facility List

| | |
|---|---|
| Date of Government Version: 03/03/2014 | Source: Mono County Health Department |
| Date Data Arrived at EDR: 03/04/2014 | Telephone: 760-932-5580 |
| Date Made Active in Reports: 04/01/2014 | Last EDR Contact: 06/02/2014 |
| Number of Days to Update: 28 | Next Scheduled EDR Contact: 09/15/2014 |
| | Data Release Frequency: Varies |

MONTEREY COUNTY:

CUPA Facility Listing

CUPA Program listing from the Environmental Health Division.

| | |
|---|---|
| Date of Government Version: 03/18/2014 | Source: Monterey County Health Department |
| Date Data Arrived at EDR: 03/20/2014 | Telephone: 831-796-1297 |
| Date Made Active in Reports: 04/25/2014 | Last EDR Contact: 05/22/2014 |
| Number of Days to Update: 36 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

NAPA COUNTY:

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Sites With Reported Contamination

A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 12/05/2011
Date Data Arrived at EDR: 12/06/2011
Date Made Active in Reports: 02/07/2012
Number of Days to Update: 63

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/30/2014
Next Scheduled EDR Contact: 09/15/2014
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites

Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/30/2014
Next Scheduled EDR Contact: 09/15/2014
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 11/06/2013
Date Data Arrived at EDR: 11/07/2013
Date Made Active in Reports: 12/04/2013
Number of Days to Update: 27

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 05/13/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups

Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/15/2014
Date Made Active in Reports: 05/22/2014
Number of Days to Update: 7

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2014
Next Scheduled EDR Contact: 08/28/2014
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups

Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/15/2014
Date Made Active in Reports: 05/28/2014
Number of Days to Update: 13

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2014
Next Scheduled EDR Contact: 08/25/2014
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities

Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/14/2014
Date Made Active in Reports: 05/21/2014
Number of Days to Update: 7

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2014
Next Scheduled EDR Contact: 08/25/2014
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

| | |
|---|---|
| Date of Government Version: 03/10/2014 | Source: Placer County Health and Human Services |
| Date Data Arrived at EDR: 03/11/2014 | Telephone: 530-745-2363 |
| Date Made Active in Reports: 04/10/2014 | Last EDR Contact: 06/09/2014 |
| Number of Days to Update: 30 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Semi-Annually |

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

| | |
|---|---|
| Date of Government Version: 04/15/2014 | Source: Department of Environmental Health |
| Date Data Arrived at EDR: 04/17/2014 | Telephone: 951-358-5055 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 03/02/2014 |
| Number of Days to Update: 7 | Next Scheduled EDR Contact: 07/07/2014 |
| | Data Release Frequency: Quarterly |

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

| | |
|---|---|
| Date of Government Version: 04/15/2014 | Source: Department of Environmental Health |
| Date Data Arrived at EDR: 04/17/2014 | Telephone: 951-358-5055 |
| Date Made Active in Reports: 05/09/2014 | Last EDR Contact: 03/24/2014 |
| Number of Days to Update: 22 | Next Scheduled EDR Contact: 07/07/2014 |
| | Data Release Frequency: Quarterly |

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

| | |
|---|---|
| Date of Government Version: 02/06/2014 | Source: Sacramento County Environmental Management |
| Date Data Arrived at EDR: 04/08/2014 | Telephone: 916-875-8406 |
| Date Made Active in Reports: 04/29/2014 | Last EDR Contact: 04/04/2014 |
| Number of Days to Update: 21 | Next Scheduled EDR Contact: 07/21/2014 |
| | Data Release Frequency: Quarterly |

Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

| | |
|---|---|
| Date of Government Version: 02/06/2014 | Source: Sacramento County Environmental Management |
| Date Data Arrived at EDR: 04/08/2014 | Telephone: 916-875-8406 |
| Date Made Active in Reports: 04/29/2014 | Last EDR Contact: 04/04/2014 |
| Number of Days to Update: 21 | Next Scheduled EDR Contact: 07/21/2014 |
| | Data Release Frequency: Quarterly |

SAN BERNARDINO COUNTY:

Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

| | |
|---|---|
| Date of Government Version: 03/18/2014 | Source: San Bernardino County Fire Department Hazardous Materials Division |
| Date Data Arrived at EDR: 03/21/2014 | Telephone: 909-387-3041 |
| Date Made Active in Reports: 04/25/2014 | Last EDR Contact: 05/12/2014 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: Quarterly |

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

| | |
|---|---|
| Date of Government Version: 09/23/2013 | Source: Hazardous Materials Management Division |
| Date Data Arrived at EDR: 09/24/2013 | Telephone: 619-338-2268 |
| Date Made Active in Reports: 10/17/2013 | Last EDR Contact: 06/09/2014 |
| Number of Days to Update: 23 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Quarterly |

Solid Waste Facilities

San Diego County Solid Waste Facilities.

| | |
|---|---|
| Date of Government Version: 10/31/2013 | Source: Department of Health Services |
| Date Data Arrived at EDR: 11/19/2013 | Telephone: 619-338-2209 |
| Date Made Active in Reports: 12/31/2013 | Last EDR Contact: 04/28/2014 |
| Number of Days to Update: 42 | Next Scheduled EDR Contact: 08/11/2014 |
| | Data Release Frequency: Varies |

Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

| | |
|---|---|
| Date of Government Version: 03/23/2010 | Source: San Diego County Department of Environmental Health |
| Date Data Arrived at EDR: 06/15/2010 | Telephone: 619-338-2371 |
| Date Made Active in Reports: 07/09/2010 | Last EDR Contact: 06/04/2014 |
| Number of Days to Update: 24 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: No Update Planned |

SAN FRANCISCO COUNTY:

Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

| | |
|---|---|
| Date of Government Version: 09/19/2008 | Source: Department Of Public Health San Francisco County |
| Date Data Arrived at EDR: 09/19/2008 | Telephone: 415-252-3920 |
| Date Made Active in Reports: 09/29/2008 | Last EDR Contact: 05/09/2014 |
| Number of Days to Update: 10 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: Quarterly |

Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

| | |
|---|---|
| Date of Government Version: 11/29/2010 | Source: Department of Public Health |
| Date Data Arrived at EDR: 03/10/2011 | Telephone: 415-252-3920 |
| Date Made Active in Reports: 03/15/2011 | Last EDR Contact: 05/09/2014 |
| Number of Days to Update: 5 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: Quarterly |

SAN JOAQUIN COUNTY:

San Joaquin Co. UST

A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 04/10/2014
Date Data Arrived at EDR: 04/11/2014
Date Made Active in Reports: 04/29/2014
Number of Days to Update: 18

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 04/07/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List

Cupa Facility List.

Date of Government Version: 02/24/2014
Date Data Arrived at EDR: 02/26/2014
Date Made Active in Reports: 03/26/2014
Number of Days to Update: 28

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 06/09/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory

List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 04/03/2014
Date Data Arrived at EDR: 04/04/2014
Date Made Active in Reports: 05/01/2014
Number of Days to Update: 27

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/16/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Annually

Fuel Leak List

A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/17/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/13/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing

CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/22/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List

Cupa facility list

| | |
|---|---|
| Date of Government Version: 03/04/2014 | Source: Department of Environmental Health |
| Date Data Arrived at EDR: 03/06/2014 | Telephone: 408-918-1973 |
| Date Made Active in Reports: 03/20/2014 | Last EDR Contact: 06/02/2014 |
| Number of Days to Update: 14 | Next Scheduled EDR Contact: 09/15/2014 |
| | Data Release Frequency: Varies |

HIST LUST - Fuel Leak Site Activity Report

A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

| | |
|---|---|
| Date of Government Version: 03/29/2005 | Source: Santa Clara Valley Water District |
| Date Data Arrived at EDR: 03/30/2005 | Telephone: 408-265-2600 |
| Date Made Active in Reports: 04/21/2005 | Last EDR Contact: 03/23/2009 |
| Number of Days to Update: 22 | Next Scheduled EDR Contact: 06/22/2009 |
| | Data Release Frequency: No Update Planned |

LOP Listing

A listing of leaking underground storage tanks located in Santa Clara county.

| | |
|---|---|
| Date of Government Version: 03/03/2014 | Source: Department of Environmental Health |
| Date Data Arrived at EDR: 03/05/2014 | Telephone: 408-918-3417 |
| Date Made Active in Reports: 03/18/2014 | Last EDR Contact: 06/02/2014 |
| Number of Days to Update: 13 | Next Scheduled EDR Contact: 09/15/2014 |
| | Data Release Frequency: Annually |

Hazardous Material Facilities

Hazardous material facilities, including underground storage tank sites.

| | |
|---|---|
| Date of Government Version: 05/12/2014 | Source: City of San Jose Fire Department |
| Date Data Arrived at EDR: 05/19/2014 | Telephone: 408-535-7694 |
| Date Made Active in Reports: 05/28/2014 | Last EDR Contact: 05/12/2014 |
| Number of Days to Update: 9 | Next Scheduled EDR Contact: 08/25/2014 |
| | Data Release Frequency: Annually |

SANTA CRUZ COUNTY:

CUPA Facility List

CUPA facility listing.

| | |
|---|---|
| Date of Government Version: 02/24/2014 | Source: Santa Cruz County Environmental Health |
| Date Data Arrived at EDR: 02/25/2014 | Telephone: 831-464-2761 |
| Date Made Active in Reports: 03/20/2014 | Last EDR Contact: 05/27/2014 |
| Number of Days to Update: 23 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

SHASTA COUNTY:

CUPA Facility List

Cupa Facility List.

| | |
|---|---|
| Date of Government Version: 03/17/2014 | Source: Shasta County Department of Resource Management |
| Date Data Arrived at EDR: 03/18/2014 | Telephone: 530-225-5789 |
| Date Made Active in Reports: 04/24/2014 | Last EDR Contact: 05/22/2014 |
| Number of Days to Update: 37 | Next Scheduled EDR Contact: 09/08/2014 |
| | Data Release Frequency: Varies |

SOLANO COUNTY:

Leaking Underground Storage Tanks

A listing of leaking underground storage tank sites located in Solano county.

| | |
|---|---|
| Date of Government Version: 04/25/2014 | Source: Solano County Department of Environmental Management |
| Date Data Arrived at EDR: 04/01/2014 | Telephone: 707-784-6770 |
| Date Made Active in Reports: 04/28/2014 | Last EDR Contact: 06/13/2014 |
| Number of Days to Update: 27 | Next Scheduled EDR Contact: 09/29/2014 |
| | Data Release Frequency: Quarterly |

Underground Storage Tanks

Underground storage tank sites located in Solano county.

| | |
|---|---|
| Date of Government Version: 03/25/2014 | Source: Solano County Department of Environmental Management |
| Date Data Arrived at EDR: 04/01/2014 | Telephone: 707-784-6770 |
| Date Made Active in Reports: 05/05/2014 | Last EDR Contact: 06/13/2014 |
| Number of Days to Update: 34 | Next Scheduled EDR Contact: 09/29/2014 |
| | Data Release Frequency: Quarterly |

SONOMA COUNTY:

Cupa Facility List

Cupa Facility list

| | |
|---|---|
| Date of Government Version: 12/31/2013 | Source: County of Sonoma Fire & Emergency Services Department |
| Date Data Arrived at EDR: 01/02/2014 | Telephone: 707-565-1174 |
| Date Made Active in Reports: 02/11/2014 | Last EDR Contact: 03/31/2014 |
| Number of Days to Update: 40 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Varies |

Leaking Underground Storage Tank Sites

A listing of leaking underground storage tank sites located in Sonoma county.

| | |
|---|---|
| Date of Government Version: 04/01/2014 | Source: Department of Health Services |
| Date Data Arrived at EDR: 04/03/2014 | Telephone: 707-565-6565 |
| Date Made Active in Reports: 04/28/2014 | Last EDR Contact: 03/31/2014 |
| Number of Days to Update: 25 | Next Scheduled EDR Contact: 07/14/2014 |
| | Data Release Frequency: Quarterly |

SUTTER COUNTY:

Underground Storage Tanks

Underground storage tank sites located in Sutter county.

| | |
|---|---|
| Date of Government Version: 03/24/2014 | Source: Sutter County Department of Agriculture |
| Date Data Arrived at EDR: 03/24/2014 | Telephone: 530-822-7500 |
| Date Made Active in Reports: 04/28/2014 | Last EDR Contact: 06/09/2014 |
| Number of Days to Update: 35 | Next Scheduled EDR Contact: 09/22/2014 |
| | Data Release Frequency: Semi-Annually |

TUOLUMNE COUNTY:

CUPA Facility List

Cupa facility list

| | |
|---|---|
| Date of Government Version: 05/16/2014 | Source: Divison of Environmental Health |
| Date Data Arrived at EDR: 05/16/2014 | Telephone: 209-533-5633 |
| Date Made Active in Reports: 06/13/2014 | Last EDR Contact: 04/28/2014 |
| Number of Days to Update: 28 | Next Scheduled EDR Contact: 08/11/2014 |
| | Data Release Frequency: Varies |

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks

The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 04/28/2014
Date Data Arrived at EDR: 05/20/2014
Date Made Active in Reports: 05/27/2014
Number of Days to Update: 7

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/16/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites

Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 04/04/2014
Next Scheduled EDR Contact: 07/21/2014
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites

Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/16/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Quarterly

Medical Waste Program List

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 04/28/2014
Date Data Arrived at EDR: 04/30/2014
Date Made Active in Reports: 05/19/2014
Number of Days to Update: 19

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 04/28/2014
Next Scheduled EDR Contact: 08/11/2014
Data Release Frequency: Quarterly

Underground Tank Closed Sites List

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 03/06/2014
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 04/28/2014
Number of Days to Update: 38

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/16/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report

Underground storage tank sites located in Yolo county.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 04/08/2014
Date Made Active in Reports: 05/05/2014
Number of Days to Update: 27

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 03/24/2014
Next Scheduled EDR Contact: 07/07/2014
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 02/11/2014
Date Data Arrived at EDR: 02/13/2014
Date Made Active in Reports: 03/17/2014
Number of Days to Update: 32

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 05/19/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Varies

## OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/23/2014
Next Scheduled EDR Contact: 09/01/2014
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 08/28/2012
Number of Days to Update: 40

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/18/2014
Next Scheduled EDR Contact: 07/28/2014
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 05/01/2014
Date Data Arrived at EDR: 05/07/2014
Date Made Active in Reports: 06/10/2014
Number of Days to Update: 34

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/07/2014
Next Scheduled EDR Contact: 08/18/2014
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 07/24/2013
Date Made Active in Reports: 08/19/2013
Number of Days to Update: 26

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/21/2014
Next Scheduled EDR Contact: 08/04/2014
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 06/21/2013
Date Made Active in Reports: 08/05/2013
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/27/2014
Next Scheduled EDR Contact: 09/08/2014
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 08/09/2013
Date Made Active in Reports: 09/27/2013
Number of Days to Update: 49

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/16/2014
Next Scheduled EDR Contact: 09/29/2014
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

## STREET AND ADDRESS INFORMATION

# GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

**TARGET PROPERTY ADDRESS**

HEIDORN RANCH ROAD
5220 - 5300 HEIDORN RANCH ROAD
ANTIOCH, CA 94531

**TARGET PROPERTY COORDINATES**

| | |
|---|---|
| Latitude (North): | 37.9561 - 37˚ 57’ 21.96’’ |
| Longitude (West): | 121.7532 - 121˚ 45’ 11.52’’ |
| Universal Tranverse Mercator: | Zone 10 |
| UTM X (Meters): | 609535.8 |
| UTM Y (Meters): | 4201472.0 |
| Elevation: | 151 ft. above sea level |

**USGS TOPOGRAPHIC MAP**

| | |
|---|---|
| Target Property Map: | 37121-H7 ANTIOCH SOUTH, CA |
| Most Recent Revision: | 1980 |
| | |
| East Map: | 37121-H6 BRENTWOOD, CA |
| Most Recent Revision: | 1978 |

EDR’s GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

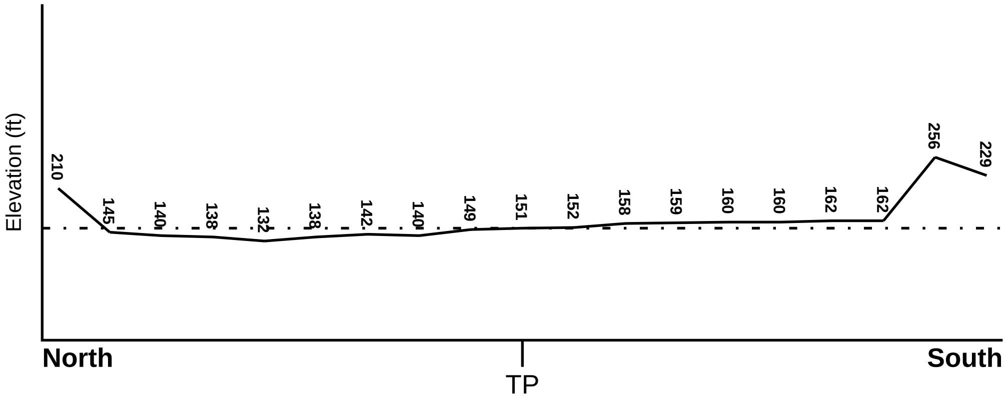
## TOPOGRAPHIC INFORMATION

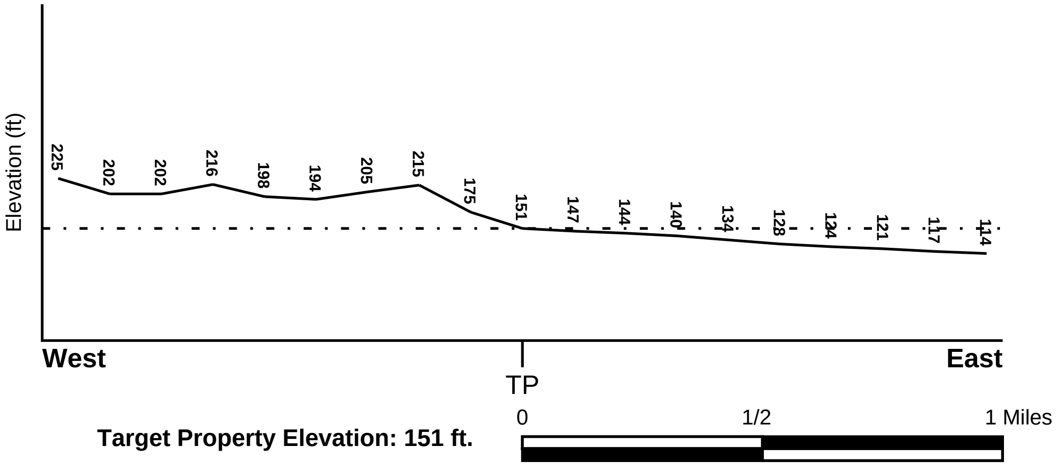
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

### TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General ENE

### SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





**Target Property Elevation: 151 ft.**

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

### FEMA FLOOD ZONE

| Target Property County | FEMA Flood Electronic Data |
|---|---|
| CONTRA COSTA, CA | YES - refer to the Overview Map and Detail Map |

Flood Plain Panel at Target Property: 06013C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

### NATIONAL WETLAND INVENTORY

| NWI Quad at Target Property | NWI Electronic Data Coverage |
|---|---|
| ANTIOCH SOUTH | YES - refer to the Overview Map and Detail Map |

## HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

***Site-Specific Hydrogeological Data*:***

| | |
|---|---|
| Search Radius: | 1.25 miles |
| Status: | Not found |

### AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

| MAP ID | LOCATION FROM TP | GENERAL DIRECTION GROUNDWATER FLOW |
|---|---|---|
| Not Reported | | |

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* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

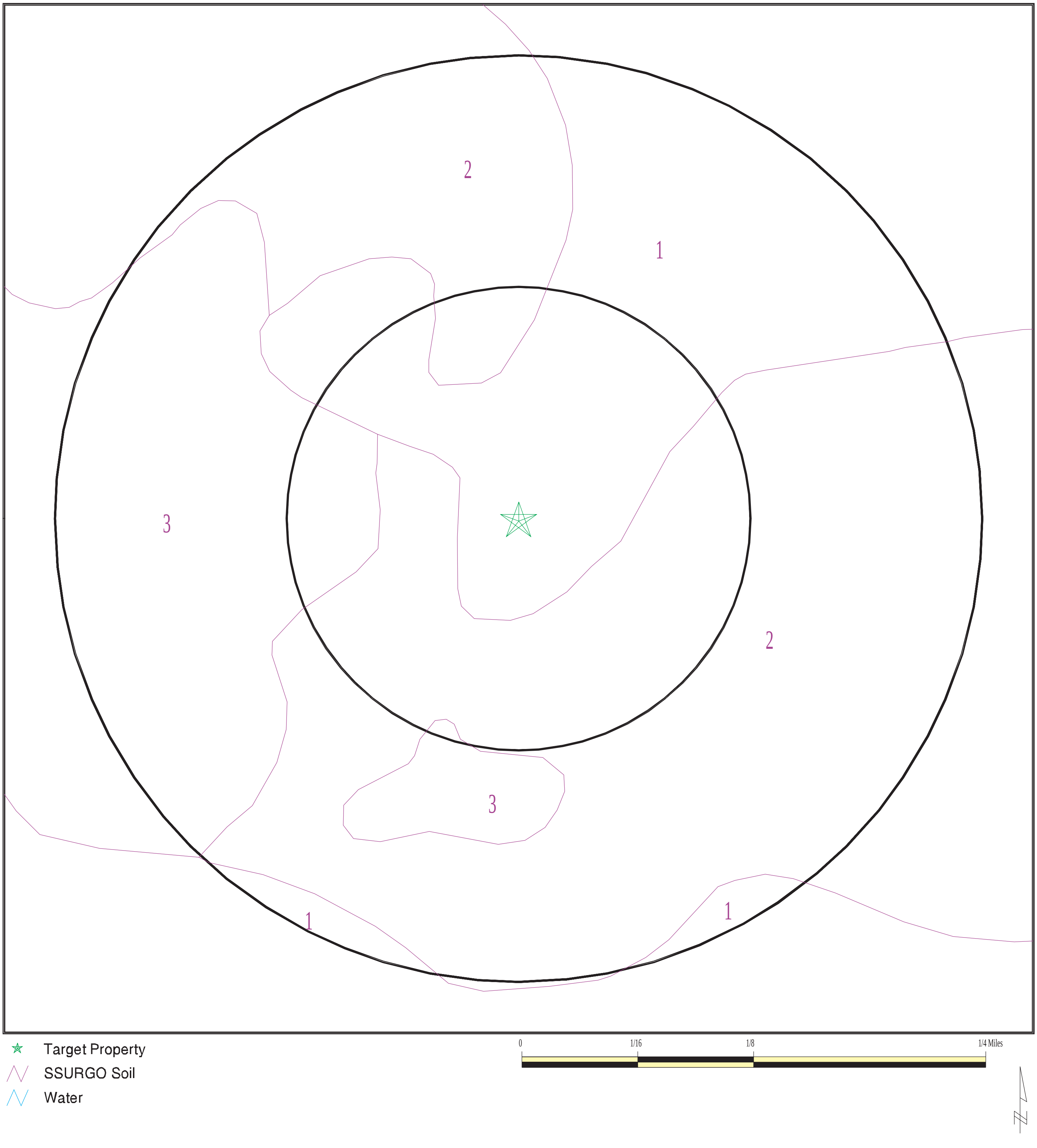
## GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

| ROCK STRATIGRAPHIC UNIT | | GEOLOGIC AGE IDENTIFICATION | |
|---|---|---|---|
| Era: | Cenozoic | Category: | Stratified Sequence |
| System: | Tertiary | | |
| Series: | Miocene | | |
| Code: | Tm *(decoded above as Era, System & Series)* | | |

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

# SSURGO SOIL MAP - 3976090.2s



SITE NAME: Heidorn Ranch Road
ADDRESS: 5220 - 5300 Heidorn Ranch Road
Antioch CA 94531
LAT/LONG: 37.9561 / 121.7532

CLIENT: Aqua Science Engineers Inc.
CONTACT: Dave Allen
INQUIRY #: 3976090.2s
DATE: June 18, 2014 3:03 pm

**DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY**

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

---

**Soil Map ID: 1**

| | |
|---|---|
| Soil Component Name: | CAPAY |
| Soil Surface Texture: | clay |
| Hydrologic Group: | Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer. |
| Soil Drainage Class: | Moderately well drained |

Hydric Status: Partially hydric

| | |
|---|---|
| Corrosion Potential - Uncoated Steel: | High |
| Depth to Bedrock Min: | > 0 inches |
| Depth to Watertable Min: | > 0 inches |

**Soil Layer Information**

| | Boundary | | | Classification | | Saturated hydraulic conductivity micro m/sec | |
|---|---|---|---|---|---|---|---|
| **Layer** | **Upper** | **Lower** | **Soil Texture Class** | **AASHTO Group** | **Unified Soil** | | **Soil Reaction (pH)** |
| 1 | 0 inches | 35 inches | clay | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 6.6 |
| 2 | 35 inches | 51 inches | clay | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 6.6 |
| 3 | 51 inches | 72 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 6.6 |

---

**Soil Map ID: 2**

Soil Component Name: RINCON

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

**Soil Layer Information**

| | **Boundary** | | | **Classification** | | **Saturated hydraulic conductivity micro m/sec** | |
|---|---|---|---|---|---|---|---|
| **Layer** | **Upper** | **Lower** | **Soil Texture Class** | **AASHTO Group** | **Unified Soil** | | **Soil Reaction (pH)** |
| 1 | 0 inches | 11 inches | clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 4<br>Min: 1.4 | Max: 7.8<br>Min: 6.1 |
| 2 | 11 inches | 29 inches | clay | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 6.6 |
| 3 | 29 inches | 59 inches | silty clay loam | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. | Max: 4<br>Min: 1.4 | Max: 8.4<br>Min: 7.9 |

---

**Soil Map ID: 3**

Soil Component Name: ALTAMONT

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Boundary | | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| Layer | Upper | Lower | Soil Texture Class | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 25 inches | clay | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 6.6 |
| 2 | 25 inches | 48 inches | clay | Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils. | FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay | Max: 1.4<br>Min: 0.42 | Max: 8.4<br>Min: 7.4 |
| 3 | 48 inches | 51 inches | weathered bedrock | Not reported | Not reported | Max: 1.4<br>Min: 0 | Max: Min: |

## LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

## WELL SEARCH DISTANCE INFORMATION

| DATABASE | SEARCH DISTANCE (miles) |
|---|---|
| Federal USGS | 1.000 |
| Federal FRDS PWS | Nearest PWS within 1 mile |
| State Database | 1.000 |

## FEDERAL USGS WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| 1 | USGS40000186287 | 1/2 - 1 Mile ENE |

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

### FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| No PWS System Found | | |

Note: PWS System location is not always the same as well location.

### STATE DATABASE WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| No Wells Found | | |

## OTHER STATE DATABASE INFORMATION

### STATE OIL/GAS WELL INFORMATION

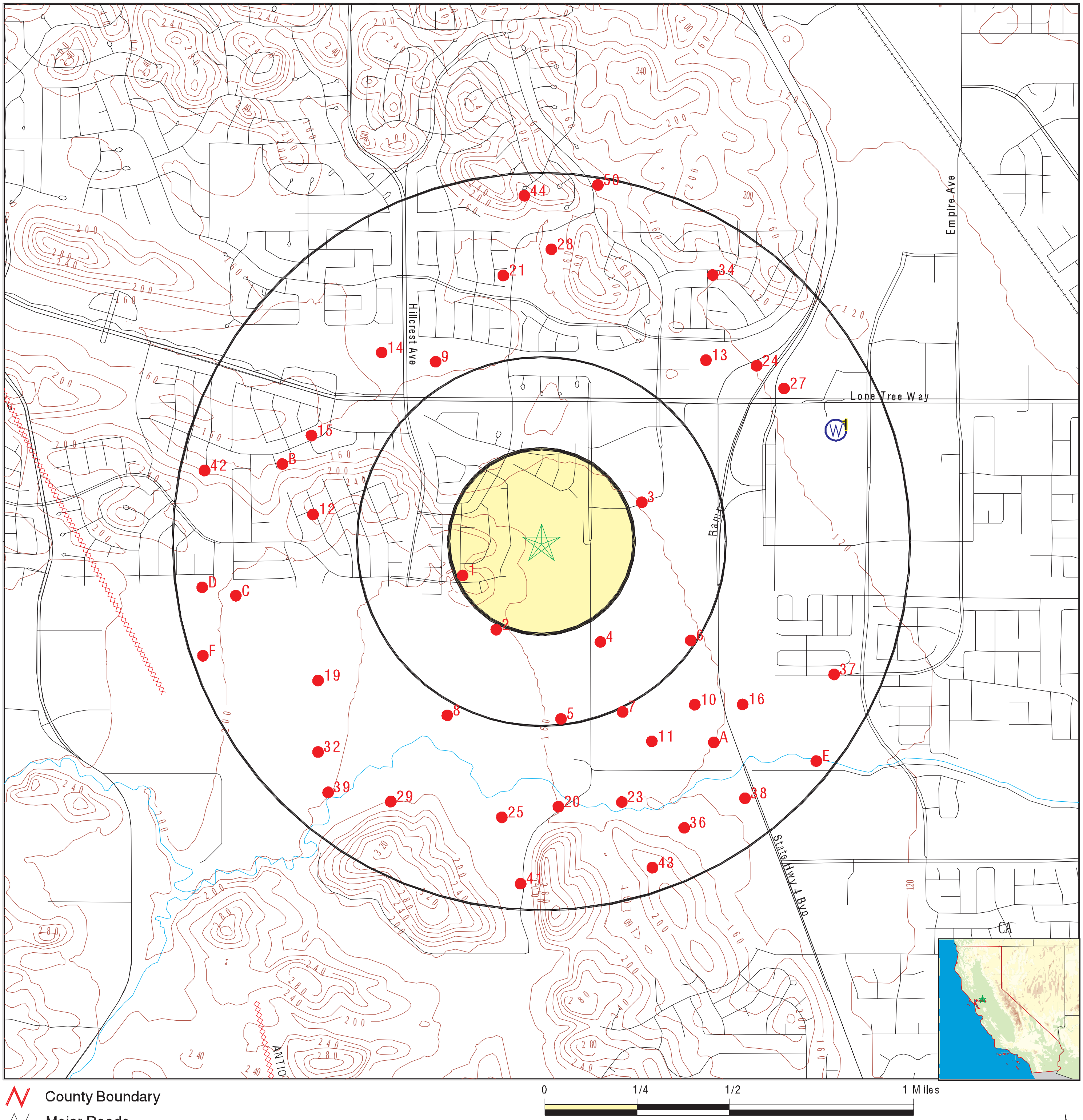
| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| 1 | CAOG9A000207835 | 1/8 - 1/4 Mile WSW |
| 2 | CAOG9A000207812 | 1/4 - 1/2 Mile SSW |
| 3 | CAOG9A000207862 | 1/4 - 1/2 Mile ENE |
| 4 | CAOG9A000207804 | 1/4 - 1/2 Mile SSE |
| 5 | CAOG9A000207778 | 1/4 - 1/2 Mile South |
| 6 | CAOG9A000207805 | 1/4 - 1/2 Mile ESE |
| 7 | CAOG9A000207782 | 1/2 - 1 Mile SSE |
| 8 | CAOG9A000207780 | 1/2 - 1 Mile SSW |
| 9 | CAOG9A000207908 | 1/2 - 1 Mile NNW |
| 10 | CAOG9A000207783 | 1/2 - 1 Mile SE |
| 11 | CAOG9A000207775 | 1/2 - 1 Mile SSE |
| 12 | CAOG9A000207855 | 1/2 - 1 Mile West |
| 13 | CAOG9A000207909 | 1/2 - 1 Mile NE |
| 14 | CAOG9A000207913 | 1/2 - 1 Mile NW |
| 15 | CAOG9A000207891 | 1/2 - 1 Mile WNW |
| 16 | CAOG9A000207784 | 1/2 - 1 Mile SE |
| A17 | CAOG9A000207776 | 1/2 - 1 Mile SE |
| B18 | CAOG9A000207880 | 1/2 - 1 Mile WNW |
| 19 | CAOG9A000207789 | 1/2 - 1 Mile WSW |
| 20 | CAOG9A000207742 | 1/2 - 1 Mile South |
| 21 | CAOG9A000207934 | 1/2 - 1 Mile North |
| A22 | CAOG9A000207774 | 1/2 - 1 Mile SE |
| 23 | CAOG9A000207746 | 1/2 - 1 Mile SSE |
| 24 | CAOG9A000207907 | 1/2 - 1 Mile NE |
| 25 | CAOG9A000207737 | 1/2 - 1 Mile South |
| B26 | CAOG9A000207877 | 1/2 - 1 Mile WNW |
| 27 | CAOG9A000207900 | 1/2 - 1 Mile ENE |
| 28 | CAOG9A000207940 | 1/2 - 1 Mile North |
| 29 | CAOG9A000207747 | 1/2 - 1 Mile SSW |
| C30 | CAOG9A000207829 | 1/2 - 1 Mile West |
| C31 | CAOG9A000207818 | 1/2 - 1 Mile WSW |
| 32 | CAOG9A000207771 | 1/2 - 1 Mile SW |
| C33 | CAOG9A000207832 | 1/2 - 1 Mile West |
| 34 | CAOG9A000207935 | 1/2 - 1 Mile NNE |
| C35 | CAOG9A000207828 | 1/2 - 1 Mile West |
| 36 | CAOG9A000207733 | 1/2 - 1 Mile SSE |
| 37 | CAOG9A000207791 | 1/2 - 1 Mile ESE |

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| 38 | CAOG9A000207750 | 1/2 - 1 Mile SE |
| 39 | CAOG9A000207752 | 1/2 - 1 Mile SW |
| D40 | CAOG9A000207833 | 1/2 - 1 Mile West |
| 41 | CAOG9A000207711 | 1/2 - 1 Mile South |
| 42 | CAOG9A000207876 | 1/2 - 1 Mile WNW |
| 43 | CAOG9A000207714 | 1/2 - 1 Mile SSE |
| 44 | CAOG9A000207955 | 1/2 - 1 Mile North |
| D45 | CAOG9A000207826 | 1/2 - 1 Mile West |
| E46 | CAOG9A000207765 | 1/2 - 1 Mile SE |
| E47 | CAOG9A000207766 | 1/2 - 1 Mile SE |
| F48 | CAOG9A000207793 | 1/2 - 1 Mile WSW |
| F49 | CAOG9A000207801 | 1/2 - 1 Mile WSW |
| 50 | CAOG9A000207959 | 1/2 - 1 Mile North |

# PHYSICAL SETTING SOURCE MAP - 3976090.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- ◎ Earthquake epicenter, Richter 5 or greater
- Ⓦ Water Wells
- Ⓟ Public Water Supply Wells
- ● Cluster of Multiple Icons

- ↑ Groundwater Flow Direction
- (GI) Indeterminate Groundwater Flow at Location
- (GV) Groundwater Flow Varies at Location
- (HD) Closest Hydrogeological Data
- ● Oil, gas or related wells

| | | | |
|---|---|---|---|
| SITE NAME: | Heidorn Ranch Road | CLIENT: | Aqua Science Engineers Inc. |
| ADDRESS: | 5220 - 5300 Heidorn Ranch Road<br>Antioch CA 94531 | CONTACT: | Dave Allen |
| | | INQUIRY #: | 3976090.2s |
| LAT/LONG: | 37.9561 / 121.7532 | DATE: | June 18, 2014 3:03 pm |

| Map ID<br>Direction<br>Distance<br>Elevation | Database | EDR ID Number |
|---|---|---|
| **1**<br>**ENE**<br>**1/2 - 1 Mile**<br>**Lower** | **FED USGS** | **USGS40000186287** |

| | | | |
|---|---|---|---|
| Org. Identifier: | USGS-CA | | |
| Formal name: | USGS California Water Science Center | | |
| Monloc Identifier: | USGS-375738121441501 | | |
| Monloc name: | 001N002E03K001M | | |
| Monloc type: | Well | | |
| Monloc desc: | Not Reported | | |
| Huc code: | 18040003 | Drainagearea value: | Not Reported |
| Drainagearea Units: | Not Reported | Contrib drainagearea: | Not Reported |
| Contrib drainagearea units: | Not Reported | Latitude: | 37.9604783 |
| Longitude: | -121.7385648 | Sourcemap scale: | 24000 |
| Horiz Acc measure: | 1 | Horiz Acc measure units: | seconds |
| Horiz Collection method: | Interpolated from map | | |
| Horiz coord refsys: | NAD83 | Vert measure val: | 112.00 |
| Vert measure units: | feet | Vertacc measure val: | 2.5 |
| Vert accmeasure units: | feet | | |
| Vertcollection method: | Interpolated from topographic map | | |
| Vert coord refsys: | NGVD29 | Countrycode: | US |
| Aquifername: | Central Valley aquifer system | | |
| Formation type: | Alluvium of the Coast Range, Younger (Pleistocene-Holocene) | | |
| Aquifer type: | Not Reported | | |
| Construction date: | 19760615 | Welldepth: | 80 |
| Welldepth units: | ft | Wellholedepth: | 113 |
| Wellholedepth units: | ft | | |

Ground-water levels, Number of Measurements: 1

| Date | Feet below Surface | Feet to Sealevel |
|---|---|---|
| 1976-06-15 | 30.00 | |

**1**
**WSW** **OIL_GAS** **CAOG9A000207835**
**1/8 - 1/4 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300048 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.954764 | | |
| Glong: | -121.75711 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 04/02/2002, Status Code 024 | | |
| Leasename: | Heidorn | Wellnumber: | 4-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207835 |

**2**
**SSW** **OIL_GAS** **CAOG9A000207812**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300038 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.952633 | | |
| Glong: | -121.755445 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Ginochio | Wellnumber: | 2-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207812 |

**3**
**ENE** **OIL_GAS** **CAOG9A000207862**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300032 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 3 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.957643 | | |
| Glong: | -121.748215 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Dempsey | Wellnumber: | 3-3 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207862 |

---

**4**
**SSE** **OIL_GAS** **CAOG9A000207804**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320340 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | EOG Resources, Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | 164 |
| Locationde: | Not Reported | | |
| Glat: | 37.952153 | | |
| Glong: | -121.750265 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 025 | | |
| Leasename: | Sunset-Graham | Wellnumber: | 1-10D |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207804 |

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**5**
**South** **OIL_GAS** **CAOG9A000207778**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300039 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.949123 | | |
| Glong: | -121.752225 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ginochio | Wellnumber: | 21-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207778 |

**6**
**ESE** **OIL_GAS** **CAOG9A000207805**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300030 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Production Specialties Company | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.95221 | | |
| Glong: | -121.745781 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 04/02/2002, Status Code 024 | | |
| Leasename: | Continente | Wellnumber: | 1-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207805 |

**7**
**SSE** **OIL_GAS** **CAOG9A000207782**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300036 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.949403 | | |
| Glong: | -121.749165 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Garaventa | Wellnumber: | 14-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207782 |

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**8**
**SSW** **OIL_GAS** **CAOG9A000207780**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320005 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.949263 | | |
| Glong: | -121.757875 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Ginochio | Wellnumber: | 22-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207780 |

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**9**
**NNW** **OIL_GAS** **CAOG9A000207908**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300047 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.963173 | | |
| Glong: | -121.758455 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Heidorn | Wellnumber: | 2-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207908 |

---

**10**
**SE** **OIL_GAS** **CAOG9A000207783**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300053 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.949683 | | |
| Glong: | -121.745585 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Maggiora-Capital Co. | Wellnumber: | 33X-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207783 |

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**11**
**SSE** **OIL_GAS** **CAOG9A000207775**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300035 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.948243 | | |
| Glong: | -121.747715 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Garaventa | Wellnumber: | 12-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207775 |

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**12**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207855**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320004 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.957163 | | |
| Glong: | -121.764545 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Williamson | Wellnumber: | 3-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207855 |

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**13**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207909**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320187 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Natural Gas Corp. of Calif. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 3 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.963233 | | |
| Glong: | -121.745025 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 09/29/2004, Status Code 006 | | |
| Leasename: | Transamerica | Wellnumber: | 2 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207909 |

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**14**
**NW** **OIL_GAS** **CAOG9A000207913**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320065 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Sinco Oil Corp. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.963533 | | |
| Glong: | -121.761135 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Williamson | Wellnumber: | 2 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207913 |

---

**15**
**WNW** **OIL_GAS** **CAOG9A000207891**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320029 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.960273 | | |
| Glong: | -121.764625 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Williamson | Wellnumber: | 31-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207891 |

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**16**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207784**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300054 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.949693 | | |
| Glong: | -121.743205 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Maggiora-Capital Co. | Wellnumber: | 43X-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207784 |

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**A17**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207776**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300052 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.948323 | | |
| Glong: | -121.744825 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Maggiora-Capital Co. | Wellnumber: | 13-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207776 |

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**B18**
**WNW** **OIL_GAS** **CAOG9A000207880**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320068 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.959263 | | |
| Glong: | -121.765515 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Williamson | Wellnumber: | 33-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207880 |

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**19**
**WSW** **OIL_GAS** **CAOG9A000207789**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300067 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.950633 | | |
| Glong: | -121.764295 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Williamson | Wellnumber: | 1-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207789 |

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**20**
**South**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207742**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300045 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.945673 | | |
| Glong: | -121.752355 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ginochio-Shellenberger | Wellnumber: | 43-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207742 |

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**21**
**North**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207934**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300046 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.966563 | | |
| Glong: | -121.755095 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Heidorn | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207934 |

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**A22**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207774**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300051 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.948083 | | |
| Glong: | -121.744445 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Maggiora-Capital Co. | Wellnumber: | 11-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207774 |

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**23**
**SSE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207746**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300071 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.945853 | | |
| Glong: | -121.749205 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ward | Wellnumber: | 34-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207746 |

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**24**
**NE**
**1/2 - 1 Mile** **OIL_GAS** **CAOG9A000207907**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320026 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Western Continental Operating Company | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 3 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.963013 | | |
| Glong: | -121.742505 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Transamerica | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207907 |

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**25**
**South**
**1/2 - 1 Mile** **OIL_GAS** **CAOG9A000207737**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300041 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.945253 | | |
| Glong: | -121.755165 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ginochio-Shellenberger | Wellnumber: | 4-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207737 |

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**B26**
**WNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207877**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320042 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.959033 | | |
| Glong: | -121.766625 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Williamson | Wellnumber: | 32-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207877 |

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**27**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207900**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320323 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Western Continental Operating Company | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 3 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | 127 |
| Locationde: | Not Reported | | |
| Glat: | 37.962123 | | |
| Glong: | -121.741145 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 007 | | |
| Leasename: | Transamerica | Wellnumber: | 3 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207900 |

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**28**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207940**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300049 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.967592 | | |
| Glong: | -121.752705 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Heidorn | Wellnumber: | 21-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207940 |

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**29**
**SSW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207747**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320053 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Sinco Oil Corp. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.945873 | | |
| Glong: | -121.760685 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 007 | | |
| Leasename: | Williamson | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207747 |

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**C30**
**West**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207829**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320250 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.954083 | | |
| Glong: | -121.768075 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Williamson | Wellnumber: | 4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207829 |

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**C31**
**WSW**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207818**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320226 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.953263 | | |
| Glong: | -121.767865 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Williamson | Wellnumber: | 2 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207818 |

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**32**
**SW** **OIL_GAS** **CAOG9A000207771**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300068 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Shell Western Exploration & Production Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.947823 | | |
| Glong: | -121.764295 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Williamson | Wellnumber: | 11-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207771 |

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**C33**
**West** **OIL_GAS** **CAOG9A000207832**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320252 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 4 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.954593 | | |
| Glong: | -121.768795 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Williamson | Wellnumber: | 34-4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207832 |

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**34**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207935**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300029 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Western Continental Operating Company | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 3 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.966583 | | |
| Glong: | -121.744685 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 04/11/2003, Status Code 024 | | |
| Leasename: | Napolitano | Wellnumber: | 4 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDG | Site id: | CAOG9A000207935 |

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**C35**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207828**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320240 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.953953 | | |
| Glong: | -121.768795 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Williamson | Wellnumber: | 3 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207828 |

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**36**
**SSE**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207733**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300066 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.944843 | | |
| Glong: | -121.746105 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 024 | | |
| Leasename: | Ward | Wellnumber: | 3-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207733 |

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**37**
**ESE**
**1/2 - 1 Mile**
**OIL_GAS** **CAOG9A000207791**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320339 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | EOG Resources, Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | 144 |
| Locationde: | Not Reported | | |
| Glat: | 37.950873 | | |
| Glong: | -121.738655 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 007 | | |
| Leasename: | Sunset-Nunn | Wellnumber: | 1-10D |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207791 |

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**38**
**SE**
**1/2 - 1 Mile** **OIL_GAS** **CAOG9A000207750**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300072 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.946003 | | |
| Glong: | -121.743085 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ward | Wellnumber: | 35-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207750 |

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**39**
**SW**
**1/2 - 1 Mile** **OIL_GAS** **CAOG9A000207752**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320212 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Any Area | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.946233 | | |
| Glong: | -121.763795 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 007 | | |
| Leasename: | Williamson | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207752 |

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**D40**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207833**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320235 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venada National | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 5 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.954703 | | |
| Glong: | -121.769905 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Prewett | Wellnumber: | 5-6 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207833 |

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**41**
**South**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207711**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300044 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 9 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.942643 | | |
| Glong: | -121.754235 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 025 | | |
| Leasename: | Ginochio-Shellenberger | Wellnumber: | 41-9 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207711 |

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**42**
**WNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207876**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320197 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venada National | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 5 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.958893 | | |
| Glong: | -121.769936 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 015 | | |
| Leasename: | Prewett | Wellnumber: | 5-5 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207876 |

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**43**
**SSE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207714**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300085 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Occidental Petroleum Corporation | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.943273 | | |
| Glong: | -121.747685 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Ward | Wellnumber: | 38-10 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207714 |

**44**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207955**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300279 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | S. M. Reynolds, Opr. | | |
| Countyname: | Contra Costa | Fieldname: | Any Field |
| Areaname: | Any Area | | |
| Section: | 33 | | |
| Township: | 02N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.969702 | | |
| Glong: | -121.754045 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 007 | | |
| Leasename: | Brazos-Canada | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207955 |

**D45**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207826**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320264 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 8 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.953893 | | |
| Glong: | -121.770206 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Enea | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207826 |

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**E46**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207765**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320008 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Allied Energy Corp. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | 139 |
| Locationde: | Not Reported | | |
| Glat: | 37.947457 | | |
| Glong: | -121.739664 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 06/11/1997, Status Code 014 | | |
| Leasename: | Transamerica-Maggiora | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207765 |

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**E47**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207766**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320020 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Allied Energy Corp. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | Main | | |
| Section: | 10 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | 139 |
| Locationde: | Not Reported | | |
| Glat: | 37.947472 | | |
| Glong: | -121.739419 | | |
| Gissourcec: | gps | | |
| Comments: | GPS Date 06/11/1997, Status Code 014 | | |
| Leasename: | Transamerica-Maggiora | Wellnumber: | 2 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207766 |

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**F48**
**WSW** **OIL_GAS** **CAOG9A000207793**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320269 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | West | | |
| Section: | 8 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.951353 | | |
| Glong: | -121.769825 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Capital-Enea | Wellnumber: | 3 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207793 |

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**F49**
**WSW** **OIL_GAS** **CAOG9A000207801**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01320265 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | N | Wellstatus: | P |
| Operatorna: | Venturini Associates Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Brentwood (ABD) |
| Areaname: | West | | |
| Section: | 8 | | |
| Township: | 01N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.951863 | | |
| Glong: | -121.770205 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 014 | | |
| Leasename: | Enea | Wellnumber: | 2 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | POG | Site id: | CAOG9A000207801 |

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**50**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG9A000207959**

| | | | |
|---|---|---|---|
| Districtnu: | 6 | Apinumber: | 01300281 |
| Blmwell: | N | Redrillcan: | Not Reported |
| Dryhole: | Y | Wellstatus: | P |
| Operatorna: | Chevron U.S.A. Inc. | | |
| Countyname: | Contra Costa | Fieldname: | Any Field |
| Areaname: | Any Area | | |
| Section: | 34 | | |
| Township: | 02N | Range: | 02E |
| Basemeridi: | MD | Elevation: | Not Reported |
| Locationde: | Not Reported | | |
| Glat: | 37.970122 | | |
| Glong: | -121.750395 | | |
| Gissourcec: | hud | | |
| Comments: | Status Code 006 | | |
| Leasename: | Canada Community | Wellnumber: | 1 |
| Epawell: | N | Hydraulica: | N |
| Confidenti: | N | Spuddate: | 30-DEC-99 |
| Welldeptha: | Not Reported | Redrillfoo: | Not Reported |
| Abandonedd: | / / | Completion: | / / |
| Gissymbol: | PDH | Site id: | CAOG9A000207959 |

### AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

| Zipcode | Num Tests | > 4 pCi/L |
|---|---|---|
| 94531 | 2 | 0 |

Federal EPA Radon Zone for CONTRA COSTA County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

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Federal Area Radon Information for CONTRA COSTA COUNTY, CA

Number of sites tested: 55

| Area | Average Activity | % <4 pCi/L | % 4-20 pCi/L | % >20 pCi/L |
|---|---|---|---|---|
| Living Area - 1st Floor | 0.760 pCi/L | 100% | 0% | 0% |
| Living Area - 2nd Floor | 0.300 pCi/L | 100% | 0% | 0% |
| Basement | 0.525 pCi/L | 100% | 0% | 0% |

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## TOPOGRAPHIC INFORMATION

USGS 7.5’ Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5’ Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5’ Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

## HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

## HYDROGEOLOGIC INFORMATION

AQUIFLOW$^{R}$ Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

## GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

## OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR’s Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California’s Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

## STREET AND ADDRESS INFORMATION

Aqua Science Engineers, Inc.
55 Oak Court, Suite 220, Danville, CA  94526
(925) 820-9391
www.aquascienceengineers.com

# APPENDIX I

## Qualifications

Aqua Science Engineers, Inc. 55 Oak Court, Suite 220, Danville, CA 94526
(925) 820-9391 - Fax (925) 837-4853 - www.aquascienceengineers.com

# DAVID ALLEN, R.E.A.
Vice President

## Education
B.S. Industrial Technology, San Jose State University

## Professional Registration
Registered Environmental Assessor, California #06211

## Experience
Mr. Allen manages operations for ASE's Northern California Office. He is responsible for coordinating and managing all of ASE's Phase I and Phase II investigations involving the integration of ASE's engineering, drilling and field services departments. Mr. Allen manages all risk-based assessment projects, on-going in-situ remediation projects, and industrial process engineering contracts. Mr. Allen is responsible for the design, installation, and operation of all remediation equipment for ASE's Northern California office.

Mr. Allen has over 20 years in the environmental contracting industry. His specialties include the assessment and remediation of properties impacted by petroleum, heavy metals and chlorinated solvents at service-stations and commercial properties.

# Appendix E: Stormwater Control Plan

# Preliminary Post Construction Stormwater Control Plan

## Heidorn Village

CITY OF ANTIOCH, CONTRA COSTA COUNTY, CALIFORNIA
APN'S 056-130-013, 056-130-015, 056-130-017 AND 056-130-018

Dated: July 7, 2014

Prepared For:

MISSION PEAK COMPANY
47289, Mission Falls Court
Fremont, CA 94539

Prepared By:

**Carlson, Barbee & Gibson, Inc.**
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350 • SAN RAMON, CALIFORNIA 94583 • (925) 866-0322 • www.cbandg.com

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# TABLE OF CONTENTS

## APPENDIX

## EXHIBITS

# I. PROJECT SETTING

## *A. Project Name, Location and Description*

This Stormwater Control Plan for the proposed Heidorn Village improvements is submitted to the Engineering Department of the City of Antioch (City) as a recommendation for the post construction Best Management Practices (BMPs) at the Heidorn Village project site (site). Probable design storm flows and permanent BMP selection are presented in this report. BMP technical requirements are presented in the Contra Costa Countywide Clean Water Program C.3 Stormwater Technical Guidance Version 6.0 dated February 15, 2012.

The Heidorn Village project site is located southwest of the intersection of Heidorn Ranch Road and Lone Tree Way, in the City of Antioch, as shown on Exhibit 1 Vicinity Map. The total project area is approximately 20.04 acres and is zoned as a Planned Development District (PD). The project is proposing 117 single-family residential units consistent with the density and use outlined in the PD.

The project site is vacant with limited vegetation and is tilled regularly. The proposed development will increase the impervious surface at the site from the previous land use. Proposed impervious surfaces will include roofs, concrete flatwork, and asphalt pavement. Pervious surfaces will consist of bio-retention areas and landscaping.

## *B. Existing Site Conditions*

The site fronts onto Proposed Prewett Ranch Drive and Heidorn Ranch Road. The site is vacant with sparse vegetation due to tilling. The site is bordered by an existing development to the west and agricultural lands to the south. There is a preliminary plan for a small subdivision directly to the south of Future Prewett Ranch Drive. There is an EBMUD aqueduct to the north of the site and an existing church and Heidorn Ranch Road to the east. The site generally slopes from the southwest to the northeast. Exhibit 2 – Existing Site Aerial illustrates the existing project site.

The site is classified as having hydrologic type C soils. The depth to groundwater at the site is assumed to be greater than 10 feet. Existing soil conditions at the site were researched using the NRCS Web Soil Survey website, the findings are provided in Appendix B.

The existing site is split into two water sheds, a northern shed and eastern shed. The northern watershed flows towards the East Bay Municipal Utility District Corridor and then heads west towards Vista Grande before being collected in Lone Tree Way. The eastern watershed flows towards Heidorn Ranch Road where it is collected by an existing inlet and conveyed in a 30 inch storm drain pipe to the downstream system in Lone Tree Way. Flow from the sites to the drainage water sheds ultimately reach the Lindsey Basin.

## *C. Compliance with Municipal Regional Permit (MRP) C.3 Guidelines*

### 1. The "50% Rule" For Projects on Previously Developed Sites

The project site was previously undeveloped agricultural land. The Proposed Development will introduce all new impervious surfaces. Therefore, the 50% rule does not apply. New impervious surfaces will be directed to an integrated management practice (IMP) area for treatment.

### 2. Treatment

The project is subject to compliance with the treatment requirements set forth in the MRP. The proposed project will introduce approximately 514,818 SF± of impervious surfaces. Therefore, per the County's C.3 Guidebook, this project is required to include treatment measures.

### 3. Flow Control

The project is not subject to the flow control requirements set forth in the MRP. Stormwater runoff from the site is conveyed to the Lindsey Basin. The Lindsey Basin mitigates stormwater runoff from development on a regional level. Because the sites future residential development is mitigated for by the Lindsey Basin the project is not subject to Hydromod requirements.

## *D. Constraints and Opportunities for Stormwater Control*

The following are the site-specific underlying constraints and opportunities affecting the selection of treatment and flow control facilities for the project. Table 1 below illustrates the constraints and opportunities for each IMP. This table was used as a guideline for the selection of the IMP facilities that are proposed for the site.

**Table 1 – Integrated Management Practices (IMPs) Matrix**

| Site Features/Issues | Pervious Pavement | Green Roof | Disperse Runoff to Landscape | Storage For Later Use | Bioretention Facility | Flow-Through Planter | Dry Well | Cistern + Bioretention | Bioretention + Vault |
|---|---|---|---|---|---|---|---|---|---|
| Clayey Native Soils | | X | X | X | X | X | | X | X |
| Permeable Native Soils | X | X | X | X | X | X | X | | |
| Very Steep Slopes | | X | | X | | X | | | |
| Shallow Depth to Groundwater | | X | | X | | X | | | |
| Roof Drainage | | | X | X | X | X | X | X | |
| Parking Lots | X | | X | X | X | | X | | X |
| Extensive Landscaping | | | X | X | X | | | | |
| Densely Developed Sites with Limited Space/Landscape | X | X | | X | | X | X | X | X |

### 1. Constraints

*a.* <u>*Low Infiltrating Soils*</u> – The existing underlying soils at the site can be highly expansive and do not allow for infiltration for water quality.

*b.* <u>*Roof Drainage*</u> – The architecture roofs make up a significant portion of the projects impervious area.

*c.* <u>*Placement of C.3 Facilities*</u> – Due to the density of the site available space for water quality facilities is limited. C.3 facilities have been kept out of the park areas and concentrated along the north and east boundaries.

*d.* *Rain Cycle* – Opportunities for storage and reuse are hindered by the rain cycle of the bay area. The time periods between the rain season and the dry season are long enough to make storage of rain water for reuse infeasible.

**2. Opportunities**

*a.* *Existing Site Topography* – The project site has considerable grade providing for good hydraulics in the storm drain pipe.

*b.* *Disconnected Impervious Areas* – Disconnected impervious areas have been incorporated into the site design to promote the dispersion of runoff and to promote infiltration.

Bioretention areas have been chosen to meet the requirements of the MRP. Bioretention facilities can be incorporated into the sites landscape theme and provide significant freedom in the finished product appearance. Bioretention facilities provide an opportunity to treat an area where runoff can collect some of the worst pollutants in high concentrations without impacting the usefulness of the limited open space areas. Details for the Bioretention areas have been included in Appendix D of this report for reference.

# II. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

## *A. Optimization of Site Layout*

### 1. Limitation of Development Envelope

The project site is 20.04 acres and will be completely impacted by site development. A central park area is proposed to provide green space and bioretention areas will be placed in the open space along the north and east boundaries.

### 2. Preservation of Natural Drainage Patterns

The existing natural drainage pattern will be maintained at the site. Drainage will be collected by the existing 30 inch storm drain line in Heidorn Ranch Road and conveyed to the north. The proposed storm system is depicted on Exhibit 3 – Stormwater Control Plan Exhibit.

### 3. Setbacks from Creeks, Wetlands, and Riparian Habitats

The project is not expected to impact any creeks, wetlands or riparian habitats.

### 4. Minimization of Imperviousness

Impervious surfaces have been limited where possible and disconnected impervious surfaces have been implemented into the site design.

### 5. Using Drainage as a Design Element

There will be two bioretention IMP areas to treat and mitigate increased storm runoff. Site runoff from impervious areas will be directed to one of the bioretention facilities. The bioretention area landscaping will be integrated into the sites overall landscaping theme.

### *B. Use of Permeable Pavements*

Due to the impermeable nature of the underlying soils, pervious surfaces would require increased depths of base course and inclusion of a sub-drain system. These measures would increase the cost of development significantly, making this design infeasible. Therefore, this Stormwater Control Plan assumes no permeable pavements will be used.

### *C. Direct Runoff to Integrated Management Practices*

The proposed project's grading and storm drainage plan is designed to direct site runoff from impervious areas to a designated IMP area. The site is broken up into two drainage management areas. Each DMA has a designated IMP. The drainage areas and treatment facilities are shown on Exhibit 3 – Stormwater Control Plan Exhibit. Roof drainage will generally be routed via roof leaders to drain pipes connected directly to the designated IMP area. Runoff from vehicle and pedestrian surfaces will be directed to IMP areas utilizing a combination of pipe networks and overland flow. Landscape areas entering the IMP's have been minimized where possible on-site. Where feasible, landscape areas will drain directly to the storm drain system. The project's proposed grading and storm drainage design will allow drainage to flow into, through, and out of the IMP facilities by gravity flow. A description of the proposed IMP facilities and a breakdown of the impervious and pervious areas collected by each are provided below.

### *D. Assessment of Infiltration / Rainwater Harvesting and Reuse Feasibility*

#### 1. Infiltration

The existing site soil conditions are classified has being Type C soils with very low infiltration capacity by the NRCS web soil survey. Based on these findings infiltration will not be counted as a feasible LID option.

#### 2. Harvesting and Reuse

Harvesting and reuse of runoff was analyzed per the methods outlined in Chapter 4, of the C.3 manual. The landscaping area proposed for the project is not sufficient to warrant reuse for irrigation purposes. The toilet flushing demand is not large enough to warrant the capture and reuse of water for this purpose either. Below is a table summarizing the findings:

| Impervious area description | Area (sf) | Area (ac) | Use rates (resident - residents/dwelling unit) | Daily Use/Unit (gal/day/unit) | Water use per acre (gal/day/acre) | Is projected use> required demand (4,200 gpd/acre | Can runoff be piped to an irrigated area 2.5x the impervious area? | Is there any other consistent, reliable demand for the quantity of runoff? |
|---|---|---|---|---|---|---|---|---|
| Roof | 244,800 | 5.62 | 2.8 | 8.6 | 50 | No | No | No |
| Concrete/Asphalt | 269,386 | 6.18 | 2.8 | 8.6 | 50 | No | No | No |

# III. DOCUMENTATION OF DRAINAGE DESIGN

The following outlines the stormwater management facilities within the project site necessary to comply with the applicable C.3 guidelines. The project site design and its stormwater features balance the constraints of the site, the land use planning objectives for the site, and the MRP C.3 requirements.

The stormwater management plan for compliance with treatment requirements is described below:

## *A. Drainage Management Area's (DMA's)*

The proposed project has been broken up into two drainage management areas (DMA's). DMA's one and two have been delineated into discrete areas based on four different surface types. The surface types include roads, concrete, roof, or landscaping. For DMAs one and two treatment requirements are met using bioretention areas. Each DMA is tabulated in Table 2 below. Exhibit 3 – The Stormwater Control Plan illustrates the boundaries and surface types of each DMA.

**Table 2 – DMA Tabulation**

| *DMA* | *Concrete (SF)* | *Pavement (SF)* | *Roof (SF)* | *Landscaping (SF)* | *Total Area (SF)* |
|---|---|---|---|---|---|
| 1 | 27,742 | 57,319 | 85,700 | 106,762 | 277,523 |
| 2 | 56,153 | 128,172 | 159,100 | 219,384 | 562,809 |

## *B. Integrated Management Practices (IMP)*

The proposed project will utilize bioretention areas to treat stormwater runoff per the applicable C.3 guidelines. The project is proposing two bioretention areas. The bioretention areas were designed using flow and volume capacity calculations to minimize the footprints, the flow and volume calculations are consistent with the California BMP method and the Water Boards C.3 requirements. Each IMP is tabulated in Table 3 below. Calculations are provided in Appendix A for review. Exhibit 3 – Stormwater Control Plan Exhibit depicts the proposed locations of the bio-retention areas designated as IMPs.

## Table 3 – IMP Tabulation

| *IMP* | *Proposed Area (SF)* | *Description* | *Collects DMA* |
|---|---|---|---|
| *1* | 11,806 | Bioretention Facility | 1 |
| *2* | 14,546 | Bioretention Facility | 2 |

## IV. SOURCE CONTROL MEASURES

The proposed project will create few potential sources of stormwater pollution. Sources to be controlled include but are not limited to:

### SOURCES AND SOURCE CONTROL BMP'S

| Potential Source of Runoff Pollutants | Permanent Source Control BMP's | Operational Source Control BMP's |
|---|---|---|
| Onsite storm drain inlets | Mark all accessible onsite inlets with the words "No Dumping! Flows to Creek" or approved equivalent language.<br>Detail location of all onsite storm drain inlets on Stormwater Control Plan Drawings. | Maintain and periodically replace inlet markings as needed.<br>Provide stormwater pollution prevention information to new site owners, lessees, or operators.<br>Include the following in lease agreement "Tenant shall not discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."<br>Inlets and pipes conveying stormwater to BMPs shall be inspected and maintained as part of the Project Operation and Maintenance Plan. |
| Interior floor drains | Interior floor drains shall be plumbed to drain directly to the sanitary sewer system. | Inspect and maintain drains to prevent blockages and overflows. |
| Need for future indoor or structural pest control | Project construction drawings shall incorporate features that discourage entry of pests. | Provide Integrated Pest Management (IPM) information to owners, lessees, and operators. |

| Potential Source of Runoff Pollutants | Permanent Source Control BMP's | Operational Source Control BMP's |
|---|---|---|
| Landscape/outdoor pesticide use | Final project landscape plans shall reflect the following:<br>Design that minimizes need for irrigation; minimizes runoff; promotes surface infiltration where appropriate; and details the use of planting material that minimizes the amount of fertilizers and pesticides that are needed.<br>Where landscaped areas are used to retain and detain stormwater, project landscape plans shall specify the use of plants that are tolerant of saturated soil conditions.<br>Project landscape plans shall detail use of plantings appropriate to site soils, slopes, climate, sun, land use, air movement, ecological consistency, and plant interactions.<br>Detail locations of stormwater treatment and hydrograph modification management BMPs on Stormwater Control Plan Drawings. | Maintain landscaping using minimum or no pesticides.<br>Provide Integrated Pest Management information to new owners, lessees and operators.<br>See applicable BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks www.babmphandbooks.com |
| Water features (fountains) | Where architectural water features are incorporated, plumb such features directly to the sanitary sewer system. | Inspect and maintain drains to prevent blockage and overflows. |

| **Potential Source of Runoff Pollutants** | **Permanent Source Control BMP's** | **Operational Source Control BMP's** |
|---|---|---|
| Roofing, gutters, and trim | Do not utilize roofing, gutter, or architectural trim materials made of copper or other unprotected metals that would leach into the storm water runoff. | |
| Plazas, sidewalks, and parking lots | | Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain. |
| Fire Sprinkler Test Water | Provide means to drain fire sprinkler test water to sanitary sewer system. | See note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com |
| Air Conditioning | Air conditioner condensation shall be directed to landscaped areas or plumbed to the sanitary sewer. | |

# V. FACILITIES MAINTENANCE REQUIREMENTS

## *A. Ownership and Responsibility for Maintenance in Perpetuity*

As part of the C.3 stormwater requirements municipalities must verify stormwater treatment and flow-control facilities function and our maintained as intended by their design. Facilities on site will be maintained and the responsibility in their entirety of the Home Owner's Association (HOA).

The owner will prepare and provide a Storm Water Control Operation and Maintenance (O&M) Plan for review of the City of Antioch, Public Works Department, and record an Operation and Maintenance Agreement, including any necessary rights-of-entry, prior to issuance of a building permit.

## *B. Summary of Maintenance Requirements*

Bioretention facilities require routine maintenance to prevent a loss in the rate of infiltration, insure unobstructed flow, prevent erosion, and keep plants healthy and the engineered soil biologically active. Typical maintenance requirements of bioretention facilities will include:

- Inspection of inlets for channels, exposure of soils, and other evidence of erosion.
- Replenishment of all erosion control measures necessary.
- Inspect outlets to ensure that planter has not clogged or that excessive erosion has not inhibited flow.
- Inspection of facility side slopes for evidence of erosion.
- Observe percolation in treatment areas to verify design percolation rates are met (i.e., whether a 48 hour percolation window is exceeded).
- Till or replace engineered soil in treatment areas where design percolation rates are not met.
- Examine all vegetation to insure it is healthy and dense enough to provide filtering. Replenish mulch as necessary, remove fallen leaves and debris and prune large shrubs and trees. Replace dead plants and remove noxious and invasive vegetation.
- Confirm irrigation is adequate but not excessive.
- Remove any invasive plans that might be present.

- Abate any potential vectors by insuring there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact the Contra Costa Mosquito and Vector Control District for information and advice. Mosquito larvicides shall be applied only when absolutely necessary and then, only by a licensed individual or contractor.

# VI. CONSTRUCTION PLAN C.3 CHECKLIST

| Stormwater Control Plan Page No. | BMP Description | Construction Documents Sheet # |
|---|---|---|
| Section III, Page 7-8 | IMP 1 – Collects DMA 1<br>11,806 *SF*<br>*Bioretention Facility* | |
| Section III, Page 7-8 | IMP 2 – Collects DMA 2<br>*14,546 SF*<br>*Bioretention Facility* | |
| Section IV, Page 9-11 | Project complies with complete list of Source control measures outlined in the SWCP. | |
| Section II, Page 5 | Final drainage plan conforms to the delineation of drainage areas in the SWCP, i.e. drainage from impervious areas, including building roofs, is routed to bioretention areas, as shown in the SWCP. | |

## VII. CERTIFICATION

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2009-0074 and subsequent amendments.

Justin R. DeKnoblough, P.E.
RCE# 79604 Expires 09/30/2014

Date

# Appendix A

# Sizing Calculations

# DRAINAGE MANAGEMENT AREA 2

## BIORETENTION FOOTPRINT OPTIMIZATION SPREADSHEET - PRELIMINARY CALCULATIONS

| | | |
|---|---|---|
| Drainage Management Area: | 562,809 sf | 12.92 ac |
| Impervious Percentage: | 0.61 decimal | |
| Pervious Percentage: | 0.39 decimal | |
| Rainfall Intensity: | 0.2 in/hr | |
| MAP: | 14.4 in | |
| Proposed Treatment Area: | 14,546 sf | |

Calculations:

| | | |
|---|---|---|
| 1 Composite Runoff Coefficient | | |
| Impervious: | 342,751 sf | 7.87 ac |
| Pervious: | 22,006 sf | 0.51 ac |
| Composite C: | 0.65 | |
| 2 Rainfall Amount | | |
| Rainfall Depth: | 0.36 in | |
| Adjust for MAP: | 0.36 in | |
| Total Rainfall during Treatment Storm: | 0.56 in | |
| Rainfall Duration: | 2.80 hr | |
| 3 Volume | | |
| Storm Volume: | 17,022 cf | |
| 4 Treatment Measure Sizing | | |
| Treated Storm Volume w/out Storage: | 16,970 cf | |
| Storage Volume Required: | 52 cf | |
| Storage Volume Provided: | TBD cf | |
| Drawdown Time: | 3 hrs | |

## DRAINAGE MANAGEMENT AREA 1

### BIORETENTION FOOTPRINT OPTIMIZATION SPREADSHEET - PRELIMINARY CALCULATIONS

| | | | | |
|---|---|---|---|---|
| Drainage Management Area: | 277,523 | sf | 6.37 | ac |
| Impervious Percentage: | 0.62 | decimal | | |
| Pervious Percentage: | 0.38 | decimal | | |
| Rainfall Intensity: | 0.2 | in/hr | | |
| MAP: | 13.3 | in | | |
| Proposed Treatment Area: | 11,806 | sf | | |
| | | | | |
| Calculations: | | | | |
| 1 Composite Runoff Coefficient | | | | |
| Impervious: | 172,064 | sf | 3.95 | ac |
| Pervious: | 10,546 | sf | 0.24 | ac |
| Composite C: | 0.66 | | | |
| | | | | |
| 2 Rainfall Amount | | | | |
| Rainfall Depth: | 0.37 | in | | |
| Adjust for MAP: | 0.34 | in | | |
| Total Rainfall during Treatment Storm: | 0.52 | in | | |
| Rainfall Duration: | 2.59 | hr | | |
| | | | | |
| 3 Volume | | | | |
| Storm Volume: | 7,871 | cf | | |
| | | | | |
| 4 Treatment Measure Sizing | | | | |
| Treated Storm Volume w/out Storage: | 12,722 | cf | | |
| Storage Volume Required: | 0 | cf | | |
| Storage Volume Provided: | 5,903 | cf | | |
| Drawdown Time: | 3 | hrs | | |

# Appendix B

# NRCS Soil Survey Data

United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for

# Contra Costa County, California

June 20, 2014

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map

Map Scale: 1:2,830 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- □ Area of Interest (AOI)

**Soils**
- □ Soil Map Unit Polygons
- ~ Soil Map Unit Lines
- ■ Soil Map Unit Points

**Special Point Features**
- Blowout
- ☒ Borrow Pit
- Clay Spot
- ◇ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- ◎ Miscellaneous Water
- ◎ Perennial Water
- ∨ Rock Outcrop
- + Saline Spot
- ∴ Sandy Spot
- Severely Eroded Spot
- ◇ Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- △ Other
- Special Line Features

**Water Features**
- ~ Streams and Canals

**Transportation**
- +++ Rails
- ~ Interstate Highways
- ~ US Routes
- ~ Major Roads
- ~ Local Roads

**Background**
- ■ Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Contra Costa County, California
Survey Area Data: Version 9, Nov 25, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 12, 2010—Nov 15, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Contra Costa County, California (CA013) | | | |
|---|---|---|---|
| **Map Unit Symbol** | **Map Unit Name** | **Acres in AOI** | **Percent of AOI** |
| CaA | Capay clay, 0 to 2 percent slopes | 8.3 | 40.4% |
| RbA | Rincon clay loam, 0 to 2 percent slopes | 12.3 | 59.6% |
| **Totals for Area of Interest** | | **20.6** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# Soil Information for All Uses

## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## Soil Erosion

This folder contains a collection of tabular reports that present soil erosion factors and groupings. The reports (tables) include all selected map units and components for each map unit. Soil erosion factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

### RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the surface horizon.

#### Report—RUSLE2 Related Attributes

| RUSLE2 Related Attributes–Contra Costa County, California | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Map symbol and soil name | Pct. of map unit | Slope length (ft) | Hydrologic group | Kf | T factor | Representative value | | |
| | | | | | | % Sand | % Silt | % Clay |
| CaA—Capay clay, 0 to 2 percent slopes | | | | | | | | |
| Capay | 85 | — | C | .24 | 5 | 28.1 | 29.4 | 42.5 |
| RbA—Rincon clay loam, 0 to 2 percent slopes | | | | | | | | |
| Rincon | 85 | — | C | .32 | 5 | 35.4 | 33.6 | 31.0 |

# Appendix C

# Bioretention Facility Detail

# Bioretention Facilities

Bioretention facilities can rectangular, linear, or nearly any shape.
*Photo by Scott Wikstrom*

Bioretention detains runoff in a surface reservoir, filters it through plant roots and a biologically active soil mix, and then infiltrates it into the ground. Where native soils are less permeable, an underdrain conveys treated runoff that does not infiltrate to a storm drain or to surface drainage.

Bioretention facilities can be configured as in-ground or above-ground planter boxes, with the bottom open to allow infiltration to native soils underneath. *If infiltration cannot be allowed, use the sizing factors and criteria for the Flow-Through Planter.*

## ▶ CRITERIA

For development projects subject only to runoff treatment requirements, the following criteria apply:

| Parameter | Criterion |
|---|---|
| Soil mix depth | 18 inches minimum |
| Soil mix requirements | See Appendix B |
| Soil mix surface area | 0.04 times tributary impervious area (or equivalent) |
| Surface reservoir depth | 6 inches minimum; may be sloped to 4 inches adjacent to walkways. |
| Underdrain | Perforated pipe (PVC SDR 35 or approved equivalent) embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point. Include a cleanout. |

### Best Uses

- Commercial areas
- Residential subdivisions
- Industrial developments
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

### Advantages

- Can be any shape
- Low maintenance
- Can be landscaped

### Limitations

- Require 4%-15% of tributary impervious square footage
- Typically require 3-4 feet of head
- Irrigation may be required

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PROGRAM

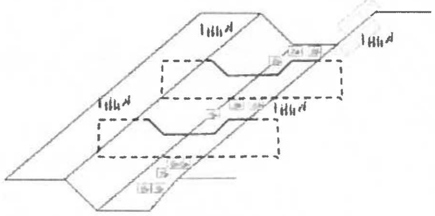
*Stormwater C.3 Guidebook*

www.cccleanwater.org

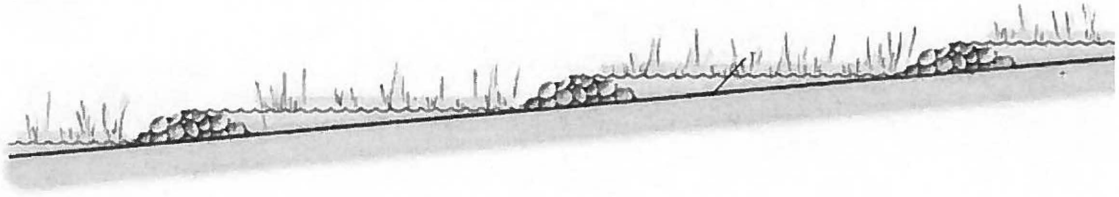
Where flow-control requirements also apply, the bioretention facility must be designed to meet the minimum surface area (A), surface volume ($V_1$), and subsurface volume ($V_2$) using the sizing factors and equations in Tables 4-8 and 4-9.

## ▶ DETAILS

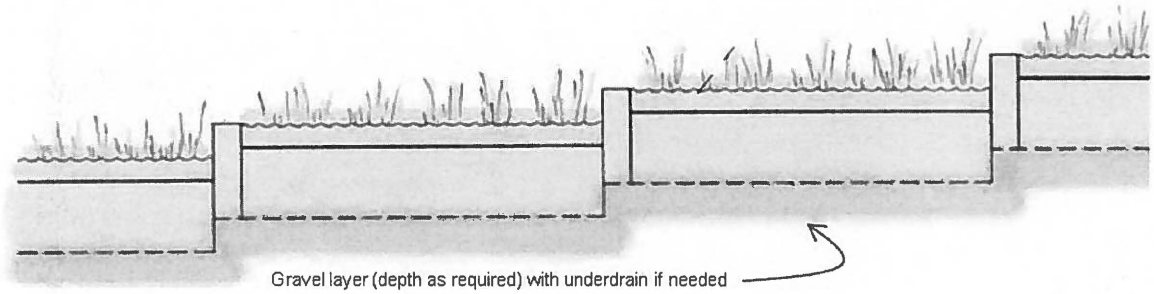
**Plan and Profile.** On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil mix.



Key check dams into bottom and side slopes.



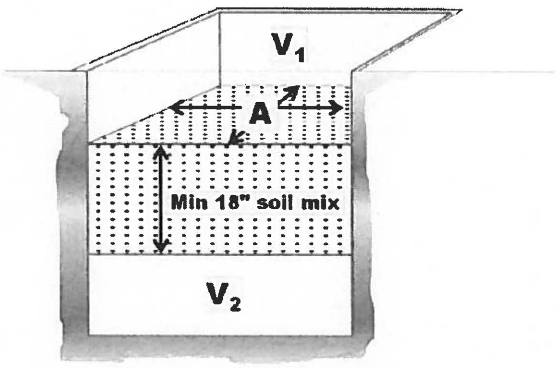
Swale with check dams. Provides limited storage; not suitable for slopes 6% and greater.



Planter on slope provides more storage. Check dams should be keyed into planter sides. (USEPA 2009b)

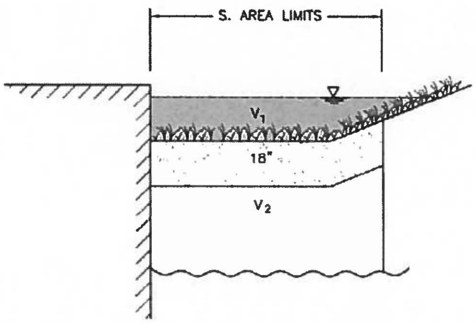
In a linear swale, check dams should be placed for every 4 to 6 inches of elevation change and so that the lip of each dam is at least as high as the toe of the next upstream dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders.

**Minimum Surface Volume.** For a treatment-and-flow-control facility, the sizing factor $V_1$ is equivalent to the sizing factor A flooded to a 12" depth (10" overflow plus 2" freeboard). Surrounding the facility with a 12" vertical wall minimizes the required surface area as shown in (a). However, alternatives include:

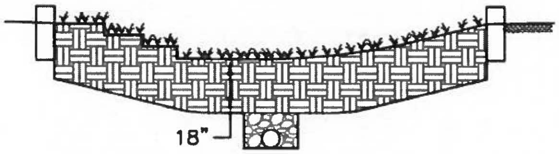


(a) A, $V_1$ and $V_2$

- Increasing the facility area and reducing the surface depth accordingly.
- Sloping the soil mix surface to be deeper than 12" at the middle, but less deep at the edges, so the average 12" depth is achieved (works best on larger facilities).
- Sloping or stepping back the wall as shown in (b) and (c) (requires additional area).
- Allowing shallow flooding on a portion of adjacent landscape or paving when the facility is at peak capacity as shown in (d) (rare and relatively brief events).

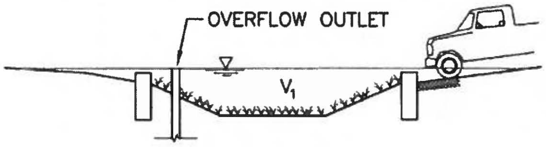


(b) Sloped side wall



(c) Stepped back side wall

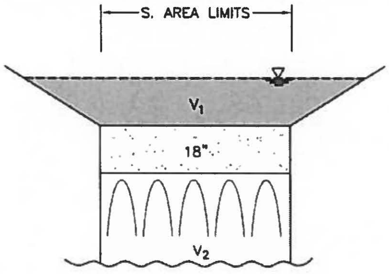
**Soil mix.** The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life with a minimum of fertilizer use. See Appendix B and check with local staff for further guidance.



(d) allowing occasional flooding of adjacent landscaping and pavement.

**Storage and drainage layer.** "Class 2 permeable," Caltrans specification 68-1.025, is preferred. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock layer. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

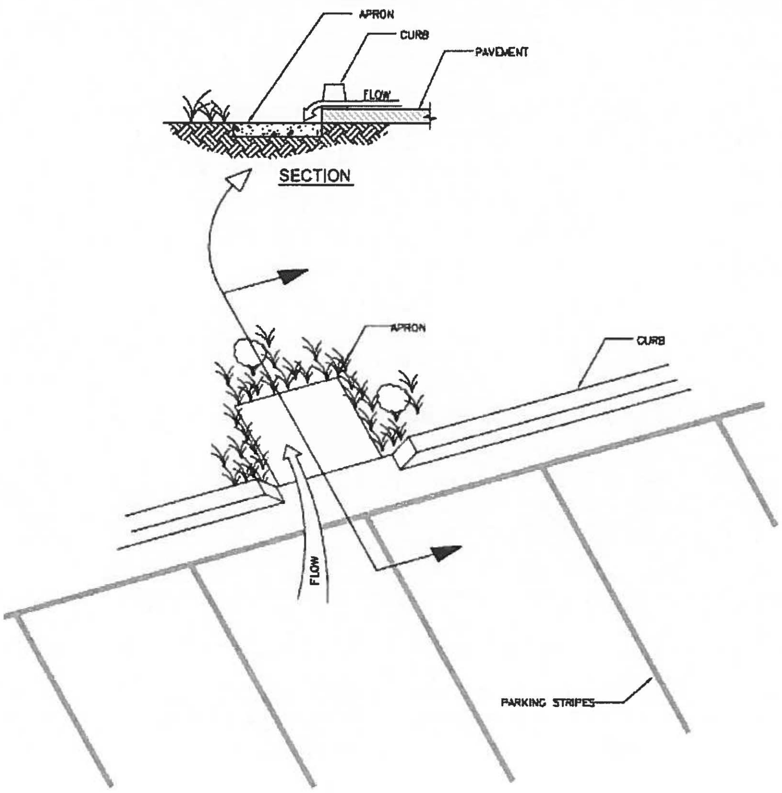
**Minimum subsurface volume.** No minimum subsurface volume is required for treatment-only facilities. The gravel layer must be extensive enough and deep enough to ensure the soil mix is well-drained. For treatment-and-flow-control facilities where the native soils are Hydrologic Soil Group C or D, the minimum subsurface volume $V_2$ specified in Table 4-8 is equivalent to the minimum area times a 30" deep layer of gravel **of 40% porosity** ($V_2$ is the void space, not the entire volume of gravel.) Note that if the facility area is increased, the required depth is correspondingly decreased. If desired, voids created by buried structures such as pipes or arches may be substituted, as long as the voids are hydraulically interconnected and the minimum subsurface volume calculated by Equation 4-5 is achieved.



Buried pipes or arches may be used to achieve the required subsurface volume $V_2$

**Inlets.** Paved areas draining to the facility should be graded, and inlets should be placed, so that runoff remains as sheet flow or as dispersed as possible. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 4"-6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.

Where runoff is collected in pipes or gutters and conveyed to the facility, protect the landscaping from high-velocity flows with energy-dissipating rocks. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.



Recommended design details for bioretention facility inlets (see text).

"Bubble ups" can be used to dissipate energy when runoff is piped from roofs and upgradient paved areas.

**Underdrains.** Perforated pipe must be bedded **near the top of the gravel layer** and must terminate at a storm drain or other approved discharge point. Underdrains must be constructed of rigid pipe (SDR 35 or equivalent, holes facing down) and provided with a cleanout. In locations where native soils beneath the facility are Hydrologic Soil Group A or B, underdrains are optional but municipal reviewers may require them as a preventative against poor drainage.

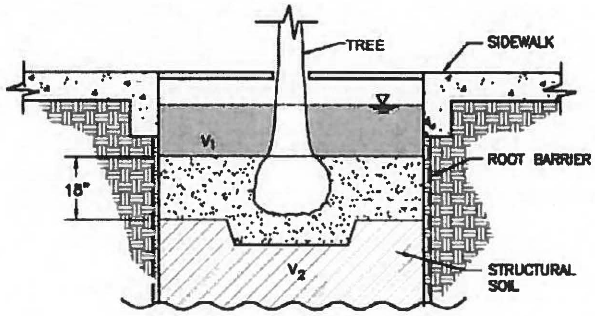
**Flow-control orifice.** For treatment-and-flow-control facilities, the underdrain must be routed through a device designed to limit flows to that specified in Equation 4-10 or 4-11 (page 52). Details of combined outlet-and-underdrain facilities are shown on page 76.

**Overflow outlets.** In treatment-only facilities, overflow outlets must be set high enough to ensure the surface reservoir fills and the entire surface area of soil mix is flooded before the outlet elevation is reached. In swales, this can be achieved with appropriately placed check dams.

In treatment-and-flow-control facilities, the outlet elevation must be set to achieve the minimum surface storage volume calculated using Equation 4-3 and the $V_1$ sizing factor.

The outlet should be designed to exclude floating mulch and debris.

**Vaults, utility boxes and light standards.** It is best to locate utilities outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose. If utility structures are to be placed within the facility, the locations should be anticipated and adjustments made to ensure the minimum bioretention surface area and volumes are achieved. Leaving the final locations to each individual utility can produce a haphazard, unaesthetic appearance and make the bioretention facility more difficult to maintain.

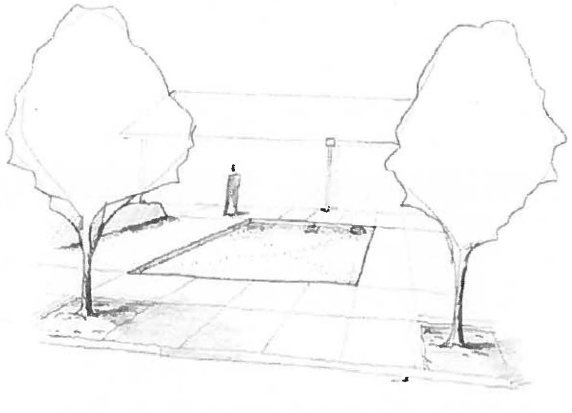


Bioretention facility configured as a tree well. The root barrier is optional.

**Emergency overflow.** The site grading plan should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

**Trees.** Bioretention areas can accommodate small or large trees within the minimum areas and volumes calculated by Equation 4-5. Tree canopies intercept rain, and extensive tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.

The bioretention facility can be integrated with a tree pit of the required depth and filled with structural soil. If a root barrier is used, it can be located to allow tree roots to spread throughout the bioretention facility while protecting adjacent pavement. Locations and planting elevations should be selected to avoid blocking the facility's inlets and outlets as trees mature.



Bioretention facility configured as a recessed decorative lawn with hardscaped edge.

## APPLICATIONS

**Multi-purpose landscaped areas.** Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support turf or a plant palette suitable to the location and a well-drained soil. See Appendix B for additional guidance on soil, plant selection, and irrigation.

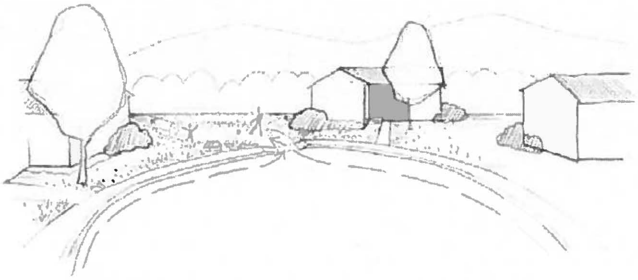
Example landscape treatments:

- Lawn with sloped transition to adjacent landscaping.

- Swale in setback area
- Swale in parking median
- Lawn with hardscaped edge treatment
- Decorative garden with formal or informal plantings
- Traffic island with low-maintenance landscaping
- Raised planter with seating
- Bioretention on a terraced slope

**Residential subdivisions.** In the design of many subdivisions, it has proven easiest and most effective to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 6 lots, depending on subdivision layout and topography.

Bioretention areas can be placed on one or more separate, dedicated parcels with joint ownership.



Bioretention facility configured and planted as a lawn/ play area.

**Sloped sites.** Bioretention facilities must be constructed as a basin or series of basins, with the circumference of each basin level. It may be necessary to add curbs or low retaining walls during final grading if elevations have not been determined with sufficient precision during design.

## Design Checklist for Bioretention

☐ Volume or depth of surface reservoir meets or exceeds minimum.

☐ 18" depth "loamy sand" soil mix with minimum long-term percolation rate of 5"/hour. See Appendix B.

☐ Area of soil mix meets or exceeds minimum.

☐ Perforated pipe (PVC SDR 35 or approved equivalent) underdrain bedded **near the top** of the "Class 2 perm" layer with holes facing downward. Connection and sufficient head to storm drain or approved discharge point (except in "A" or "B" soils).

☐ No filter fabric.

☐ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 4 inches and a watertight cap.

☐ Location and footprint of facility are shown on site plan, landscaping plan, and grading plan.

☐ Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. If facility is designed as a swale, check dams are set so the lip or weir of each dam is at least as high as the toe of the next upstream dam.

☐ Curb inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.

☐ Overflow connected to a downstream storm drain or approved discharge point.

☐ Emergency spillage will be safely conveyed overland.

☐ Plantings are suitable to the climate, exposure, and a well-drained soil, and occasional inundation during large storm events.

☐ Irrigation system with connection to water supply, on a separate zone.

☐ Vaults, utility boxes, and light standards are located outside the minimum soil mix surface area.

☐ When excavating, avoid smearing of the soils on bottom and side slopes. Minimize compaction of native soils and "rip" soils if clayey and/or compacted. Protect the area from construction site runoff.

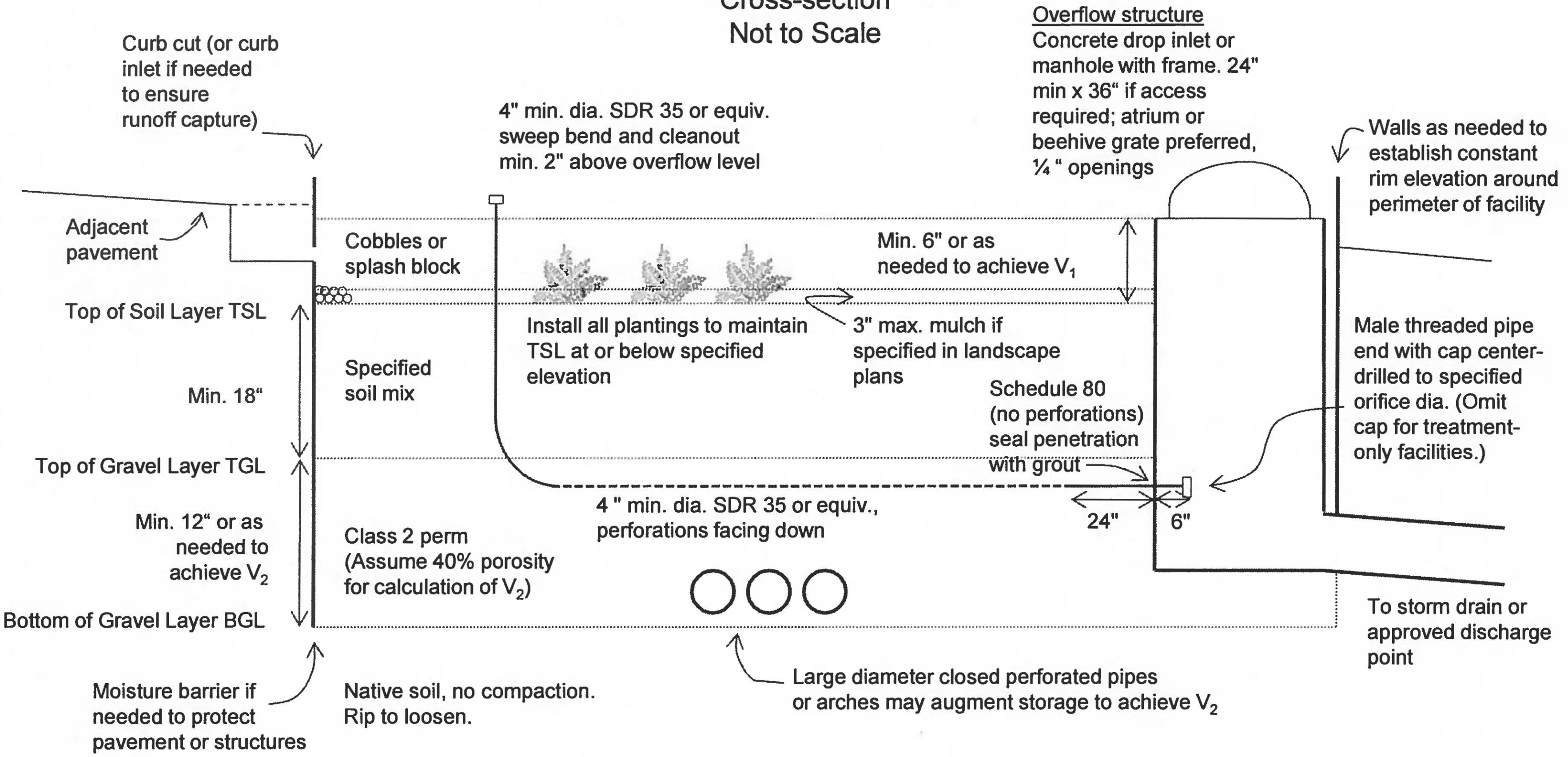
### For treatment-and-flow-control facilities only

☐ Volume of subsurface storage meets or exceeds minimum.

☐ In "C" and "D" native soils, underdrain is connected to discharge through an appropriately sized orifice or other flow-limiting device.

# Bioretention Facility

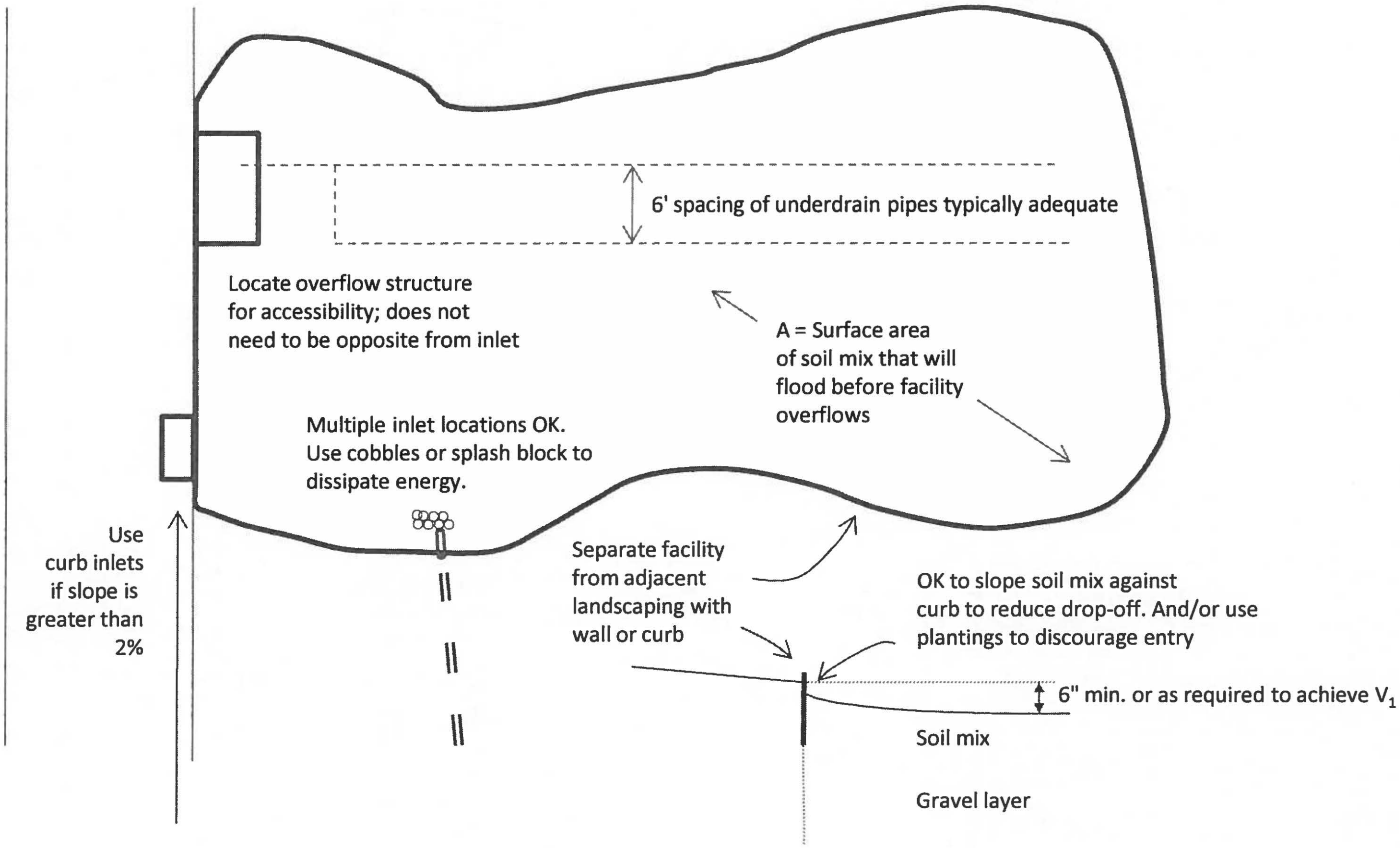
## Cross-section
## Not to Scale



Notes:
- No liner, no filter fabric, no landscape cloth.
- Maintain BGL. TGL, TSL throughout facility area at elevations to be specified in plan.
- Class 2 perm layer may extend below and underneath drop inlet.
- Elevation of perforated pipe underdrain is near top of gravel layer, except when zero infiltration is expected.
- See Appendix B for soil mix specification, planting and irrigation guidance.
- See Chapter 4 for factors and equations used to calculate $V_1$, $V_2$, and orifice diameter.

# Bioretention Facility

Plan (Not to Scale)



Note: Call out elevations of curb, pavement, inlet, top of soil layer (TSL), bottom of soil layer (BSL), and bottom of gravel layer (BGL) at all inlets and outlets and at key points along edge of facility.

# Appendix D

# Stormwater Control Plan Checklist

# STORMWATER CONTROL PLAN CHECKLIST

The following checklist is adapted from the Stormwater C.3 Guidebook which contains a detailed description and instructions for preparing a Stormwater Control Plan. The Guidebook is available online at http://cccleanwater.org/construction/nd.php or it may be purchased from the City of Antioch. ***A Stormwater Control Plan is required for projects that are creating more than 10,000 square feet of impervious surface.***

## CONTENTS OF PLAN:

Show on scaled (1"= 20', 40', 50' or 100') drawings:

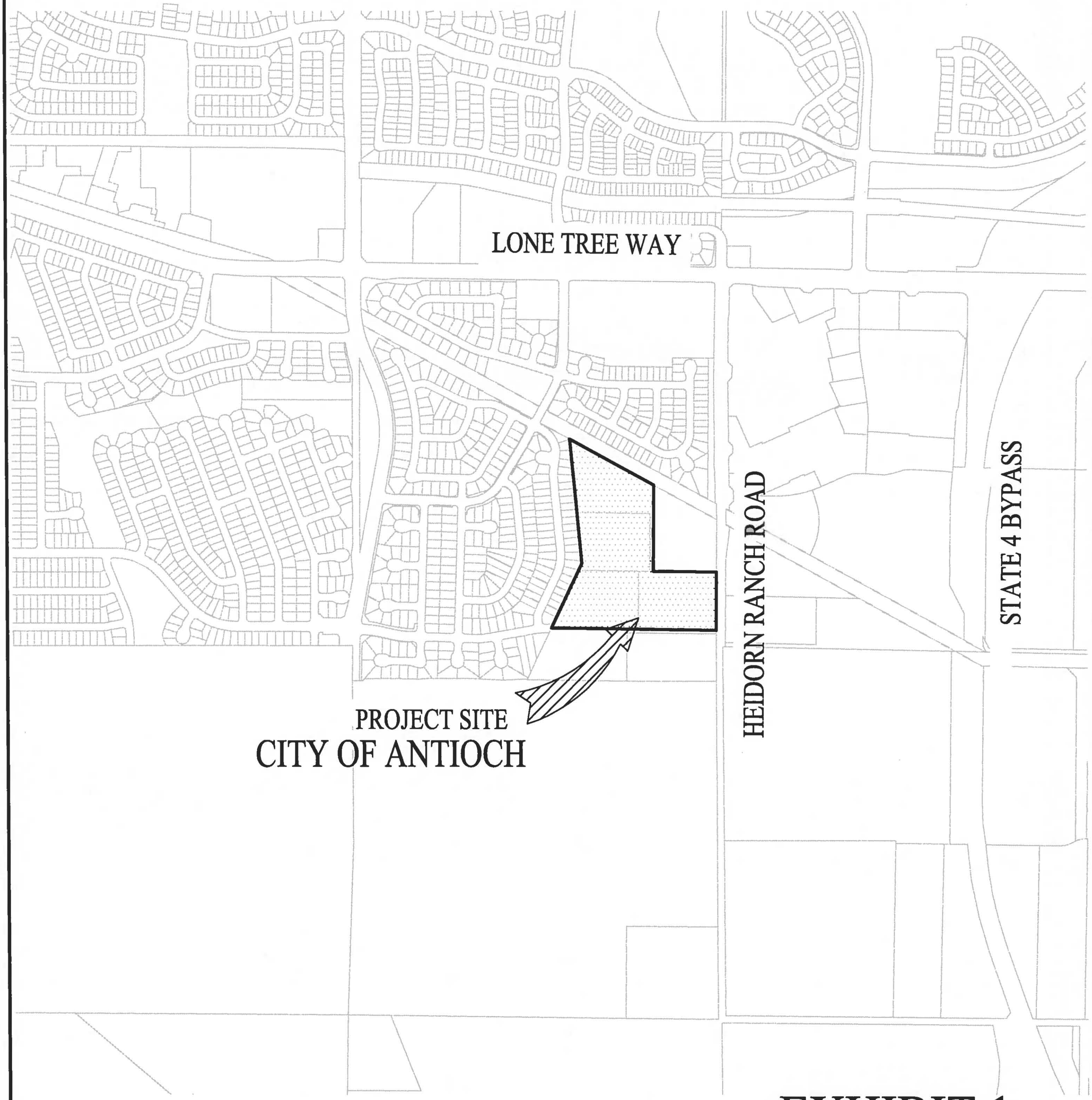
- ☑ Existing natural hydrologic features (depressions, watercourses, relatively undisturbed areas) and significant natural resources.
- ☐ Soil types and depth to groundwater (if infiltration is proposed). INFILTRATION IS NOT PROPOSED.
- ☑ Existing and proposed site drainage network and connections to drainage off-site.
- ☑ Proposed design features and surface treatments used to minimize imperviousness.
- ☑ Separate drainage areas, depending on complexity of drainage network.
- ☑ Existing condition of each drainage area, including pervious and impervious areas.
- ☑ For each drainage area, types of impervious area (roof, plaza/sidewalk, and streets/parking) and area of each.
- ☑ Proposed locations and approximate sizes of infiltration, treatment, or hydrograph modification BMPs.
- ☑ Pollutant source areas, including loading docks, food service areas, refuse areas, outdoor processes and storage, vehicle cleaning, repair or maintenance, fuel dispensing, equipment washing, etc., and corresponding required source controls from Appendix E of Stormwater C.3 Guidebook.

## CONTENTS OF REPORT:

A report accompanying the drawings should include:

- ☑ Narrative analysis or description of site features and conditions that constrain or provide opportunities for stormwater control.
- ☑ Narrative description of site design characteristics that protect natural resources.

# Exhibits



# EXHIBIT 1

## VICINITY MAP

cbg
Carlson, Barbee
& Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583

(925) 866-0322
www.cbandg.com

6/24/2014 12:07 PM

G:\2245\ACAD\EXHIBITS\XB 007 VICINITY MAP.DWG

# EXHIBIT 2

## EXISTING CONDITION

Carlson, Barbee
& Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

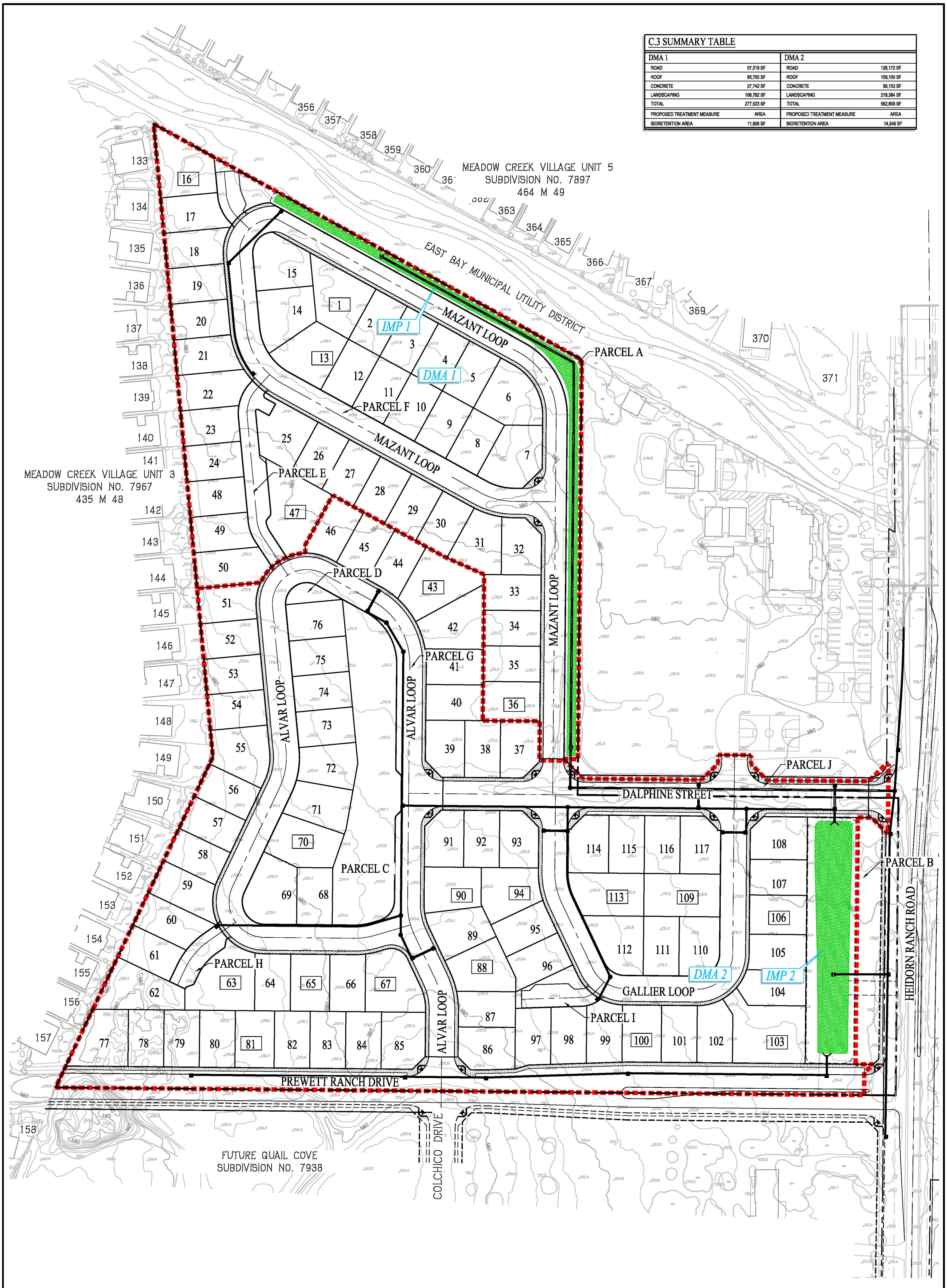
2633 CAMINO RAMON, SUITE 350
SAN RAMON, CALIFORNIA 94583
(925) 866-0322

6/24/2014 11:53 AM

G:\2245\ACAD\EXHIBITS\XB 006 EXISTING CONDITION EXHIBIT.DWG

## C.3 SUMMARY TABLE

| DMA 1 | | DMA 2 | |
|---|---|---|---|
| ROAD | 57,319 SF | ROAD | 128,172 SF |
| ROOF | 85,700 SF | ROOF | 159,100 SF |
| CONCRETE | 27,742 SF | CONCRETE | 56,153 SF |
| LANDSCAPING | 106,762 SF | LANDSCAPING | 219,384 SF |
| TOTAL | 277,523 SF | TOTAL | 562,809 SF |
| PROPOSED TREATMENT MEASURE | AREA | PROPOSED TREATMENT MEASURE | AREA |
| BIORETENTION AREA | 11,806 SF | BIORETENTION AREA | 14,546 SF |



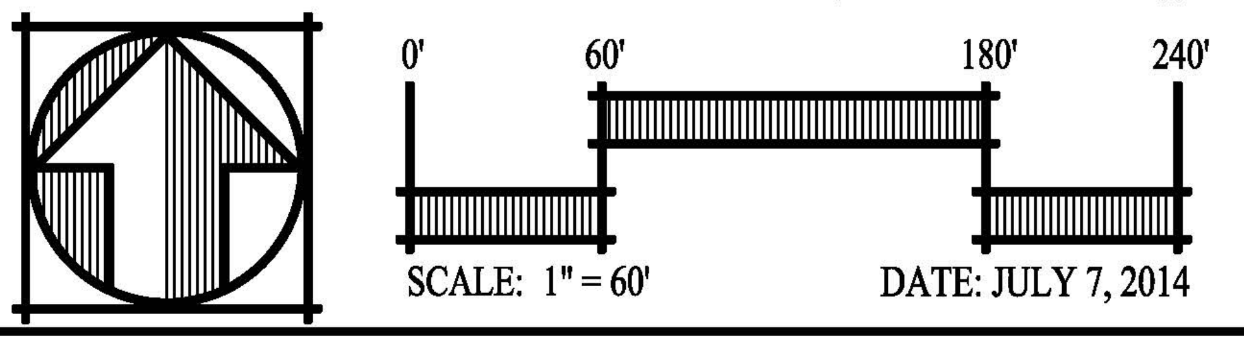
LEGEND

| | |
|---|---|
| | PROPOSED STORM DRAIN |
| IMP 1 🟩 | INTEGRATED MANAGEMENT PRACTICE - BIORETENTION AREA |
| 🟥 | DRAINAGE MANAGEMENT AREA BOUNDARY |
| DMA 1 | DRAINAGE MANAGEMENT AREA DRAINING TO BIO-RETENTION AREA OR FILTERRA BIORETENTION UNIT |

# STORM WATER CONTROL PLAN

## HEIDORN VILLAGE

CITY OF ANTIOCH CONTRACOSTA COUNTY CALIFORNIA



SCALE: 1" = 60'

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# Appendix F: Noise Assessment

# *HEIDORN VILLAGE RESIDENTIAL PROJECT ENVIRONMENTAL NOISE ASSESSMENT ANTIOCH, CALIFORNIA*

**October 5, 2014**

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## INTRODUCTION

This assessment evaluates the significance of noise and vibration impacts resulting from the Heidorn Village residential project proposed west of Heidorn Ranch Road in Antioch, California. The project proposes to construct 117 single-family residential units, park and open space areas, the extension of Prewett Ranch Road to Heidorn Ranch Road, and internal access roads. This report evaluates the project's potential to result in significant impacts with respect to applicable CEQA guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

## SETTING

### Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called $L_{eq}$. The most common averaging period is hourly, but $L_{eq}$ can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the *sound level meter*. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. - 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The *Day/Night Average Sound Level* ($L_{dn}$ *or DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

## Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

**TABLE 1 Definition of Acoustical Terms Used in this Report**

| Term | Definition |
|---|---|
| Decibel, dB | A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals. |
| Sound Pressure Level | Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter. |
| Frequency, Hz | The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz. |
| A-Weighted Sound Level, dBA | The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. |
| Equivalent Noise Level, $L_{eq}$ | The average A-weighted noise level during the measurement period. |
| $L_{max}$, $L_{min}$ | The maximum and minimum A-weighted noise level during the measurement period. |
| $L_{01}$, $L_{10}$, $L_{50}$, $L_{90}$ | The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period. |
| Day/Night Noise Level, $L_{dn}$ or DNL | The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m. |
| Community Noise Equivalent Level, CNEL | The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m. |
| Ambient Noise Level | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location. |
| Intrusive | That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level. |

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

**TABLE 2 Typical Noise Levels in the Environment**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|---|---|---|
| | 110 dBA | Rock band |
| Jet fly-over at 1,000 feet | | |
| | 100 dBA | |
| Gas lawn mower at 3 feet | | |
| | 90 dBA | |
| Diesel truck at 50 feet at 50 mph | | Food blender at 3 feet |
| | 80 dBA | Garbage disposal at 3 feet |
| Noisy urban area, daytime | | |
| Gas lawn mower, 100 feet | 70 dBA | Vacuum cleaner at 10 feet |
| Commercial area | | Normal speech at 3 feet |
| Heavy traffic at 300 feet | 60 dBA | |
| | | Large business office |
| Quiet urban daytime | 50 dBA | Dishwasher in next room |
| Quiet urban nighttime | 40 dBA | Theater, large conference room |
| Quiet suburban nighttime | | |
| | 30 dBA | Library |
| Quiet rural nighttime | | Bedroom at night, concert hall (background) |
| | 20 dBA | |
| | | Broadcast/recording studio |
| | 10 dBA | |
| | 0 dBA | |

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

**TABLE 3 Reactions of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels**

| Velocity Level, PPV (in/sec) | Human Reaction | Effect on Buildings |
|---|---|---|
| 0.01 | Barely perceptible | No effect |
| 0.04 | Distinctly perceptible | Vibration unlikely to cause damage of any type to any structure |
| 0.08 | Distinctly perceptible to strongly perceptible | Recommended upper level of the vibration to which ruins and ancient monuments should be subjected |
| 0.1 | Strongly perceptible | Virtually no risk of damage to normal buildings |
| 0.3 | Strongly perceptible to severe | Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings |
| 0.5 | Severe - Vibrations considered unpleasant | Threshold at which there is a risk of damage to newer residential structures |

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

## REGULATORY BACKGROUND

The State of California, the City of Antioch, the City of Brentwood, and the US Department of Transportation Federal Transit Administration (FTA) have established plans and policies designed to limit noise exposure at noise sensitive land uses. These plans and policies are contained in the following documents: (1) the State of California Environmental Quality Act (CEQA) Guidelines, Appendix G, (2) the City of Antioch General Plan, and (3) the City of Antioch Zoning Ordinance, (4) the City of Brentwood General Plan, and (5) the construction vibration criteria established by the Federal Transit Authority (FTA). Regulations, plans, and policies presented within these documents form the basis of the significance criteria used to assess project impacts.

***State CEQA Guidelines.*** The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) For a project located within 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, if the project would expose people residing or working in the project area to excessive noise levels; or

(f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

Of these guidelines, items (a), (b), (c), and (d) are applicable to the proposed project. Guidelines (e) and (f) are not applicable because the project is not located in the vicinity of a public or private airstrip.

***Environmental Hazards Chapter of the General Plan*.** The Environmental Hazards Chapter of the City of Antioch General Plan sets forth noise and land use compatibility standards to guide development, and noise goals and policies to protect citizens from the harmful and annoying effects of excessive noise. Objectives and policies established in the Noise Element of the General Plan that are applicable to the proposed project include:

**11.6.1 Noise Objective:** Achieve and maintain exterior noise levels appropriate to planned land uses throughout Antioch as described below:

- Residential: Single-Family: 60 dBA CNEL within rear yards, Multi-Family: 60 dBA CNEL within exterior open space

**11.6.2 Noise Policies:**

*Noise Compatible Land Use and Circulation Patterns*

b. Maintain a pattern of land uses that separates noise-sensitive land uses from major noise sources to the extent possible, and guide noise-tolerant land uses into the noisier portions of the Planning Area.

*Noise Analysis and Mitigation*

d. When new development is proposed in areas exceeding the noise levels exceeding the noise levels identified in the General Plan Noise Objective, or where the development of proposed uses could result in a significant increase in noise, require a detailed noise attenuation study to be prepared by a qualified acoustical engineer to determine appropriate mitigation and ways to incorporate such mitigation into project design and implementation.

f. In reviewing noise impacts, utilize site design and architectural design features to the extent feasible to mitigate impacts on residential neighborhoods and other uses that are sensitive to noise.

g. Where feasible, require the use of noise barriers (walls, berms, or a combination thereof) to reduce significant noise impacts.
    - The barrier must have sufficient mass to reduce noise transmission and high enough to shield the receptor from the noise source.

    - To be effective, the barrier needs to be constructed without cracks or openings.

    - The barrier must interrupt the line-of-sight between the noise source and the receptor.

    - The effects of noise 'flanking' the noise barrier should be minimized by bending the end of the barrier back from the noise source.

h. Continue enforcement of California Noise Insulation Standards (Title 25, Section 1092, California Administration Code).

    The California Building Code (CBC) no longer includes noise insulation standards for residences. For compliance with the intent of this policy, the 2010 CBC noise insulation standards are used. The 2010 CBC established an interior noise level standard of 45 dBA CNEL/$L_{dn}$ in any habitable room for new hotels, motels, dormitories, and apartment houses. This standard is generally also applied for single family dwellings.

*Temporary Construction*

i. Ensure that construction activities are regulated as to hours of operation in order to avoid or mitigate noise impacts on adjacent noise-sensitive land uses.

j. Require proposed development adjacent to occupied noise sensitive land uses to implement a construction-related noise mitigation plan. This plan would depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses.

k. Require that all construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

m. Prior to the issuance of any grading plans, the City shall condition approval of subdivisions and non-residential development adjacent to any developed/occupied noise-sensitive land uses by requiring applicants to submit a construction-related noise mitigation plan to the City for review and approval. The plan should depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of the project through the use of such methods as:

    - The construction contractor shall use temporary noise-attenuation fences, where feasible, to reduce construction noise impacts on adjacent noise sensitive land uses

- During all project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during project construction.

- The construction contractor shall limit all construction-related activities that would result in high noise levels to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. No construction shall be allowed on Sundays and public holidays.

n. The construction-related noise mitigation plan required shall also specify that haul truck deliveries be subject to the same hours specified for construction equipment. Additionally, the plan shall denote any construction traffic haul routes where heavy trucks would exceed 100 daily trips (counting those both to and from the construction site). To the extent feasible, the plan shall denote haul routes that do not pass sensitive land uses or residential dwellings. Lastly, the construction-related noise mitigation plan shall incorporate any other restrictions imposed by the city.

***City of Antioch Zoning Ordinance.*** The City of Antioch Zoning Ordinance specifies hours of construction operations. Construction activity is restricted to between the hours of 7:00 am and 6:00 pm on weekdays, 8:00 am and 5:00 pm on weekdays within 300 feet of occupied dwellings, and 9:00 am and 5:00 pm on weekends and holidays, irrespective of the distance from the occupied dwellings.

***City of Brentwood's General Plan.*** The project is proposed within the City of Antioch, but the site borders the City of Brentwood. Single family residences in Brentwood border the site to the east, across Heidorn Ranch Road. The City of Brentwood's General Plan contains policies designed to support the City's two primary concerns: (1) preventing the introduction of new noise-producing uses in noise-sensitive areas; and (2) preventing the encroachment of noise-sensitive uses into existing noise-producing areas. The City has policies that protect new development from existing noise sources and to protect existing noise sensitive development from new transportation noise sources (such as roadway improvements), industrial noise sources, or increases in noise. Since the project is not proposed within Brentwood, only the policies concerning the protection of existing noise sensitive uses from increases in noise due to proposed uses would be applicable, as follows:

**Policy N 1-1:** Ensure the noise compatibility of existing and future development when making land use planning decisions.

**Policy N 1-7:** For projects that are required by the California Environmental Quality Act (CEQA) to analyze noise impacts, the following criteria shall be used to determine the significance of those impacts:

**Transportation Noise Sources**

- Where existing traffic noise levels are less than 60 dB $L_{dn}$ at the outdoor activity areas of noise-sensitive uses, a +5 dB $L_{dn}$ increase in roadway noise levels will be considered significant;
- Where existing traffic noise levels range between 60 and 65 dB $L_{dn}$ at the outdoor activity areas of noise-sensitive uses, a +3 dB $L_{dn}$ increase in roadway noise levels will be considered significant; and
- Where existing traffic noise levels are greater than 65 dB $L_{dn}$ at the outdoor activity areas of noise-sensitive uses, a + 1.5 dB $L_{dn}$ increase in roadway noise levels will be considered significant.

Since the project is in Antioch, where a CNEL criteria is used, these increases are applied as increases to the CNEL in this document.

**Policy N 1-15:** Require construction activities to comply with standard best practices (see Action N 1e).

**Action N 1e:** During the environmental review process, determine if proposed construction will constitute a significant impact on nearby residents and, if necessary, require mitigation measures in addition to the standard best practice controls. Suggested best practices for control of construction noise include:

1. Construction period shall be less than 12 months;
2. Noise-generating construction activities, including truck traffic coming to and from the construction site for any purpose, shall be limited to between the hours of 7:00 am and 6:00 pm on weekdays, and between 8:00 am and 5:00 pm on Saturdays. No construction shall occur on Sundays or City holidays;
3. All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment;
4. The construction contractor shall utilize “quiet” models of air compressors and other stationary noise sources where technology exists;
5. At all times during project grading and construction, stationary noise generating equipment shall be located as far as practical from sensitive receptors and placed so that emitted noise is directed away from residences;
6. Unnecessary idling of internal combustion engines shall be prohibited;
7. Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction activities, to the extent feasible;
8. The required construction-related noise mitigation plan shall also specify that haul truck deliveries are subject to the same hours specified for construction equipment;
9. Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing; and
10. The construction contractor shall designate a “noise disturbance coordinator” who will be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall be responsible for determining the cause of the noise complaint (e.g., starting too early, poor muffler, etc.) and instituting reasonable measures

as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.

***Construction Vibration Guidelines.*** The City of Antioch does not establish vibration thresholds applicable to the proposed project. The FTA establishes the following construction vibration damage criteria for various structural categories:

**TABLE 4 Construction Vibration Damage Criteria**

| Building Category | PPV (in/sec) |
|---|---|
| I. Reinforced-concrete, steel or timber (no plaster) | 0.5 |
| II. Engineered concrete and masonry (no plaster) | 0.3 |
| III. Non-engineered timber and masonry buildings | 0.2 |
| IV. Buildings extremely susceptible to vibration damage | 0.12 |

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Federal Transit Agency, Office of Planning and Environment, May 2006.

## EXISTING NOISE ENVIRONMENT

The Heidorn Village residential project site is located in southeast Antioch, west of Heidorn Ranch Road and southeast of the existing terminus of Prewett Ranch Drive. Residential land uses, including large-lot rural residences and single-family subdivisions, surround the site in all directions. The Heritage Baptist Church and School borders the project site to the northeast.

A noise monitoring survey was conducted from March 31, 2009 to April 3, 2009 to quantify the existing noise environment at the site and in the project vicinity. An additional noise monitoring survey was conducted on September 26, 2014 to update the 2009 noise survey and to confirm that no major changes in land uses have occurred near the site since 2009 that could affect the results of the noise study.

The 2009 noise monitoring survey included one long-term noise measurement (LT-1), and two short-term measurements (ST-1, ST-2), as shown in Figure 1. For the 2014 noise measurement survey, short-term measurements were made at locations LT-1 and ST-2. The noise environment at the site results primarily from intermittent traffic along Heidorn Ranch Road.

Noise measurement location LT-1 was made approximately 40 feet from the center of Heidorn Ranch Road. Hourly average noise levels measured in 2009 at this site typically ranged from 51 to 56 dBA $L_{eq}$ during the day, and from 41 to 50 dBA $L_{eq}$ at night. The ten-minute average noise level measured at 1:50 pm on September 26, 2014 during was 47 dBA $L_{eq}$, which is in-line with the 2009 data. The calculated CNEL noise level at this location was 57 dBA. These data are summarized in Appendix 1.

Short-term noise measurement (ST-1) was made approximately 155 feet from the nearest residential land uses to the north and adjacent to the northwest corner of the Church property. The ten-minute average noise level during this time period was 47 dBA $L_{eq}$. An update to this measurement could not be completed during the 2014 site visit because of landscaping activities occurring north of the project site. Short-term noise measurement (ST-2) was conducted at the end of Prewett Ranch Drive, just west of the site. The ten-minute average noise level during this time period was 46 dBA $L_{eq}$ in 2009 and 44 dBA $L_{eq}$ in 2014. Table 5 summarizes the results of these measurements.

**TABLE 5 Summary of Short-Term Noise Measurement Data**

| **Noise Measurement Location** | | $L_{max}$ | $L_{(1)}$ | $L_{(10)}$ | $L_{(50)}$ | $L_{(90)}$ | $L_{eq}$ | **CNEL** |
|---|---|---|---|---|---|---|---|---|
| LT-1: ~40 feet from center of Heidorn Ranch Drive (9/26/14, 13:50-14:00) | | 55 | 51 | 479 | 47 | 45 | 47 | 57 |
| ST-1: ~155 feet from the nearest residential land uses. (3/31/2009, 13:50-14:00) | | 58 | 55 | 49 | 45 | 42 | 47 | 49 |
| ST-2: End of Prewett Ranch Drive. | (4/3/2009, 13:20-13:30) | 59 | 55 | 50 | 42 | 37 | 46 | 47 |
| | (9/26/14, 13:30-13:40) | 52 | 51 | 48 | 41 | 39 | 44 | |
| Note: CNEL approximated by correlating data collected during the short-term monitoring interval to data collected during a corresponding period at the long-term site. | | | | | | | | |

**Figure 1: Site Vicinity and Noise Measurement Locations**

## NOISE IMPACTS AND MITIGATION MEASURES

### Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would generate excessive ground-borne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- **Noise and Land Use Compatibility.** A significant noise impact would be identified if exterior noise levels are anticipated to exceed 60 dBA CNEL in backyards of proposed residences or if interior noise levels are anticipated to exceed 45 dBA CNEL inside residences.

- **Exposure to Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.3 in/sec PPV (peak particle velocity) would have the potential to result in cosmetic damage to normal buildings.

- **Substantial Permanent Noise Increase.** According to CEQA, a significant noise impact would result if noise levels increase substantially over a permanent basis at existing noise-sensitive land uses (e.g., residences) as a result of the project. Neither CEQA, nor the City of Antioch defines a 'significant noise increase'. However, there are adjacent noise-sensitive uses located east of the project site across Heidorn Ranch Road, which are within the City of Brentwood. The City of Brentwood does define a 'significant noise increase'. As a result, the City of Brentwood's policy is applied to this entire analysis, with as substantial increase being defined in terms of CNEL, rather than $L_{dn}$.

  The impact would be considered significant if traffic or commercial operating noise sources generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if project operations would:
    - Where existing traffic noise levels are less than 60 dB CNEL at the outdoor activity areas of noise-sensitive uses, a +5 dB $L_{dn}$ increase in roadway noise levels will be considered significant;
    - Where existing traffic noise levels range between 60 and 65 dB CNEL at the outdoor activity areas of noise-sensitive uses, a +3 dB $L_{dn}$ increase in roadway noise levels will be considered significant; and
    - Where existing traffic noise levels are greater than 65 dB CNEL at the outdoor activity areas of noise-sensitive uses, a + 1.5 dB $L_{dn}$ increase in roadway noise levels will be considered significant.

- **Temporary Construction Noise.** A significant temporary noise impact would be identified if construction-related noise would generate hourly average noise levels exceeding 60 dBA $L_{eq,}$ and raise the ambient by at least 5 dBA $L_{eq}$, for a period of more than one year at adjacent residential land uses.

**Impact 1:** **Noise and Land Use Compatibility.** Future noise levels at the project site would meet the City of Antioch's exterior and interior noise and land use compatibility standards. **This is a less-than-significant impact.**

The project would include 117 residential lots, park and open space areas, the extension of Prewett Ranch Road to Heidorn Ranch Road, and internal access roads. Project residences are proposed at a distance of about 175 feet from the center of Heidorn Ranch Road and about 40 feet from the center of the proposed extension of Prewett Ranch Drive. Park and open space areas are proposed adjacent to Heidorn Ranch Road and also on the interior of the site.

The future noise environment at the project site is anticipated to increase as a result of cumulative growth forecast under the current General Plan and also through the extension of Prewett Ranch Road. Long term (2030) + Project traffic volumes were used to assess the compatibility of the proposed residential project with respect to the noise environment expected at the site. Long term (2030) + Project traffic noise levels were modeled in the Federal Highway

Administration's (FHWA's) Traffic Noise Model (TNM) along both Heidorn Ranch Road and Prewett Ranch Road using traffic volumes supplied by Kimley Horn and posted travel speeds of 45 mph and 25 mph, respectively. Modeled traffic noise levels were calibrated based the noise monitoring survey.

Based on the traffic noise modeling, traffic noise levels are calculated to be about 53 dBA CNEL at the setback of homes along Heidorn Ranch Road and about 55 dBA CNEL at the setback of homes along Prewett Ranch Road. These noise levels would meet the exterior noise and land use compatibility standard presented in the City of Antioch's General Plan. In buildings of typical residential construction, interior noise levels are approximately 15 dBA lower than exterior noise levels with the windows partially open and 20 to 25 dBA lower than exterior noise levels with the windows closed. As a result, interior noise levels would be expected to meet the 45 dBA CNEL interior standard with standard construction and windows in the open or shut position.

At the park or open space area proposed adjacent to Heidorn Ranch Road, Long term (2030) + Project traffic noise levels are anticipated to exceed 60 dBA CNEL within about 60 feet of the center of the roadway. Approximately two-thirds of this open space area is located beyond 60 feet from the center of Heidorn Ranch Road and would meet the 60 dBA CNEL criteria. In addition, all project residents would have private yard areas and access to park and open space areas located within the interior of the site plan that meet the 60 dBA CNEL criteria. This is a less-than-significant impact.

**Mitigation Measure 1: None required.**

**Impact 2:** **Exposure to Excessive Groundborne Vibration.** Construction-related vibration would not be excessive at nearby residential land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams, etc.) are used in areas adjacent to developed properties. Construction activities would include excavation, grading, site preparation work, foundation work, and new building framing and finishing. The proposed project would not require pile driving, which can cause excessive vibration.

The FTA and California Department of Transportation use a vibration limit of 0.3 in/sec, PPV for buildings that are found to be structurally sound and designed to modern engineering standards. No sensitive historic structures or buildings that are documented to be structurally weakened adjoin the project site. Therefore, groundborne vibration levels exceeding 0.3 in/sec, PPV would have the potential to result in a significant vibration impact. Table 6 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet.

Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity of the work area. Jackhammers typically generate vibration levels of 0.035 in/sec, PPV, and drilling typically generates vibration levels of 0.09 in/sec, PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

**TABLE 6 Vibration Source Levels for Construction Equipment**

| Equipment | | PPV at 25 ft. (in/sec) | Approximate $L_v$ at 25 ft. (VdB) |
|---|---|---|---|
| Pile Driver (Impact) | upper range | 1.158 | 112 |
| | typical | 0.644 | 104 |
| Pile Driver (Sonic) | upper range | 0.734 | 105 |
| | typical | 0.170 | 93 |
| Clam shovel drop | | 0.202 | 94 |
| Hydromill (slurry wall) | in soil | 0.008 | 66 |
| | in rock | 0.017 | 75 |
| Vibratory Roller | | 0.210 | 94 |
| Hoe Ram | | 0.089 | 87 |
| Large bulldozer | | 0.089 | 87 |
| Caisson drilling | | 0.089 | 87 |
| Loaded trucks | | 0.076 | 86 |
| Jackhammer | | 0.035 | 79 |
| Small bulldozer | | 0.003 | 58 |

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Residential structures adjoining the site are located about 25 feet west of the site and more than 100 feet north of the site. At residences to the west, vibration levels would be expected to be 0.2 in/sec, PPV, or less when vibration generating operations are located adjacent to these residences. For the residences to the north, vibration levels would be expected to be 0.05 in/sec, PPV, or less. These levels are below the significance threshold. Vibration generated by construction activities near the common property line to the west could at times be perceptible at adjacent residences. However, vibration generating activities would only occur in these areas for short periods of time and would not be expected to result in "architectural" damage to the buildings. This is a less-than-significant impact.

**Mitigation Measure 2: None required.**

**Impact 3:** **Project-Generated Traffic Noise.** The proposed project would not result in a substantial permanent noise level increase at nose sensitive land uses in the vicinity. **This is a less-than-significant impact.**

The project site is currently vacant, and therefore there are no on-site uses that generate audible noise. Potential noise-sensitive receptors in the project area include medium-density residential neighborhoods to the north and west of the project site; recreational users of the Mokelumne Trail to the north; the church/school to the northeast; and two large-lot rural residential homes to the east of the project site across Heidorn Ranch Road, located in the City of Brentwood.

The development of the Project will cause an increase in vehicular traffic on the street network. Increased vehicular traffic on the streets is the only source of operational noise that would substantially affect the noise environment in the vicinity of the project. An increase is considered to be substantial if the CNEL noise exposure level at a sensitive receiver increases by 3 dBA or more where exterior noise levels would exceed 60 dBA CNEL for residential uses or by 5 dBA or more where noise levels would remain at or below 60 dBA CNEL for residential uses. The noise exposure levels were evaluated at three existing and three future intersections in the vicinity of the project to determine whether or not the increased vehicular traffic would cause a substantial increase in the noise environment. Traffic noise along a street is logarithmically proportional to the volume of traffic.

Using traffic volumes developed for this study by Kimley Horn, noise levels along the roads in and around the project area were calculated to increase above Existing levels by 1 dBA CNEL or less as a result of project generated traffic (Existing + Project Condition) on Lone Tree Way, Prewett Ranch Drive, Hillcrest Avenue, Canada Valley Road, and Heidorn Ranch Road, north of Lone Tree Way and south of the project's northern project entrance. These increases would not typically be noticeable and are below the 3 and 5 dBA CNEL permanent noise increase thresholds. Project generated traffic noise increases of 2 to 3 dBA CNEL are calculated for Heidorn Ranch Road, between Lone Tree Way and north of the northern project entrance. Based on review of the long-term noise monitoring data along Heidorn Ranch Road (LT-1), peak-hour traffic noise levels are approximately equivalent to CNEL noise levels. Existing + Project noise levels would exceed 60 dBA CNEL at a distance of about 80 feet from the center of Heidorn Ranch Road through this area, using the posted speed limit of 45 mph. There are no noise sensitive uses located east of Heidorn Ranch Road along this segment. Single and multi-family residences are 90 and 120 feet west of the center of the road, respectively. Heritage Baptist Academy is located about 175 feet west of Heidorn Ranch Road, with one basketball court located about 90 feet from the center of the road. Noise levels at these noise sensitive locations would continue to be below the 60 dBA CNEL threshold under Existing + Project conditions. As a result, increases in vehicular traffic would not cause a significant noise impact to existing residents or businesses in the area. This is a less-than-significant impact.

**Mitigation Measure 3: None required.**

**Impact 4:** **Temporary Construction Noise.** Existing noise-sensitive land uses would not be exposed to construction noise levels in excess of the significance thresholds for a period of more than one year provided standard construction noise controls are implemented at the site. **This is a less-than-significant impact with the incorporation of mitigation.**

The development of the project is expected to generate noise and would temporarily increase noise levels at nearby sensitive land uses. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors and existing ambient noise levels.

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction activities can generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Where noise from construction activities exceeds 60 dBA $L_{eq}$ and exceeds the ambient noise environment by at least 5 dBA $L_{eq}$ at noise-sensitive uses in the project vicinity for a period greater than one year, the impact would be considered significant.

The project would be built in phases. The model homes (4) would be built first. Between 36 and 39 homes would be constructed in each of the following three phases, over a total construction period of about 30 months. The highest noise levels would be generated during site preparation, excavation, grading, and trenching. Noise generated during construction of residences is generally lower. Once construction moves indoors, minimal noise would be generated at off-site locations. During construction, maximum noise levels would vary depending on the equipment operating on site.

The typical range of maximum noise levels would be 80 to 90 dBA $L_{max}$ at a distance of 50 feet. Hourly average noise levels generated by construction are about 81 dBA to 88 dBA $L_{eq}$ measured at a distance of 50 feet from the center of a busy construction site. Hourly average construction noise levels associated with the erection of the residential units, such as hammer- and drilling-related noise, range from approximately 63 to 71 dBA at a distance of 50 feet. The noise levels associated with construction of the residential units would be substantially less than the noise levels associated with grading and pavement activities during project site preparation. Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding provided by barriers or structures can provide an additional 5 to 10 dBA noise reduction at distant receptors.

The nearest existing residential receivers to the west would be exposed to hourly average noise levels ranging from 79 to 86 dBA $L_{eq}$ during the busiest construction periods along the western perimeter of the site. At residences to the north, located about 100 feet from the project boundary, construction noise levels would be about 69 to 78 $L_{eq}$ during the busiest construction periods located adjacent to the northern boundary of the site. Again, construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by barriers or buildings would provide 5 to 10 decibels of attenuation at receptors. As construction moves away from noise-sensitive receptors, or indoors, noise levels generated by heavy construction will be lower.

Although the entire construction period would exceed 12 months, not all construction activities would be anticipated to generate high levels of noise. Additionally, construction would move around the site as different phases of the project are built. Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Noise generated by project construction would not be expected to exceed 60 dBA $L_{eq}$ and exceed ambient noise levels at receivers to the east or south by more than 5 dBA $L_{eq}$ for a period greater than one year. At residences to the north and west, noise levels would achieve the criteria assuming that construction activities are conducted in accordance with the provisions of the City of Antioch and with implementation of construction best management practices as described in **Mitigation Measure 4**, stated below.

**Mitigation Measure 4:** The following construction best management controls, as identified in the Antioch General Plan and Municipal Code and the Brentwood General Plan, shall be implemented at the construction site:

- Per the most conservative restrictions between Section 5-17.04 of the City of Antioch's Municipal Code and the Action N 1e of the City of Brentwood's General Plan, construction activities, including haul truck deliveries, shall be limited to the hours of:
    - 8:00 AM to 5:00 PM on weekdays within 300 feet of occupied dwelling units, and the Heritage Baptist Church and Academy,
    - 7:00 AM to 6:00 PM on weekdays for construction located more than 300 feet from noise sensitive uses,
    - 9:00 AM to 5:00 PM on Saturdays, and
    - No construction shall occur on Sundays or public holidays.

- Prohibit unnecessary idling of internal combustion engines. Equip all equipment driven by internal combustion engines with mufflers which are in good mechanical condition, appropriate for the equipment, and no less effective that those originally installed by the manufacturer.

- Utilize "quiet" air compressors and other stationery noise sources where technology exists.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors and place equipment so that emitted noise is directed away from nearby sensitive receptors.

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment when located within 200 feet of adjoining sensitive land uses. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receiver and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Construct units at the perimeter of the site and immediately adjacent to existing residences as early as possible so that the completed buildings will provide acoustical shielding for existing residences to the north and west. Constructing units along the western and northern perimeters of the site would provide approximately 10 dB of noise reduction during the remainder of project construction activities.

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and instituting reasonable measures as warranted to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

- Coordinate with the City of Antioch to notice to the residents immediately adjacent to the project site and the Heritage Baptist Academy regarding the project construction schedule. The notice shall include the contact information for the disturbance coordinator (discussed above).

- Prior to the issuance of any grading plans, the City of Antioch shall condition approval of the project by requiring applicants to submit a construction-related noise mitigation plan to the City for review and approval. The plan should depict the location of construction equipment, storage, and maintenance areas, and document how the noise from this equipment will be mitigated during construction of the project through the use of method described above.

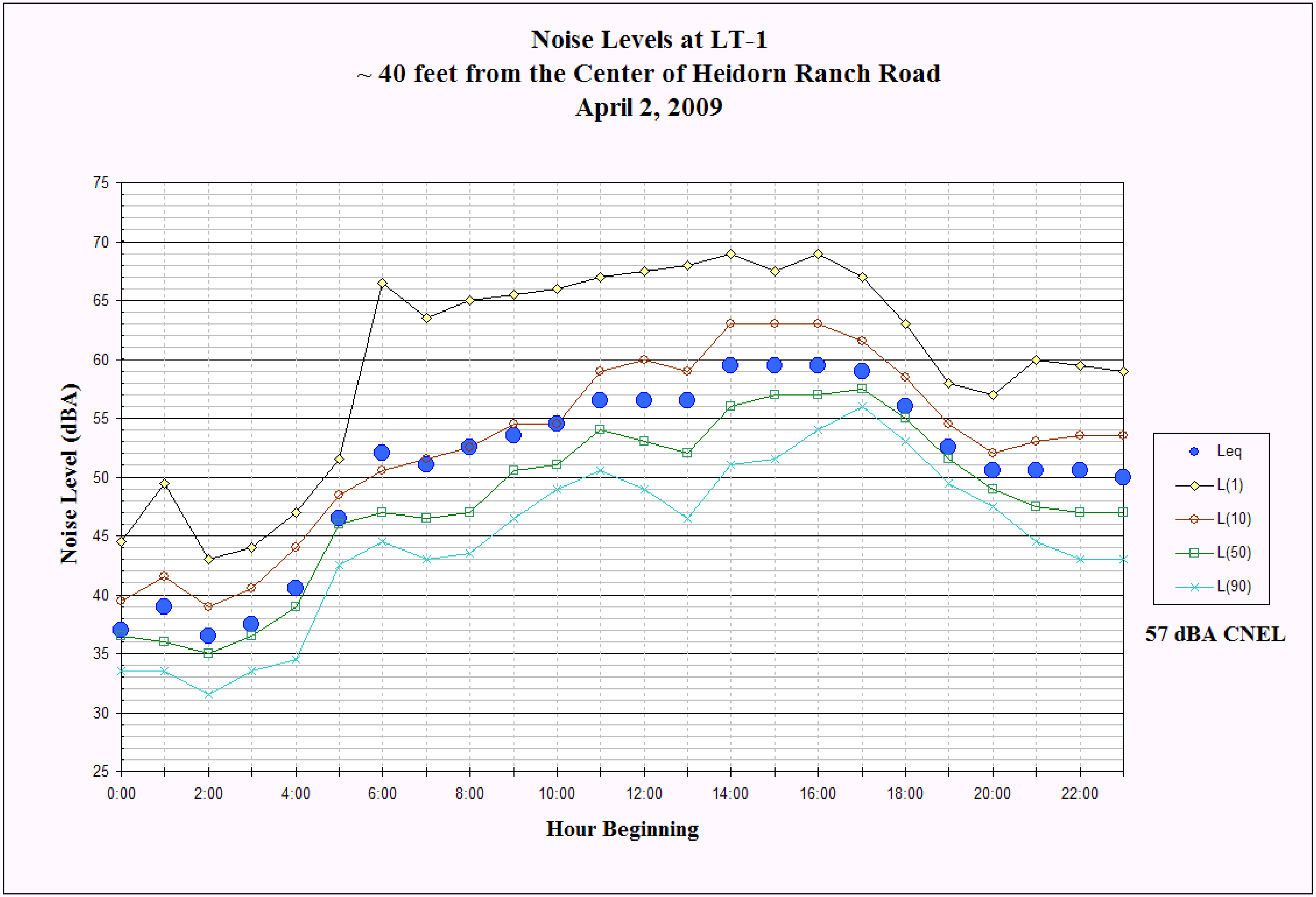
Implementation of the above measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. While construction of the residential units would take place over a period greater than one year, the noise levels associated with unit construction would be localized to a single portion of the project site at a time, as phases of the project are completed and would result in substantially lower noise levels than site preparation activities. With the implementation of these measures, and recognizing that noise generated by construction activities would occur over a temporary period, the temporary increase in ambient noise levels would be less-than-significant.

**Impact 5:** **Cumulative Traffic Noise.** The proposed project would not substantially contribute to cumulative noise levels anticipated with the build-out of the General Plan. **This is a less-than-significant impact.**

Traffic noise levels in the area are calculated to increase substantially along some roadways over the long-term as the area transitions from a rural land use pattern to a suburban area. Cumulative traffic noise levels increases were calculated by comparing Long-Term (2030) traffic volumes to Long-Term (2030) + Project volumes. The project's contribution to cumulative noise level increases would be less than 1 dBA CNEL along all studied roadway segments, except Heidorn Ranch Road, between Lone Tree Way and north of the northern project entrance. Traffic noise increases along this segment of roadway were described previously under Impact 3. Under Long-term (2030) + Project conditions, traffic noise levels would not substantially increase above Existing + Project levels. Long-term (2030) + Project noise levels would exceed 60 dBA at a distance of about 80 feet from the center of Heidorn Ranch Road. There are no noise sensitive receptors located within 80 feet of the center of the roadway through this segment; therefore, noise levels at all noise sensitive locations would continue to be below the 60 dBA CNEL threshold under Long-term (2030) + Project conditions.  As a result, the project would not make a cumulatively considerable contribution to increased noise levels resulting from the build-out of the area.

**Mitigation Measure 5:** **None required.**

# Appendix 1:  Daily Trend in Noise Levels at LT-1



**Noise Levels at LT-1**
**~ 40 feet from the Center of Heidorn Ranch Road**
**April 2, 2009**

**57 dBA CNEL**

# Appendix G: Traffic Impact Study

TRAFFIC IMPACT STUDY – FINAL REPORT

# HEIDORN VILLAGE
# ANTIOCH, CA

May 13, 2015

Prepared for:

City of Antioch, CA

Prepared by:

Kimley»Horn

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# INTRODUCTION

Kimley-Horn and Associates, Inc. was retained by the City of Antioch to prepare a traffic study for the proposed Heidorn Village residential development in Antioch, CA. The project proposes 117 single family residential homes. The project is located to the west of Heidorn Ranch Road and north of the Prewett Ranch Drive extension.

**Figure 1** illustrates the location of the project site in relation to the City of Antioch.

This traffic study was prepared based on discussions with, and criteria set forth by, the City of Antioch and Contra Costa Transportation Authority (CCTA). This study addresses the traffic and transportation effects of the proposed development to assist the project applicant and the City in project planning and determining conditions of approval for the project.

## Study Methodology

### Development Conditions

The Heidorn Village traffic study was based on the following development conditions:

- Existing (2014) conditions – Based on current traffic counts in 2014 and existing roadway geometry and traffic control.
- Existing (2014) Plus Project conditions – Based on current traffic counts and existing roadway geometry and traffic control, plus the traffic generated by the Heidorn Village residential development.
- Near-term conditions – Based on a forecast of the anticipated traffic after the project has been built out. The Near-term conditions include all approved and pending land use changes and any development that is consistent with the General Plan and expected to occur within the time frame of the project. It also includes transportation projects programmed for implementation at the time that the project is completed and any approved mitigation measures required for approved and planned projects. Additional projects submitted to the City after commencement of this traffic study have been included in the Long-term conditions.
- Near-term Plus Project conditions – Based on existing traffic volumes, traffic from all approved and pending land use changes and any development that is consistent with the General Plan, and traffic generated by the Heidorn Village residential development, as well as transportation projects programmed for implementation at the time that the project is completed and any approved mitigation measures required for approved and planned projects.
- Long-term (2030) conditions – Based on future year traffic forecasts from the CCTA 2040 travel demand forecast model. Includes road projects anticipated to

be in place under the long-term condition.

- Long-term (2030) Plus Project conditions – Based on CCTA traffic forecasts and traffic generated by the Heidorn Village residential development. Includes road projects anticipated to be in place under the long-term condition.

## Operating Conditions and Criteria

Analysis of project effects at intersections is based on the concept of Level of Service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of Service for this study were determined using methods defined in the *Highway Capacity Manual, 2010* (HCM) and appropriate traffic analysis software.

The HCM included procedures for analyzing side-street stop-controlled (SSSC), all-way stop-controlled (AWSC), and signalized intersections. The SSSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection as a whole. **Table 1** relates the operational characteristics associated with each LOS category for signalized and unsignalized intersections.

According to the CCTA requirements, there is one route of regional significance within the project study area, which includes Lone Tree Way. Routes of regional significance are governed by the CCTA Technical Procedures, which has a level of service requirement of LOS D or better. These requirements would apply to all study intersections on routes of regional significance.

For study intersections in the City of Antioch and not associated with routes of regional significance, the City has a level of service requirement of LOS “High D” or better.

Project impacts are determined by comparing conditions with the proposed project to those without the proposed project. Significant impacts for intersections are created when traffic from the proposed project causes the LOS to fall below a specific threshold. Mitigation may be required when traffic from the project causes the intersection to operate below acceptable levels of traffic operation.

### Table 1 – Intersection Level of Service Definitions

| Level of Service | Description | Signalized (Avg. control delay per vehicle sec/veh.) | Unsignalized (Avg. control delay per vehicle sec/veh.) |
|---|---|---|---|
| A | Free flow with no delays. Users are virtually unaffected by others in the traffic stream | ≤ 10 | ≤ 10 |
| B | Stable traffic. Traffic flows smoothly with few delays. | > 10 – 20 | > 10 – 15 |
| C | Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays. | > 20 – 35 | > 15 – 25 |
| D | Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours. | > 35 – 55 | > 25 – 35 |
| E | Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing. | > 55 – 80 | > 35 – 50 |
| F | Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing. | > 80 | > 50 |

Sources: Transportation Research Board, *Highway Capacity Manual 2000*, National Research Council, 2000 and Transportation Research Board, Highway Capacity Manual 2010, National Research Council, 2010

The effects of vehicle queuing were also analyzed and the 95th percentile queue is reported for all study intersections. The 95th percentile queue length represents a condition where 95 percent of the time during the peak period, traffic volumes and related queuing will be at, or less, than the queue length determined by the analysis. This is referred to as the “95th percentile queue.” Average queuing is generally less. Queuing is considered a potentially significant impact since queues that exceed the turn pocket length can create potentially hazardous conditions by blocking or disrupting through traffic in adjacent travel lanes. However, these potentially hazardous queues are generally associated with left-turn movements. Locations where the right turn pocket storage is exceeded are not considered potentially hazardous because the right turn movement typically goes at the same time as the through movement and the additional vehicles that spill out over the turn pocket will not be hindering or disrupting the adjacent through traffic as would be the case in most left turn pockets. Thus, for purposes of this analysis, a queuing impact was considered to occur under conditions where project traffic causes the queue in a left turn pocket to extend beyond the turn pocket by 25 feet or more (i.e., the length of one vehicle) into adjacent traffic lanes that operate (i.e., move) separately from the left turn lane. Where the vehicle queue already exceeds that turn pocket length under pre-project conditions, a project impact would occur if project traffic lengthens the queue by 25 feet or more.

## Study Intersections Included in Analysis

The proposed project will generate new vehicular trips that will increase traffic volumes on the nearby street network. To assess changes in traffic conditions associated with the project, the following intersections, illustrated in **Figure 1**, were selected for evaluation in this traffic study:

1. Heidorn Ranch Road/Lone Tree Way
2. Canada Valley Road/Lone Tree Way
3. Hillcrest Avenue/Prewett Ranch Drive
4. South Project Driveway/Prewett Ranch Drive (future)
5. Heidorn Ranch Road/Prewett Ranch Drive (future)
6. Heidorn Ranch Road/East Project Driveway (future)

# EXISTING (2014) CONDITIONS

## Existing Site Uses

The Heidorn Village residential development is proposed to be built on the vacant lot to the northwest of the intersection of Prewett Ranch Drive and Heidorn Ranch Road. The project will comprise only of single family residential homes.

## Existing Uses in Vicinity of Site

The proposed project site is surrounded by residential homes to the west and north, a church directly adjacent to the site to the north, Lone Tree Plaza commercial area to the northeast, and agricultural land to the east and south.

## Existing Roadway Network

Below is a description of the principal roadways included in this study.

### Canada Valley Road

Canada Valley Road is mostly a two-lane collector roadway with turn lanes serving residential areas north of Lone Tree Way. Canada Valley Road is a four lane roadway between Lone Tree Way and Country Hills Drive. South of Lone Tree Way the street serves the Lone Tree Plaza which includes the Home Depot store. The posted speed limit is 40 mph.

### Heidorn Ranch Road

Heidorn Ranch Road is a four-lane arterial with turn lanes between Lone Tree Way and Lone Tree Plaza Drive and a two-lane arterial south of Lone Tree Plaza Drive. The posted speed limit on Heidorn Ranch Road is 45 mph. The roadway serves residential and commercial uses and is planned to be extended to the south to connect with the future Sand Creek Road extension. North of Lone Tree Way, the street is named Fairside Way. Fairside Way is a two-lane roadway and serves residential areas.

### Hillcrest Avenue

Hillcrest Avenue is a four-lane divided roadway with a landscaped median and left turn bays. The roadway serves mostly residential uses and SR-4 to the north. The speed limit on Hillcrest Avenue is posted at 45 mph in the study area.

### Lone Tree Way

Lone Tree Way is an arterial roadway that that connects Antioch with the City of Brentwood. Through the project study area, Lone Tree Way is a six-lane divided roadway with a landscaped median, left turn bays, wide shoulders, and restricted parking. The speed limit on Lone Tree Way is posted at 45 mph in the study area. Lone Tree Way is designated as a Route of Regional Significance. Deer Valley High School is located on Lone Tree Way, east of Deer Valley Road. Traffic from the high school represents a significant portion of traffic during the AM peak period.

### Prewett Ranch Drive

Prewett Ranch Drive is a two-lane collector street with turn lanes at major intersections. The posted speed limit on Prewett Ranch Drive is 25 mph near Hillcrest Avenue. There are Class II bike lanes present east of Deer Valley Road.

## Existing Site Access

There are currently no driveways for access to the existing vacant lot as shown in **Figure 2**. Access to the residential development from the east will be constructed off of Heidorn Ranch Road. Prewett Ranch Drive will be extended along the proposed project frontage and access to the residential development will be constructed on Prewett Ranch Drive.

## Existing (2014) Lane Configurations and Traffic Control

Existing intersection lane configurations and traffic controls are illustrated in **Figure 3**. The two proposed project accesses will be side-street stop-controlled and will be full access intersections. It should be noted that the two proposed project driveways do not exist as current intersections and were therefore not analyzed in the existing without project condition.

## Existing (2014) Peak Hour Turning Movement Volumes

Weekday intersection turning movement volumes were collected at project study area intersections in January 2014. Volumes were collected during the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods of a typical weekday. These volumes were collected during a typical weekday when school was in session and not near any major holidays.

AM and PM peak one-hour volumes are shown in **Figure 4**. Traffic volume data sheets are shown in the **Appendix**.

## Existing Transit Facilities

Tri-Delta Transit provides bus service in Antioch. Routes 380, 383, 385, and 395 operate within the study area. Currently there are no bus routes that pass directly adjacent to the proposed project site due to the existing vacant land use at the proposed project site and surrounding areas. However, routes 380, 383, and 385 run along Lone Tree Way, north of the proposed project site. Tri-Delta Transit connects passengers to the Antioch Park and Ride (Hillcrest), Kaiser Medical Center, Pittsburg/Bay Point BART Station, Tri Delta Transit Station, various local schools, Brentwood Park and Ride, the Streets of Brentwood and convenient connections to many locations in the City and connections to other local and regional transit routes.

Route 380 operates between the Pittsburg/Bay Point BART Station to the Tri Delta Transit station. This route runs along Lone Tree Way, Canada Valley Road, Laurel Road, and Hillcrest Avenue within the study area. This route operates on weekdays from 3:04 AM to 11:33 PM on a frequency of 10-minute to 120-minute headways.

Route 383 operates between the Antioch Park and Ride (Hillcrest) to Freedom High School. This route runs along Deer Valley Road and Lone Tree Way within the study area. This route operates on weekdays from 7:12 AM to 5:23 PM on a frequency of 60-minute to 125-minute headways.

Route 385 operates between the Antioch Park and Ride (Hillcrest) to the Brentwood Park and Ride. This route runs along Hillcrest Avenue, Lone Tree Way, Sand Creek Road, and the SR-4 bypass within the study area. This route operates on weekdays from 6:39 AM to 7:17 PM on a frequency of 25-minute to 145-minute headways.

Route 395 operates between the Antioch Park and Ride (Hillcrest) to the Streets of Brentwood. This route runs along the SR-4 bypass and Sand Creek Road within the study area. This route operates on weekends from 9:40 AM to 8:03 PM on a frequency of 60-minute headways.

## Existing Bicycle and Pedestrian Facilities

There are multiple existing and proposed bikeway facilities in Antioch. Class I bicycle facilities are bike paths or trails, class II bicycle facilities are defined as bike lanes, and class III bicycle facilities are bike routes.

Class I bike paths located within the project study area include the Mokelumne Trail and the Canada Valley Trail. The Mokelumne Trail runs parallel to Lone Tree Way on the north side, starting west of the study area and terminates at Hillcrest Avenue. The Canada Valley Trail runs parallel to Country Hills Drive on the south side, starting at Hillcrest Avenue and terminates near SR-4. It is proposed that the Mokelumne Trail be extended from Hillcrest Avenue to Brentwood.

Class II bike lanes are located within the project study area on Canada Valley Road from Vista Grande Drive to Lone Tree Way, Hillcrest Avenue from E. 18th Street to Prewett Ranch Drive, Prewett Ranch Drive, and Heidorn Road from Lone Tree Way to south of Lone Tree Plaza Drive.

There are no Class III bike routes located within the project study area.

Sidewalks and crosswalks are mostly provided throughout the study area in Antioch to allow for pedestrians to access nearby transit stops, residential uses, and commercial uses. Sidewalks are absent near the southern portion of the City of Antioch where roadways are not built out yet or where they are adjacent to rural lands. Existing sidewalks along Heidorn Ranch Road terminate at the intersection of Heidorn Ranch Road and Lone Tree Plaza Drive and so there are no sidewalks adjacent to the proposed project site.

## Existing (2014) Levels of Service at Study Intersections

Traffic operations were evaluated at the study intersections under existing traffic conditions.

Results of the analysis are presented in **Table 2**, along with the minimum jurisdictional standard for acceptable levels of service (as previously described in Operating Conditions and Criteria). Additional detail of the analysis is provided in the **Appendix**.

As shown in **Table 2**, all of the study intersections function within acceptable standards under this analysis scenario.

### Table 2 – Existing (2014) Level of Service Summary

|  | Intersection | LOS Criteria | Control | Existing |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  |  |  | AM Peak |  | PM Peak |  |
|  |  |  |  | LOS | Delay | LOS | Delay |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 3.0 | A | 3.6 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | B | 13.6 | B | 14.4 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal (AWSC)* | A | 9.8 | A | 9.8 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersections |  |  |  |
|  | Worst Approach |  |  |  |  |  |  |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal |  |  |  |  |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC |  |  |  |  |
|  | Worst Approach |  |  |  |  |  |  |

Note: Intersections that are operating below acceptable levels are shown in **BOLD**.

*Prewett Ranch Drive and Hillcrest Avenue is a signalized intersection, however it operates as an All Way Stop Control (AWSC) with flashing red lights.

# HEIDORN VILLAGE RESIDENTIAL DEVELOPMENT PROJECT

## Proposed Site Uses

As noted previously, the proposed Heidorn Village residential development will be constructed on the vacant lot to the northwest of the intersection of Prewett Ranch Drive and Heidorn Ranch Road. The proposed development will consist of 117 single family residential homes.

## Project Trip Generation

Trip generation for residential development projects is typically calculated based on rates contained in the Institute of Transportation Engineer's publication, *Trip Generation 9th Edition*[1]. *Trip Generation* is a standard reference used by jurisdictions throughout the country for the estimation of trip generation potential of proposed developments.

A trip is defined in *Trip Generation* as a single or one-directional vehicle movement with either the origin or destination at the project site. In other words, a trip can be either "to" or "from" the site. In addition, a single customer visit to a site is counted as two trips (i.e., one to and one from the site).

For purposes of determining the worst-case impacts of traffic on the surrounding street network, the trips generated by a proposed development are typically estimated between the hours of 7:00-9:00 AM and 4:00-6:00 PM. This methodology is in harmony with the City's standard for the preparation of traffic impact studies.

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[1] *Trip Generation, 9th Edition*, Institute of Transportation Engineers, 2012.

The proposed single family residential development is most appropriately classified as Single-Family Detached Housing (ITE Land Use 210).

## Internal Capture

Internal capture reductions were considered, but since the project site will only consist of residential homes, no internal capture reductions were taken.

## Project Trip Pass-By

The Heidorn Village residential development is unlikely to create any pass-by trips. Pass-by trips are typically calculated based on data published in ITE's *Trip Generation Handbook, 2nd Edition*[2] which includes weekday AM and PM information. This reference assumes no pass-by trips for this specific land use.

Trip generation was calculated based on the previous discussions and is reported in **Table 3**. Additional trip generation calculations are contained in the **Appendix**.

As noted in **Table 3**, the project will generate approximately 88 new peak AM trips and approximately 117 new peak PM trips.

**Table 3 – Heidorn Village Residential Trip Generation**

| TIME PERIOD | LAND USE | Trip Rate | | | Trips | | |
|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total |
| Daily | Single-Family Detached Housing (117 DU) | 4.76 | 4.76 | 9.52 | 557 | 557 | 1114 |
| AM Peak | Single-Family Detached Housing (117 DU) | 0.1875 | 0.5625 | 0.75 | 22 | 66 | 88 |
| PM Peak | Single-Family Detached Housing (117 DU) | 0.63 | 0.37 | 1.00 | 74 | 43 | 117 |

## Project Trip Distribution and Assignment

The Heidorn Village residential development project trip distribution is based on the updated CCTA travel demand model as well as existing traffic patterns and field observations. **Figure 5** shows the traffic distribution assumed in this traffic report for the

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[2] *Trip Generation Handbook, 2nd Edition*, Institute of Transportation Engineers, June 2004.

Existing and Near-term plus Project scenarios. Based on the assumed trip distribution, new vehicle trips generated by the Heidorn Village residential development were assigned to the street network as shown in **Figure 6**.

Due to the future roadways being completed only in the Long-term scenario, the trip distribution is different in the Near-term than the Long-term. When compared to the Near-term, the Long-term trip distribution is higher in the southern portions of the City along Sand Creek Road, Hillcrest Avenue, and the SR-4 bypass. **Figure 7** shows the traffic distribution assumed in this traffic report for the Long-term plus Project scenario. Based on the assumed trip distribution, new vehicle trips generated by the Heidorn Village development were assigned to the street network as shown in **Figure 8**.

## Project Roadway Improvements

As part of the proposed project, Prewett Ranch Drive will be extended east to Heidorn Ranch Road. The project also proposes to add sidewalk along the frontage of the project. Bicycle lanes will be added along Prewett Ranch Drive in areas without front-on housing. The project also proposes to add a full access intersection on the Prewett Ranch Drive extension, which is planned to be unsignalized. An access intersection on Heidorn Ranch Road is also planned, which will also be unsignalized, but will be right-in and right-out only. Per City standards, a continuous median will run along Heidorn Ranch Road adjacent to the project access, restricting left turns in and left turns out. It is important to note that the project driveway intersections are only analyzed under the plus Proposed Project conditions, as they do not exist without the construction of the project.

The proposed Heidorn Village project will be responsible for building the frontage improvements along Heidorn Ranch Road, per City policy. In addition, per City policy, the proposed project will widen Heidorn Ranch Road to two southbound lanes and one northbound lane adjacent to the proposed project, as well as construct a divided median. Heidorn Ranch Road should be designed in a manner consistent with the build out to a four lane arterial.

# EXISTING (2014) PLUS PROJECT TRAFFIC CONDITIONS

Project traffic was added to the existing volumes at the study intersections and the volumes are shown in **Figure 9**. Traffic operations were evaluated under the Existing (2014) Plus Project Traffic Conditions. Results of the analysis are presented in **Table 4**. Additional detail is provided in the **Appendix**.

As shown in **Table 4**, all the study intersections function within acceptable standards under this analysis scenario.

# Table 4 – Existing (2014) Plus Project Level of Service Summary

|  | Intersection | LOS Criteria | Control | Existing |  |  |  | Existing + Project |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | AM Peak |  | PM Peak |  | AM Peak |  |  | PM Peak |  |  |
|  |  |  |  | LOS | Delay | LOS | Delay | LOS | Delay | Var | LOS | Delay | Var |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 3.0 | A | 3.6 | A | 4.6 | 1.6 | A | 4.8 | 1.2 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | B | 13.6 | B | 14.4 | B | 13.4 | -0.2 | B | 14.3 | -0.1 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal (AWSC)* | A | 9.8 | A | 9.8 | A | 9.8 | 0.0 | A | 9.7 | -0.1 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersections |  |  |  | A | 6.7 | - | A | 4.6 | - |
|  | Worst Approach |  |  |  |  |  |  | A | 8.6 | - | A | 8.7 | - |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal |  |  |  |  | B | 15.9 | - | B | 11.0 | - |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC |  |  |  |  | A | 2.4 | - | A | 1.4 | - |
|  | Worst Approach |  |  |  |  |  |  | A | 8.5 | - | A | 8.6 | - |

Note: Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

*Prewett Ranch Drive and Hillcrest Avenue is a signalized intersection, however it operates as an All Way Stop Control (AWSC) with flashing red lights.

# NEARBY ROADWAY AND DEVELOPMENT PROJECTS

## Planned Roadway Projects in Vicinity of Site

There are roadway improvements planned in the study area for the Near-term as identified by the City. The following summarizes the future intersection improvements and roadway improvements that will affect the study area:

- Intersection #2 – The intersection of Lone Tree Way and Canada Valley Road will be restriped on the eastbound and southbound approaches. The eastbound approach will be restriped to have dual left turn lanes. The southbound approach will be restriped to be dual left turn lanes and a through-right lane.
- Intersection #3 – The intersection of Hillcrest Avenue and Prewett Ranch Drive currently has new traffic signal equipment constructed, but is set on flashing all red. It is anticipated that the traffic signal will be fully operational by Near-term.
- The extension of Prewett Ranch Drive will be completed as part of the proposed project and therefore will not be assumed in the Near-term without project scenario.

**Figure 10** illustrates the intersection geometry and traffic control assumed in the Near-term analysis.

There is no documentation of any signal timing program in which signalized intersections are optimized every few years. The City noted that the signals are updated on an as needed basis. Therefore it was assumed that the existing signal timing was still being used for the Near-term scenario, unless there were improvements made to the intersection.

## Approved & Pending Development Projects in Vicinity of Site

Kimley-Horn coordinated with the City of Antioch, City of Brentwood, and City of Oakley to determine if there were any development projects in the vicinity of the project site that are in various stages of planning, approval, or development. This includes all approved and pending land use changes and any development that are consistent with the City's General Plan. These projects were identified and included in the Near-term conditions with and without the project. Additional projects submitted to the City after commencement of this traffic study have been included in the Long-term conditions. Available trip generation and trip distribution were used to assign vehicle trips to the study area. **Figure 11** shows the pending and approved projects considered in this study for the Near-term scenario. The pending and approved project trips were assigned to the study area and are shown in **Figure 12**.

# NEAR-TERM TRAFFIC CONDITIONS

Near-term conditions are a forecast of the anticipated traffic after the project has been built out. The Near-term conditions include all approved and pending land use changes and any development that is consistent with the General Plan and expected to occur within the time frame of the project. It also includes transportation projects programmed for implementation at the time that the project is completed and any approved mitigation measures required for approved or planned projects. Additional projects submitted to the City after commencement of this traffic study have been included in the Long-term conditions.

Traffic operations were evaluated under the following development conditions:

- Near-term Conditions
- Near-term plus Project Conditions

Near-term volumes were calculated by using the list of pending and approved development projects and determining trip generation, trip distribution, and trip assignment for each project. Vehicle trips were then assigned to the project study area. **Figure 13** illustrates the Near-term volumes.

## Near-Term Intersection Level of Service

Near-term volumes were evaluated at the study intersections. Results are presented in **Table 5**. Analysis sheets are provided in the **Appendix**. As shown in **Table 5**, all study intersections function within acceptable standards.

**Table 5 – Near-Term Intersection Level of Service Summary**

| | Intersection | LOS Criteria | Control | Near-Term | | | |
|---|---|---|---|---|---|---|---|
| | | | | AM Peak | | PM Peak | |
| | | | | LOS | Delay | LOS | Delay |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 2.5 | A | 3.4 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | A | 9.4 | B | 12.7 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal | B | 15.2 | B | 16.9 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersections | | | |
| | Worst Approach | | | | | | |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal | | | | |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC | | | | |
| | Worst Approach | | | | | | |

Note: Intersections that are operating below acceptable levels are shown in **BOLD**.

## Near-Term Plus Project Intersection Level of Service

Near-term plus project traffic conditions were evaluated at the study intersections and are shown in **Figure 14**.  As noted earlier, locations operating unacceptably that have an increase in delay are considered to be subject to a significant impact.

As shown in **Table 6**, all study intersections function within acceptable standards. Analysis sheets are provided in the **Appendix**.

## Table 6 – Near-Term Plus Project Intersection Level of Service Summary

|  | Intersection | LOS Criteria | Control | Near-Term |  |  |  | Near-Term + Project |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  | AM Peak |  | PM Peak |  | AM Peak |  |  | PM Peak |  |  |
|  |  |  |  | LOS | Delay | LOS | Delay | LOS | Delay | Var | LOS | Delay | Var |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 2.5 | A | 3.4 | A | 3.8 | 1.3 | A | 4.3 | 0.9 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | A | 9.4 | B | 12.7 | A | 9.5 | 0.1 | B | 12.7 | 0.0 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal | B | 15.2 | B | 16.9 | B | 15.3 | 0.1 | B | 16.9 | 0.0 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersections |  |  |  | A | 6.7 | - | A | 4.6 | - |
|  | Worst Approach |  |  |  |  |  |  | A | 8.6 | - | A | 8.7 | - |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal |  |  |  |  | B | 15.9 | - | B | 11.0 | - |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC |  |  |  |  | A | 2.4 | - | A | 1.4 | - |
|  | Worst Approach |  |  |  |  |  |  | A | 8.5 | - | A | 8.6 | - |

Note: Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

# LONG-TERM (2030) CONDITIONS

## Long-Term Lane Configurations and Traffic Control

There are roadway improvements planned in the study area for the Long-term (2030) as identified by the City. In the Long-term (2030) scenario, Sand Creek Road is planned to be extended from the Dozier Libbey Medical High School to the SR-4 bypass. It is assumed that there will be other developments that occur to warrant the construction of the Sand Creek Road extension. Hillcrest Avenue will be extended to Balfour Road.

Heidorn Ranch Road is currently a two-lane, undivided roadway south of Lone Tree Plaza Drive. The City of Brentwood recently updated its General Plan, which includes a number of special planning areas. The allowed land uses in these special planning areas will most likely alter the projected volumes in the CCTA model resulting in a need for the widening of Heidorn Ranch Road. The Brentwood General Plan calls for Heidorn Ranch Road to be a 4 to 6 lane arterial; the Antioch general Plan also shows Heidorn Ranch Road as an arterial, but does not specify the number of lanes. The proposed Heidorn Village project will be responsible for building the frontage improvements along Heidorn Ranch Road, per City policy. In addition, per City policy, the proposed project will widen Heidorn Ranch Road to two southbound lanes and one northbound lane adjacent to the proposed project, as well as construct a divided median. Heidorn Ranch Road should be designed in a manner consistent with the build out to a 4 lane arterial.

**Figure 15** illustrates the intersection geometry and traffic control assumed in the Long-term (2030) analysis.

There is no documentation of any signal timing program in which signalized intersections are optimized every few years. The City noted that the signals are updated on an as needed basis. Therefore it was assumed that the existing signal timing was still being used for the Long-term scenario.

## Year 2030 Forecast Model Volumes

Year 2030 roadway link volumes from the CCTA Travel Demand Forecast model were obtained from the County. The model was used to plot bi-directional AM and PM peak-hour traffic volumes on each segment along roadways within the study area. Model outputs were used to compare 2010 base year volumes and year 2040 future model forecasts to determine the annual incremental growth in traffic volumes at study intersections. Year 2030 turning movement volumes were calculated by adding the growth increment to the current year (2014) traffic count to calculate the final adjusted roadway link forecast volume. Final adjusted forecast volumes were then converted to Long-term (2030) intersection turning movement volumes using a traffic modeling standard process commonly referred to as the Furness method. The Furness method uses an iterative process to derive future turning movement volumes based on future year roadway link volumes and an initial estimate of turning percentages (obtained from the 2014 intersection turning movement counts).

# LONG-TERM TRAFFIC CONDITIONS

Traffic operations were evaluated under the following long-term conditions:

- Long-term (2030) Conditions
- Long-term (2030) plus Project Conditions

## Long-Term Intersection Level of Service

Long-term (2030) traffic volumes were evaluated at study intersections and are presented in **Figure 16**. As shown in **Table 7**, all study intersections function within acceptable standards. Analysis sheets are provided in the **Appendix**.

**Table 7 – Long-Term (2030) Intersection Level of Service Summary**

|  | Intersection | LOS Criteria | Control | Long-Term (2030) |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  |  |  | AM Peak |  | PM Peak |  |
|  |  |  |  | LOS | Delay | LOS | Delay |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 2.3 | A | 3.7 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | A | 9.6 | B | 12.6 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal | B | 17.5 | B | 17.1 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersection |  |  |  |
|  | Worst Approach |  |  |  |  |  |  |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal | A | 6.8 | A | 9.4 |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC | Future Intersection |  |  |  |
|  | Worst Approach |  |  |  |  |  |  |

Note: Intersections that are operating below acceptable levels are shown in **BOLD**.

## Long-Term (2030) Plus Project Intersection Level of Service

Long-term (2030) plus project traffic conditions were evaluated at the study intersections and are shown in **Figure 17**. As shown in **Table 8**, all study intersections function within acceptable standards. Analysis sheets are provided in the **Appendix**.

## Table 8 – Long-Term (2030) Plus Project Intersection Level of Service Summary

| | Intersection | LOS Criteria | Control | Long-Term (2030) | | | | Long-Term (2030) + Project | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AM Peak | | PM Peak | | AM Peak | | | PM Peak | | |
| | | | | LOS | Delay | LOS | Delay | LOS | Delay | Var | LOS | Delay | Var |
| 1 | Lone Tree Way and Heidorn Ranch Road | D | Signal | A | 2.3 | A | 3.7 | A | 3.1 | 0.8 | A | 4.3 | 0.6 |
| 2 | Lone Tree Way and Canada Valley Road | D | Signal | A | 9.6 | B | 12.6 | A | 9.5 | -0.1 | B | 12.6 | 0.0 |
| 3 | Prewett Ranch Drive and Hillcrest Avenue | D | Signal | B | 17.5 | B | 17.1 | B | 19.0 | 1.5 | B | 17.2 | 0.1 |
| 4 | Prewett Ranch Drive and South Project Driveway | D | SSSC | Future Intersection | | | | A | 1.0 | - | A | 1.2 | - |
| | Worst Approach | | | | | | | B | 11.9 | - | B | 10.3 | - |
| 5 | Prewett Ranch Drive and Heidorn Ranch Road | D | Signal | B | 11.6 | A | 9.6 | B | 11.2 | -0.4 | A | 9.6 | 0.0 |
| 6 | East Project Driveway and Heidorn Ranch Road | D | SSSC | Future Intersection | | | | A | 1.2 | - | A | 1.1 | - |
| | Worst Approach | | | | | | | A | 8.6 | - | A | 9.5 | - |

Note: Intersections that are operating below acceptable levels are shown in **BOLD** and significant impacts are highlighted.

# VEHICLE QUEUING FOR ALL SCENARIOS

As congestion increases it is common for traffic at signals and stop signs to form lines of stopped (or queued) vehicles. Queue lengths were determined for each lane and measure the distance that vehicles will back up in each direction approaching an intersection. Synchro software calculates the queues based on HCM 2000 methodology. The 95th percentile queue is calculated by using 95th percentile traffic to account for fluctuations in traffic and represents a condition where 95 percent of the time during the peak period, traffic volumes and related queuing will be at, or less, than determined by the analysis and is used as the benchmark for impacts as a standard transportation engineering practice. Average queuing is generally less. Ninety-fifth percentile queuing was estimated under the various development conditions and in consideration of the planned intersection and signal timing improvements.[3] A typical vehicle length of 25 feet is used in the queuing analysis. As stated in the Operating Conditions and Criteria, a significant impact was assumed to occur if the queue increases by one or more vehicles and the vehicle queue exceeds the turn pocket length. A summary of the queuing results is included in the **Appendix**. The results indicated instances where queuing in the dedicated turn lanes may exceed the storage limits of the turn pockets.

The analysis showed that several existing turn bays lengths are exceeded under future traffic volumes. In all cases the inadequate queue lengths are not associated with the project, but are a result of pre-existing deficiencies. For example, the southbound left turn queue at the intersection of Canada Valley Road and Lone Tree Way is 359 feet during the AM peak during Existing conditions and the queue length is also 359 feet during the AM peak in the Existing Plus Project conditions. Although the turn pocket length is 160 feet long and the queue spills out of the turn pocket, the result is a pre-existing deficiency not associated with the project and is therefore not an impact since the project did not increase the queue by at least one vehicle length. At locations affected by project traffic, the increase in vehicle queuing is less than one vehicle.

# POTENTIAL EFFECTS ON TRANSIT, BICYCLE, AND PEDESTRIAN MOBILITY

The project was evaluated to determine if it would likely conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks) or generate pedestrian, bicycle, or transit travel demand that would not be accommodated by transit, bicycle, or pedestrian facilities and plans.

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[3] Existing queuing was calibrated in the Synchro model based on existing signal timing parameters and field observations.

Residents to the Heidorn Village residential development have the option of driving, taking transit, walking or bicycling. For those taking transit, they can reach the site via future bus routes of the Tri-Delta Transit system.

According to the 2008-2012 U.S. Census[4], five percent of Antioch residents use transit to travel to work. This typically represents the highest level of transit ridership during the day. If it is conservatively assumed that five percent of the residents associated with the Heidorn Village residential development will use transit during the peak hours of the day, it represents approximately 5 passengers in the weekday AM and 6 passengers in the weekday PM peak periods.

Data was not readily available for peak hour ridership levels on the Tri-Delta Transit system but during the weekday periods, the routes operate as often as every 10 minutes and observations indicate that sufficient capacity exists on the buses to accommodate the potential additional transit demand. Furthermore, dispersion of the project-generated riders to the bus routes would result in a minimal effect on transit capacity. Thus the project impact on transit service is determined to be less than significant.

There will be adequate pedestrian walkways from the project site to the existing sidewalks on Prewett Ranch Drive. The project proposes to extend Prewett Ranch Drive to Heidorn Ranch Road, adjacent to the proposed project, and construct sidewalk along the north side. Although, the project proposes to construct sidewalk along Heidorn Ranch Road fronting the eastern edge of the project, there is still no sidewalk along Heidorn Ranch Road south of Lone Tree Plaza Drive.

Cyclists will be able to access the residential development using the bike lane along Prewett Ranch Drive and along Heidorn Ranch Road. The extensive bicycle network allows residents and visitors living within biking distance to travel to and from the project.

There are adequate transit facilities adjacent to the project site with continuous sidewalks and ramps to the transit stop locations. Therefore, the Heidorn Village residential development's impact on transit, pedestrian, or bicycle facilities is determined to be less than significant.

# SITE ACCESS AND CIRCULATION

On-site circulation was evaluated at the project's two driveways and within the project site. **Figure 2** shows the project site plan.

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[4] *American Factfinder*, U.S. Census Bureau, 2013.

The two access points to the project are along the Heidorn Ranch Road extension and the Prewett Ranch Drive extension. Each of these intersections will be unsignalized intersections, with the Prewett Ranch Drive entrance being full access, and the Heidorn Ranch Road entrance being restricted to right-in/right-out.

The site plan does not indicate proposed project throat depths for each of the site driveways. However, the queuing analysis at the project driveways indicated that the 95th percentile queues would be no greater one vehicle.

# SUMMARY OF IMPACTS AND RECOMMENDED MITIGATION

Based on the results of the traffic analysis and evaluation of the proposed site plan there are no significant impacts that need to be mitigated.

Kimley»Horn

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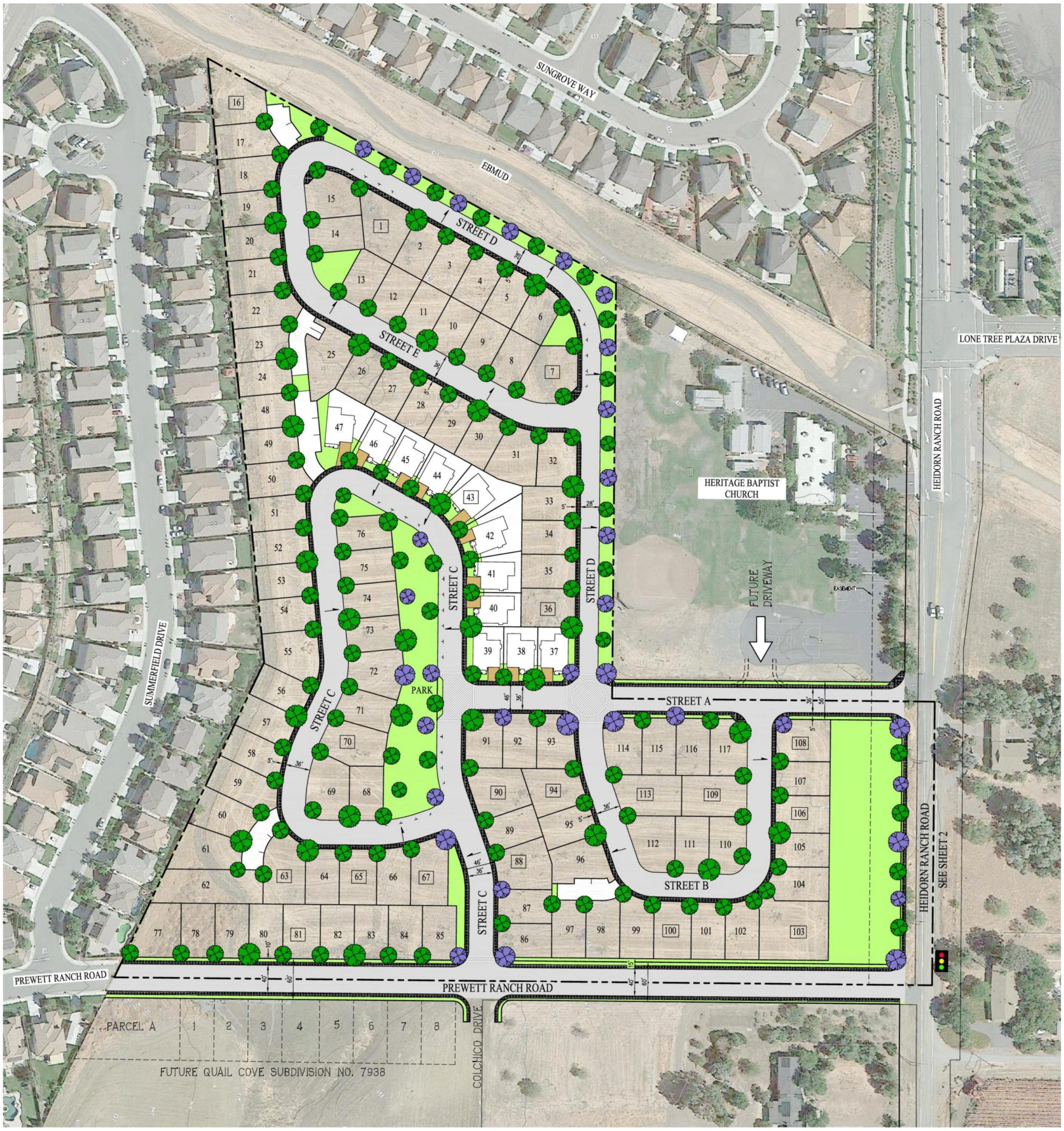
NOT TO SCALE

# FIGURE 1

## PROJECT LOCATION AND STUDY INTERSECTIONS

097037026 MAY 2015

ANTIOCH HEIDORN VILLAGE TIA



Source: Carlson, Barbee & Gibson, Inc.

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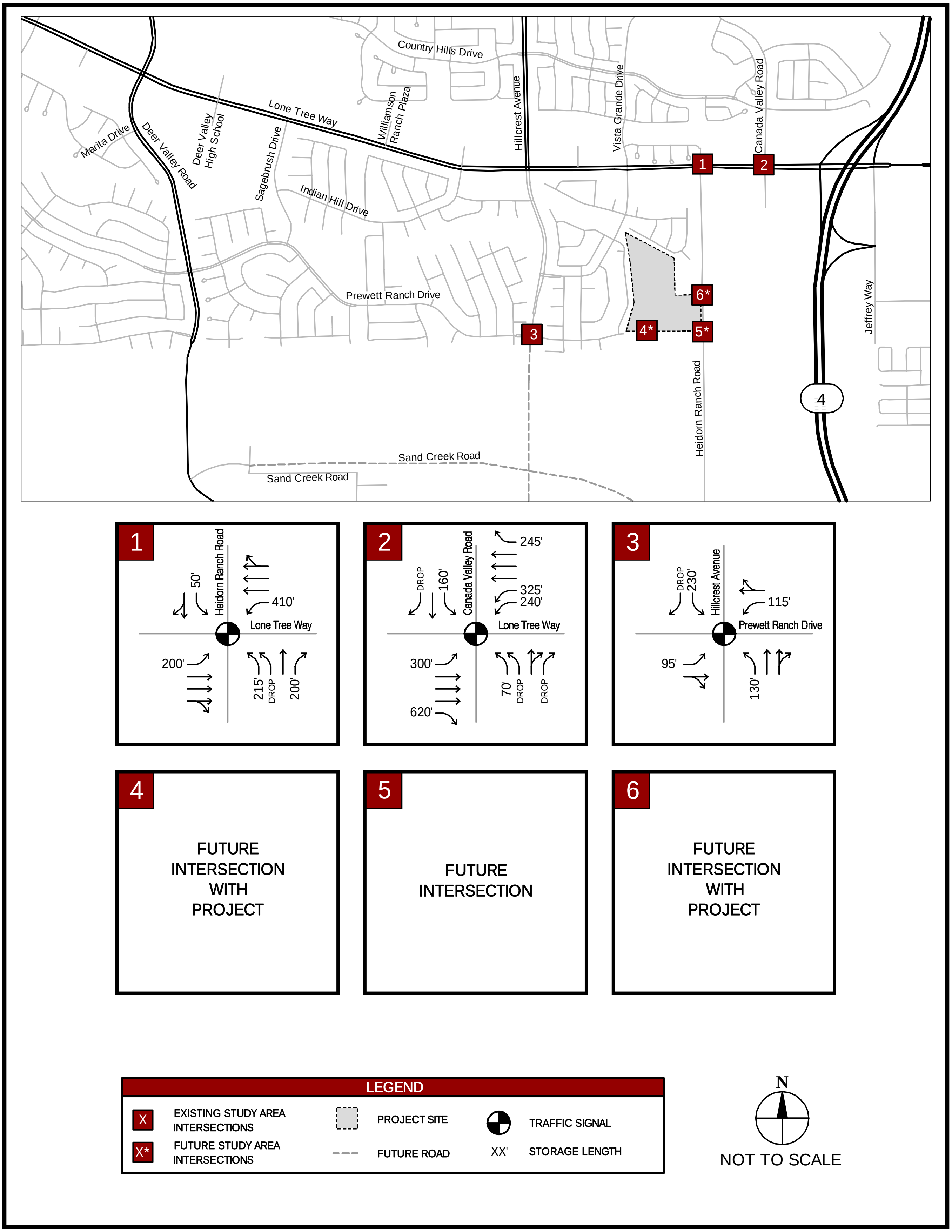
## FIGURE 2
## SITE PLAN

097037026 MAY 2015 ANTIOCH HEIDORN VILLAGE TIA



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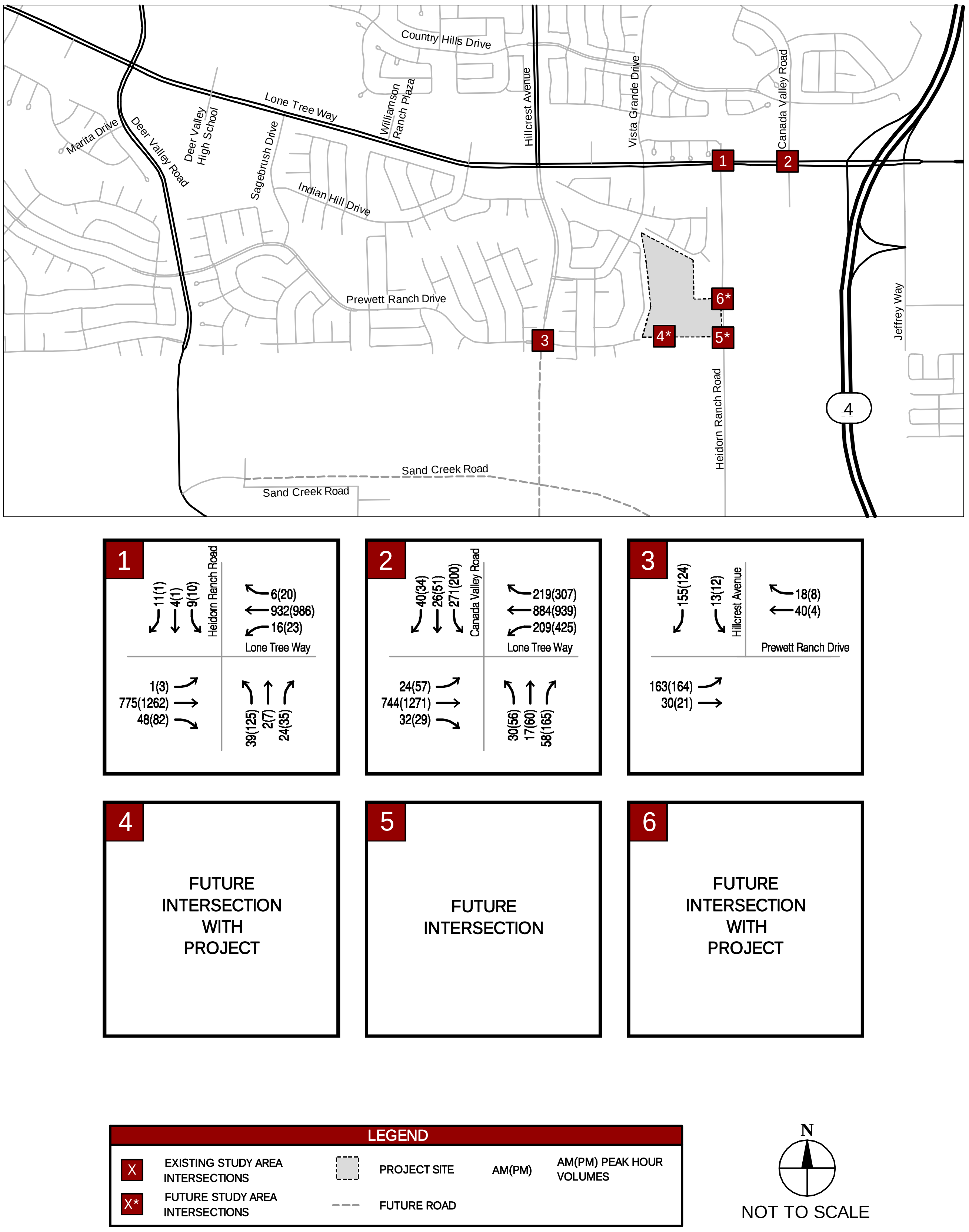
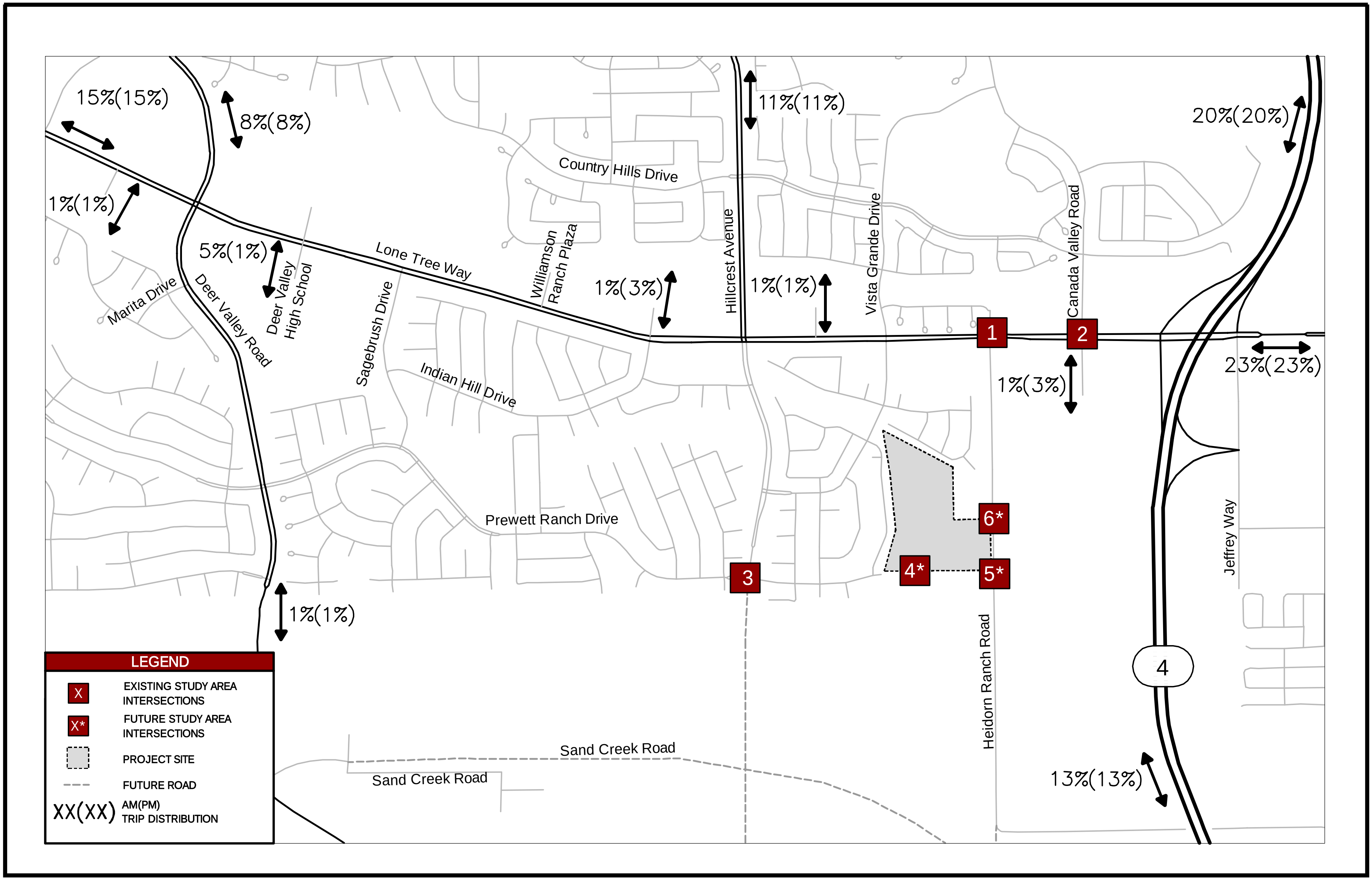
# FIGURE 3

## EXISTING (2014) CONDITION
## LANE GEOMETRY AND TRAFFIC CONTROL



## FIGURE 4

## EXISTING (2014) CONDITION PEAK HOUR TURNING MOVEMENT VOLUMES



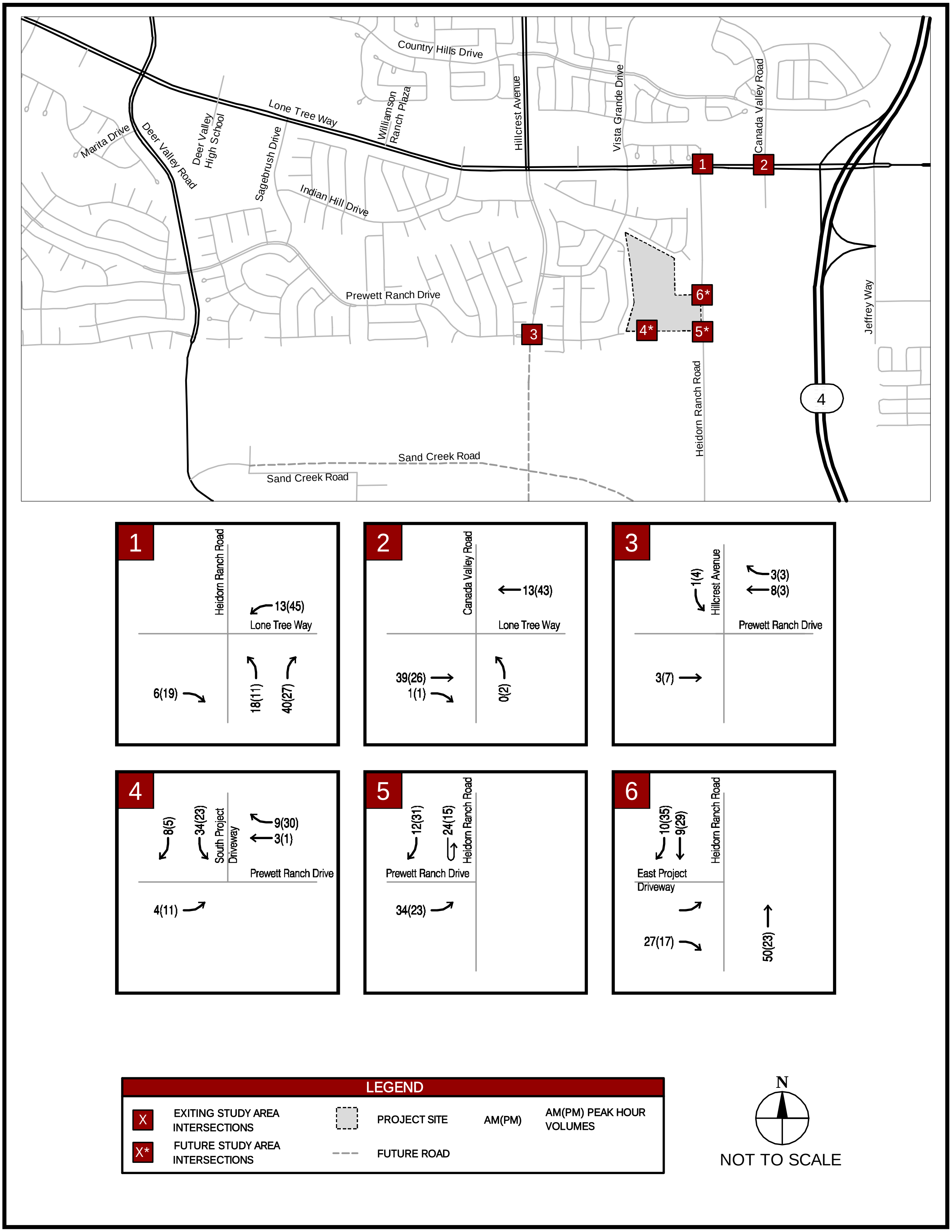
NOT TO SCALE

**FIGURE 5**

**NEAR-TERM TRIP DISTRIBUTION**

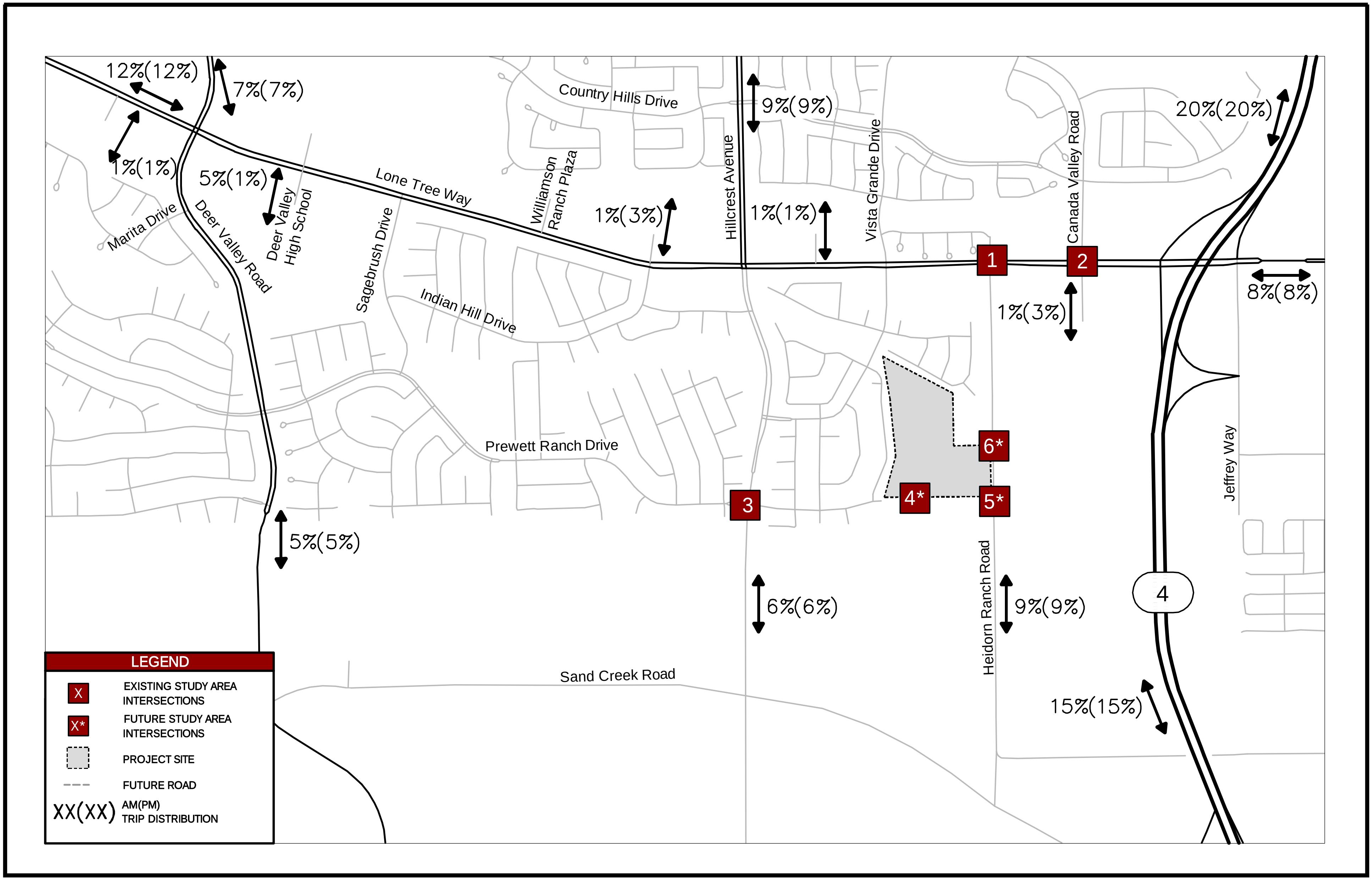
097037026 MAY 2015

ANTIOCH HEIDORN VILLAGE TIA



## FIGURE 6

## PROJECT GENERATED PEAK HOUR TURNING MOVEMENT VOLUMES IN NEAR-TERM



Kimley»Horn

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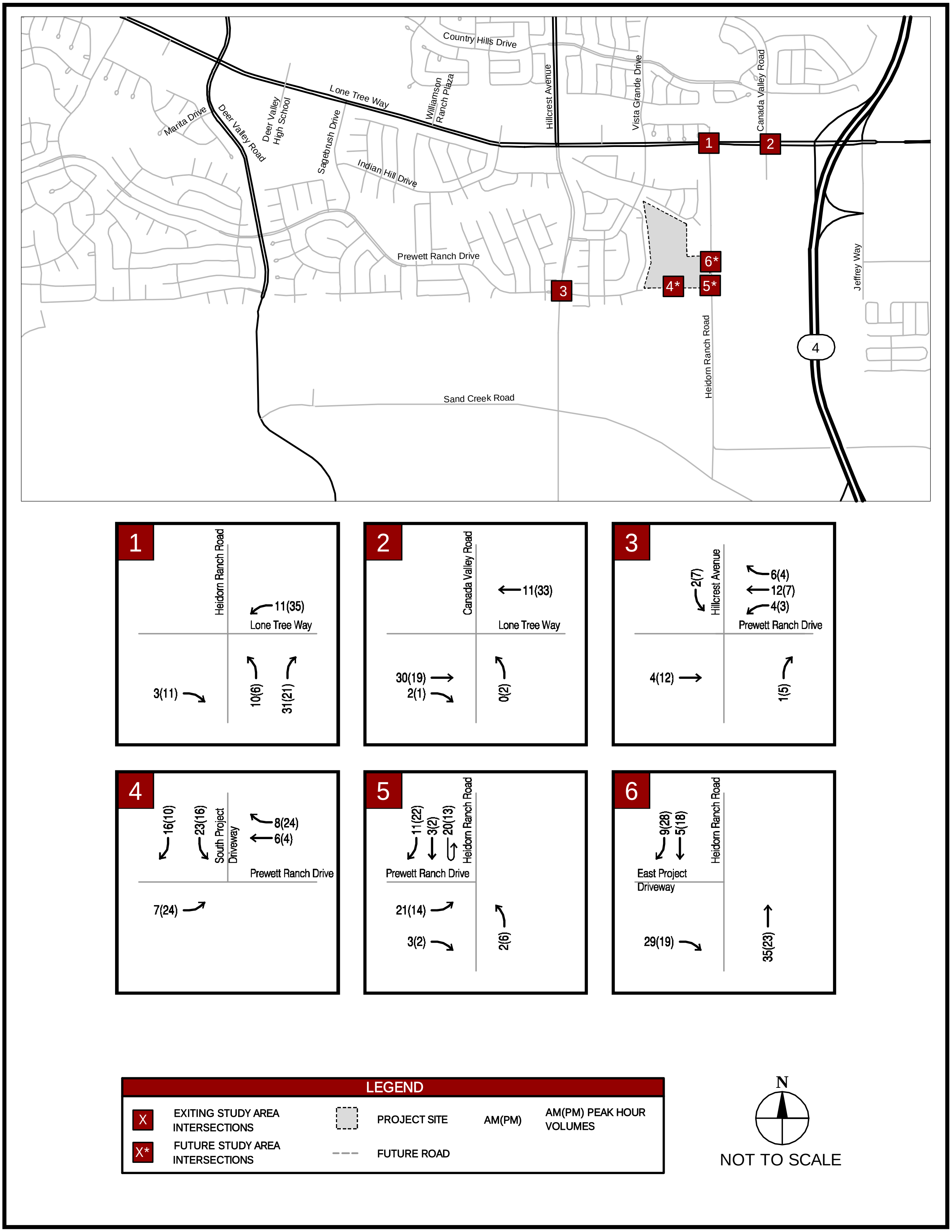
NOT TO SCALE

## FIGURE 7

## LONG-TERM TRIP DISTRIBUTION

097037026 MAY 2015 ANTIOCH HEIDORN VILLAGE TIA



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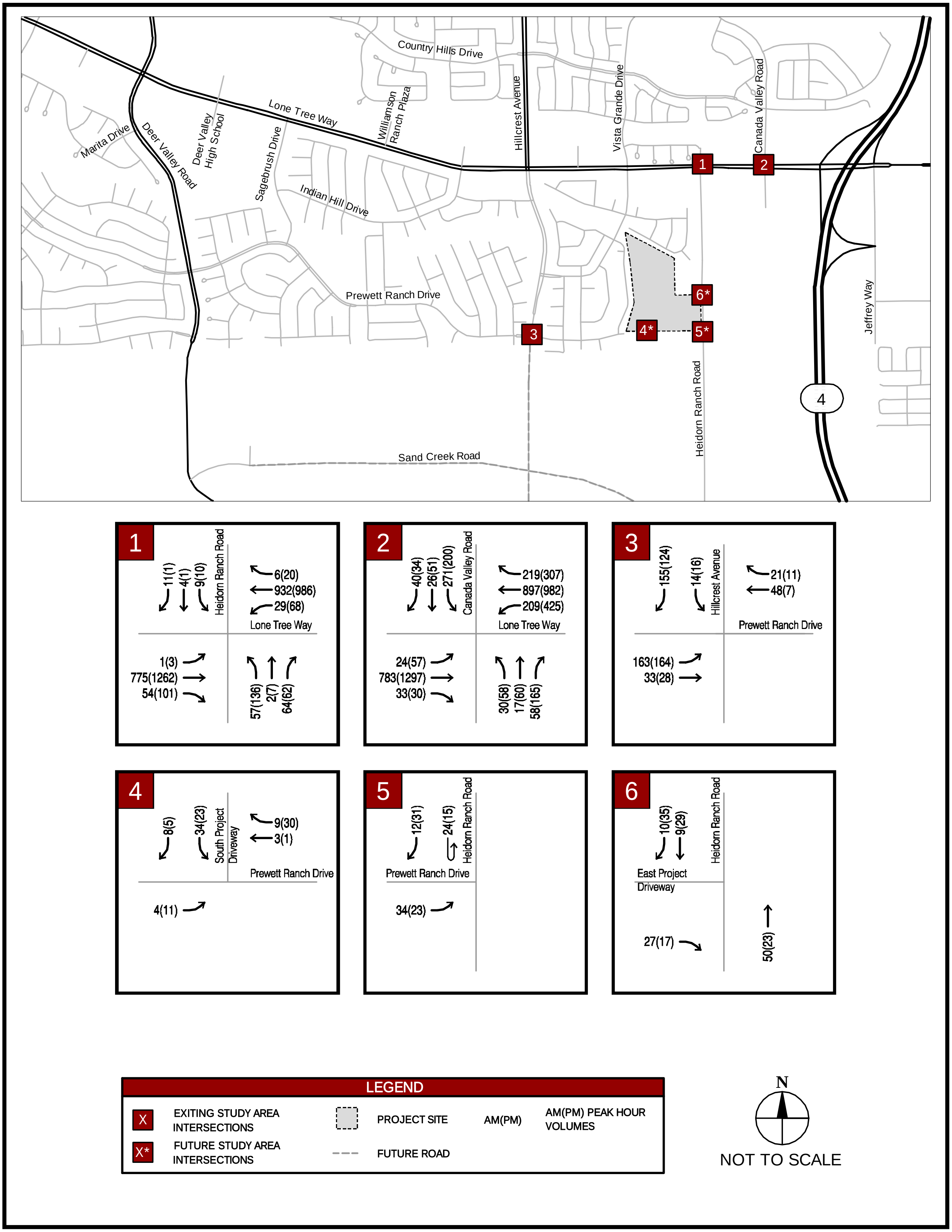
## FIGURE 8

## PROJECT GENERATED PEAK HOUR TURNING MOVEMENT VOLUMES IN LONG-TERM



# FIGURE 9

# EXISTING (2014) PLUS PROJECT CONDITION
# PEAK HOUR TURNING MOVEMENT VOLUMES

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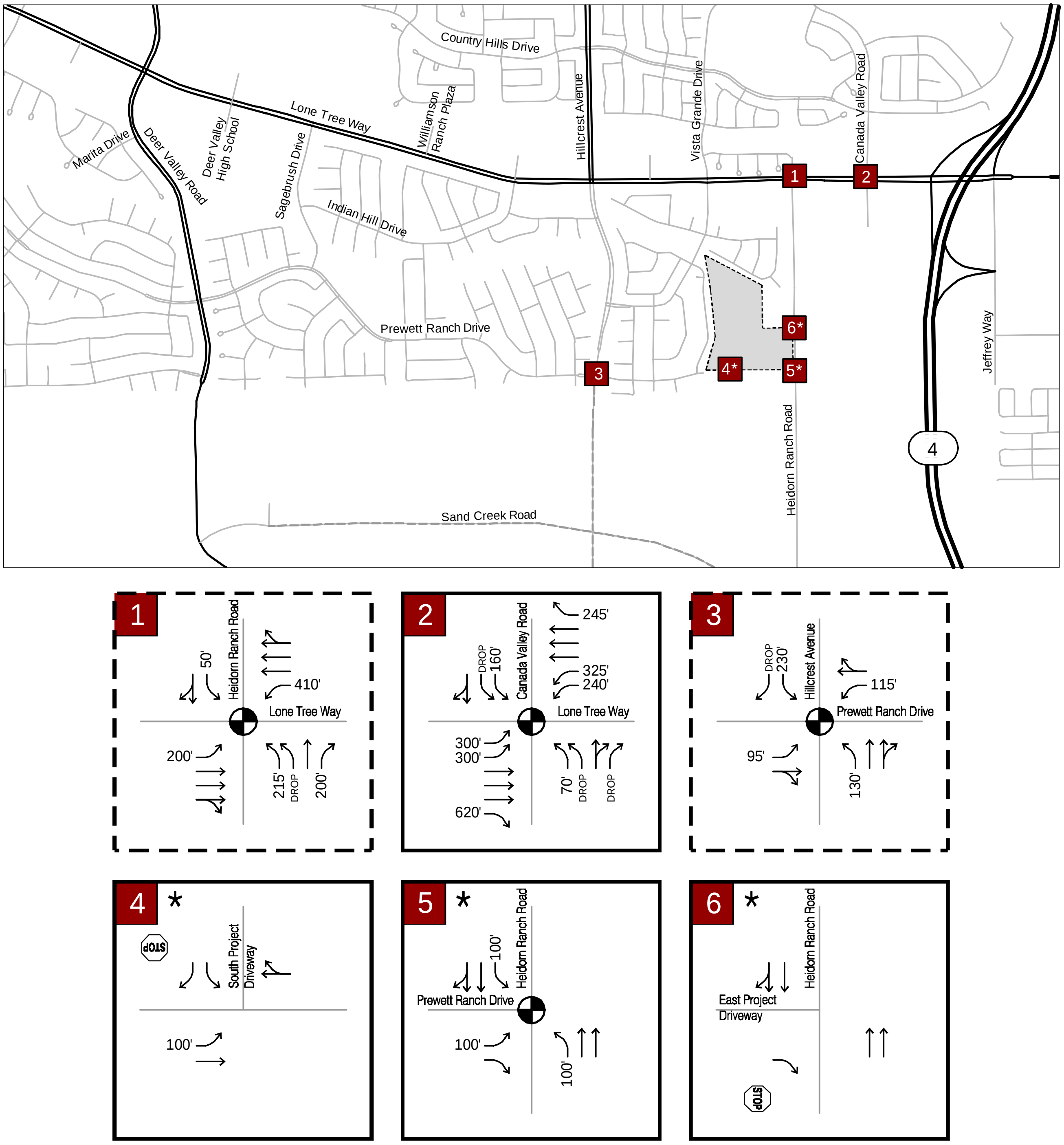


* WITH THE ADDITION OF THE PROJECT

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| X | EXITING STUDY AREA INTERSECTIONS | ▨ | PROJECT SITE | ◐ | TRAFFIC SIGNAL |
| X* | FUTURE STUDY AREA INTERSECTIONS | - - - | FUTURE ROAD | STOP | STOP SIGN |
| | | | | XX' | STORAGE LENGTH |

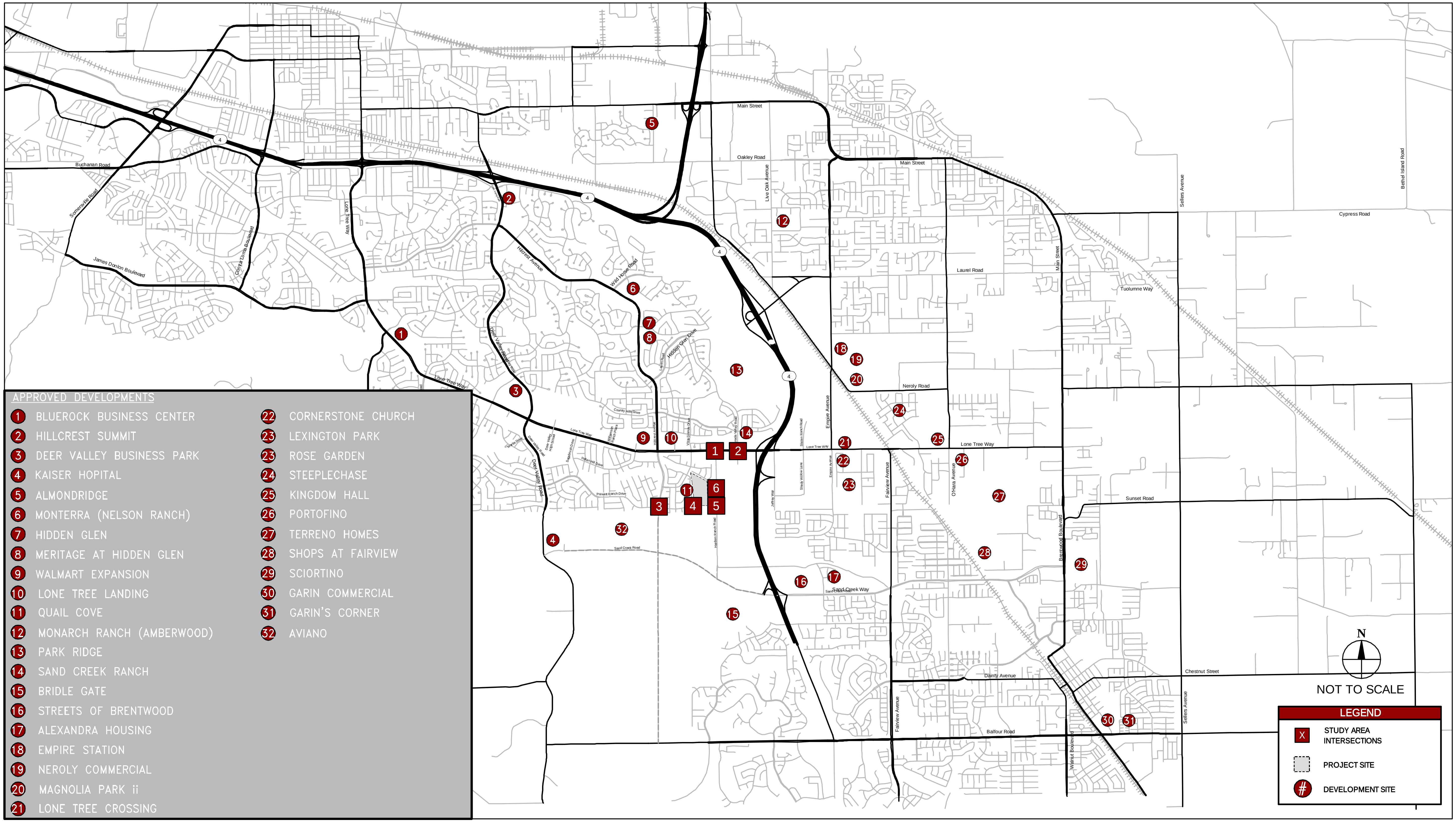
N

NOT TO SCALE

NOTE: DASHED BOXES REFLECT UNCHANGED CONDITIONS FROM EXISTING CONDITIONS.

# FIGURE 10

# NEAR-TERM CONDITION LANE GEOMETRY AND TRAFFIC CONTROL



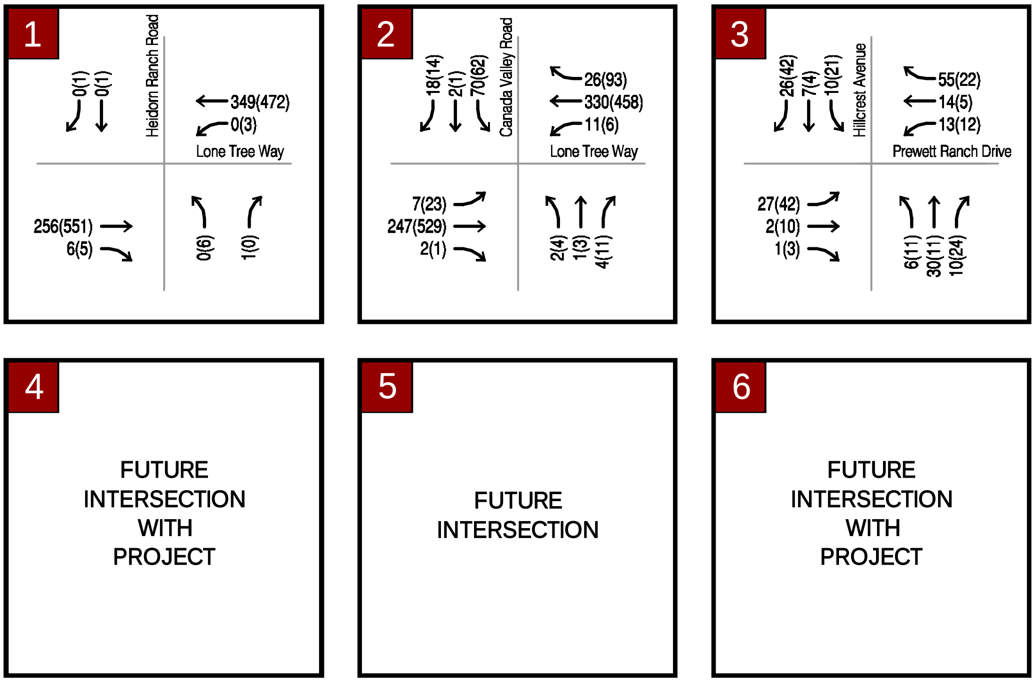
APPROVED DEVELOPMENTS

| | |
|---|---|
| 1 | BLUEROCK BUSINESS CENTER |
| 2 | HILLCREST SUMMIT |
| 3 | DEER VALLEY BUSINESS PARK |
| 4 | KAISER HOPITAL |
| 5 | ALMONDRIDGE |
| 6 | MONTERRA (NELSON RANCH) |
| 7 | HIDDEN GLEN |
| 8 | MERITAGE AT HIDDEN GLEN |
| 9 | WALMART EXPANSION |
| 10 | LONE TREE LANDING |
| 11 | QUAIL COVE |
| 12 | MONARCH RANCH (AMBERWOOD) |
| 13 | PARK RIDGE |
| 14 | SAND CREEK RANCH |
| 15 | BRIDLE GATE |
| 16 | STREETS OF BRENTWOOD |
| 17 | ALEXANDRA HOUSING |
| 18 | EMPIRE STATION |
| 19 | NEROLY COMMERCIAL |
| 20 | MAGNOLIA PARK ii |
| 21 | LONE TREE CROSSING |
| 22 | CORNERSTONE CHURCH |
| 23 | LEXINGTON PARK |
| 23 | ROSE GARDEN |
| 24 | STEEPLECHASE |
| 25 | KINGDOM HALL |
| 26 | PORTOFINO |
| 27 | TERRENO HOMES |
| 28 | SHOPS AT FAIRVIEW |
| 29 | SCIORTINO |
| 30 | GARIN COMMERCIAL |
| 31 | GARIN'S CORNER |
| 32 | AVIANO |

Kimley»Horn

097037026 MAY 2015

# FIGURE 11
# APPROVED PROJECT LOCATIONS
## ANTIOCH HEIDORN VILLAGE TIA



**LEGEND**

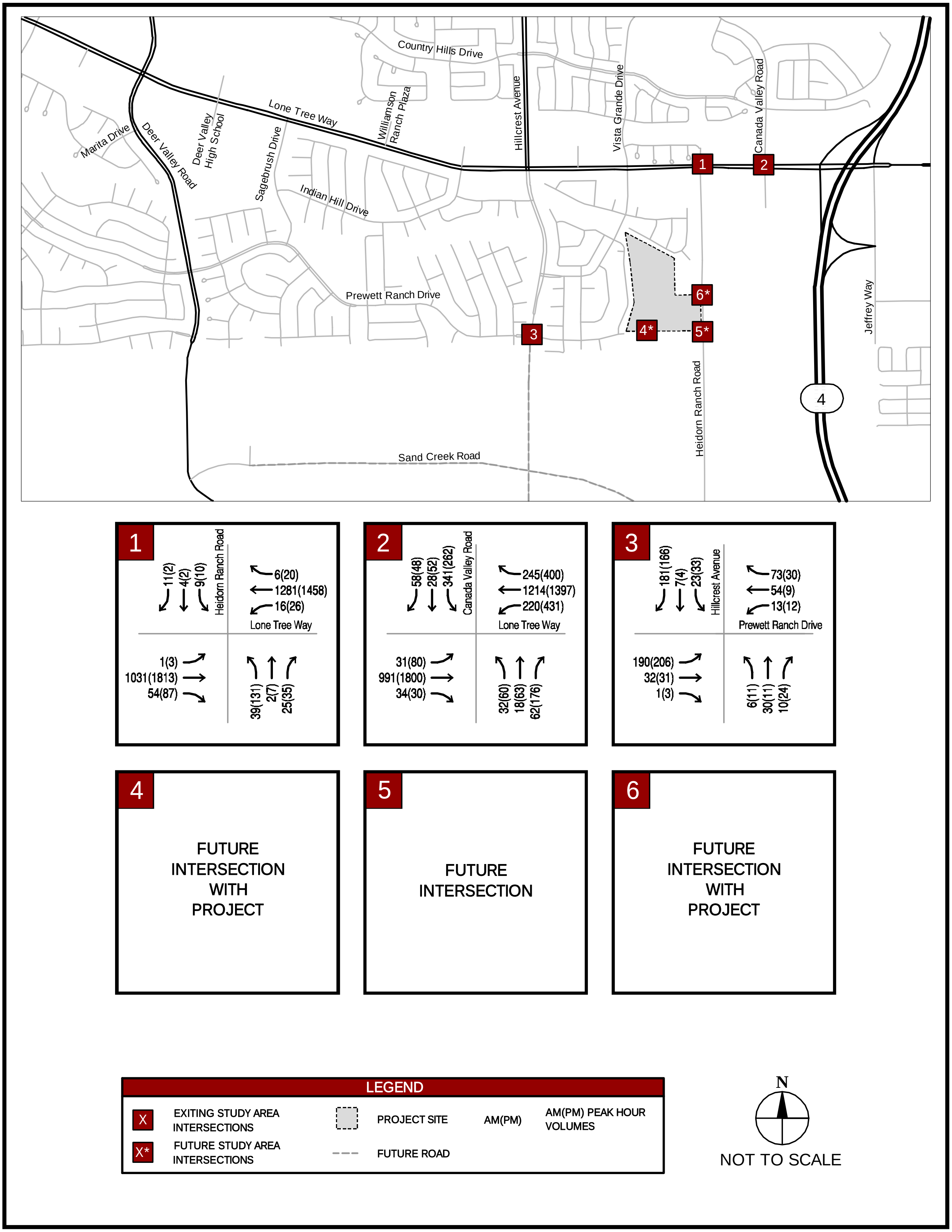
| | | | |
|---|---|---|---|
| X | EXITING STUDY AREA INTERSECTIONS | ▨ | PROJECT SITE |
| X* | FUTURE STUDY AREA INTERSECTIONS | - - - | FUTURE ROAD |
| AM(PM) | AM(PM) PEAK HOUR VOLUMES | | |

N

NOT TO SCALE

# FIGURE 12

## APPROVED AND PENDING DEVELOPMENT GENERATED PEAK HOUR VOLUMES



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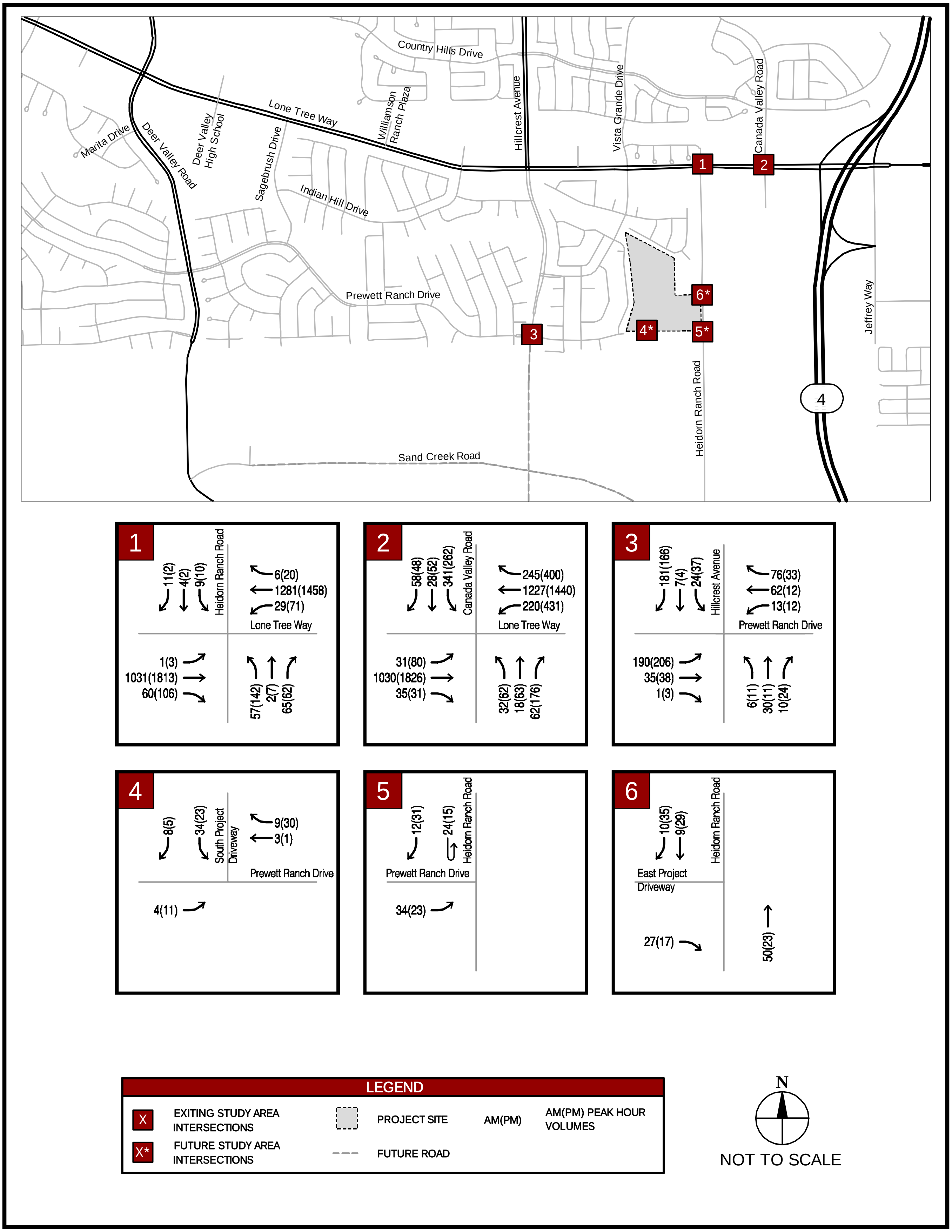
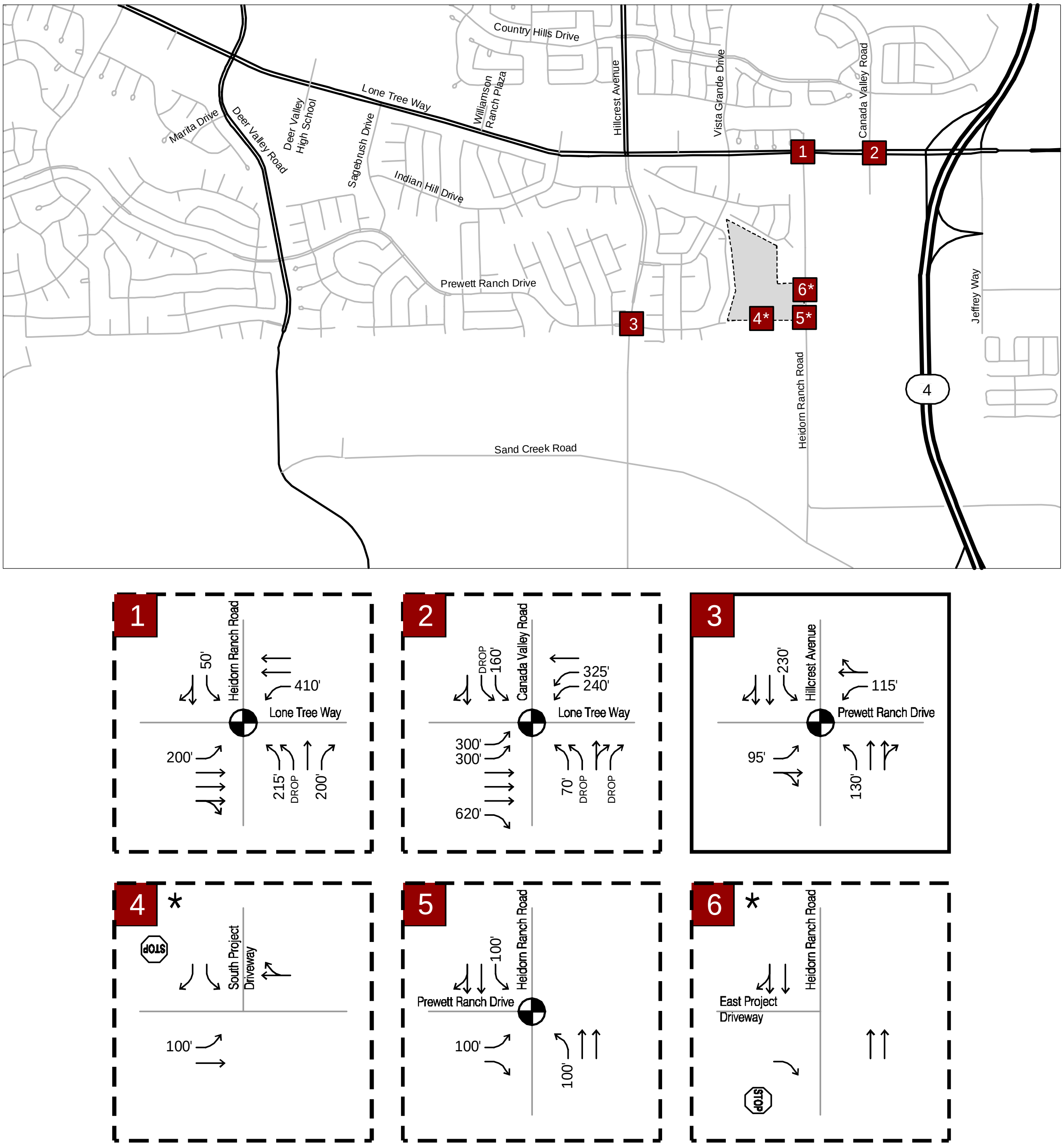
## FIGURE 13

## NEAR-TERM CONDITION PEAK HOUR TURNING MOVEMENT VOLUMES



## FIGURE 14

## NEAR-TERM PLUS PROJECT CONDITION
## PEAK HOUR TURNING MOVEMENT VOLUMES



* WITH THE ADDITION OF THE PROJECT

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| X | EXITING STUDY AREA INTERSECTIONS | ▨ | PROJECT SITE | STOP | STOP SIGN |
| X* | FUTURE STUDY AREA INTERSECTIONS | ◐ | TRAFFIC SIGNAL | XX' | STORAGE LENGTH |

N

NOT TO SCALE

NOTE: DASHED BOXES REFLECT UNCHANGED CONDITIONS FROM NEAR-TERM CONDITIONS.

# FIGURE 15

# LONG-TERM (2030) CONDITION
# LANE GEOMETRY AND TRAFFIC CONTROL

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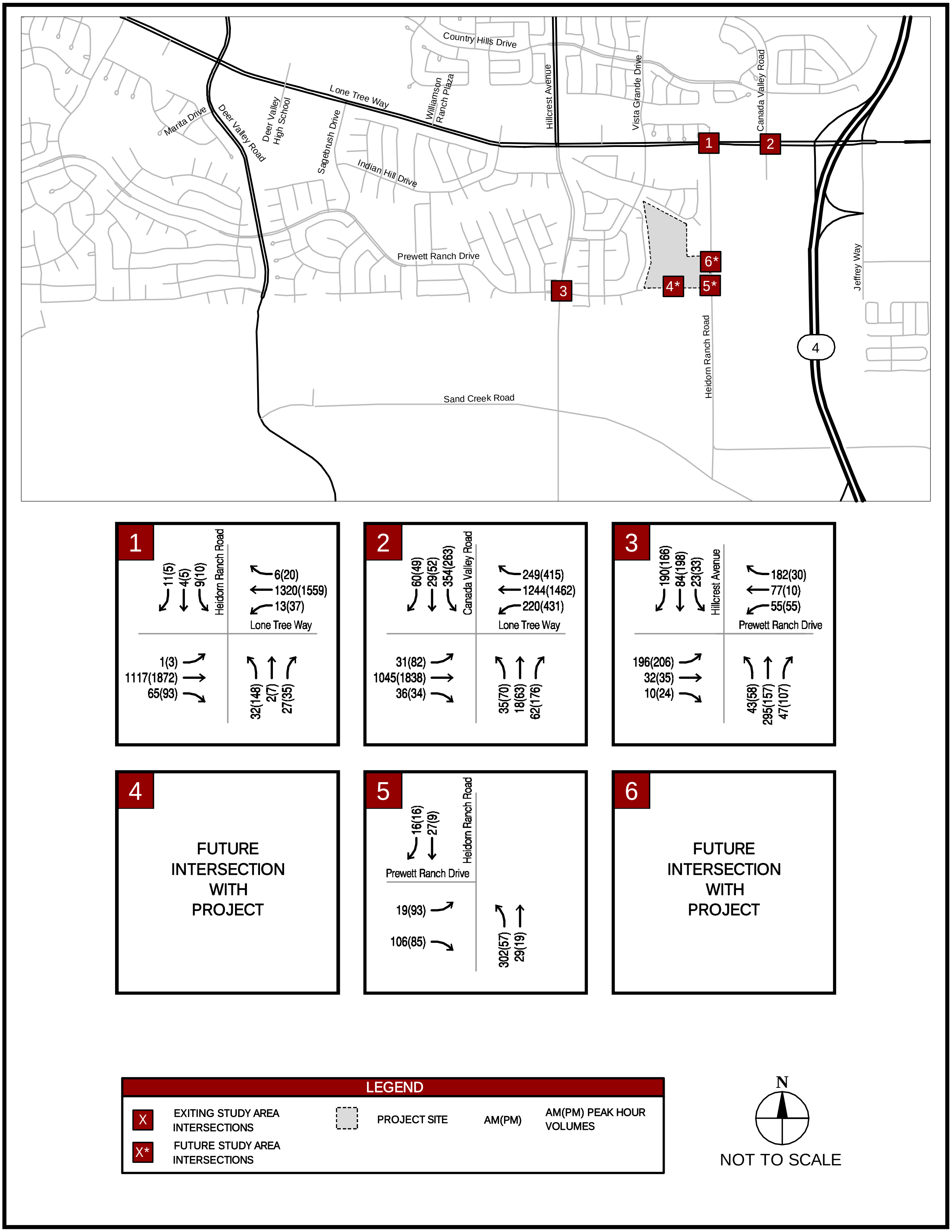
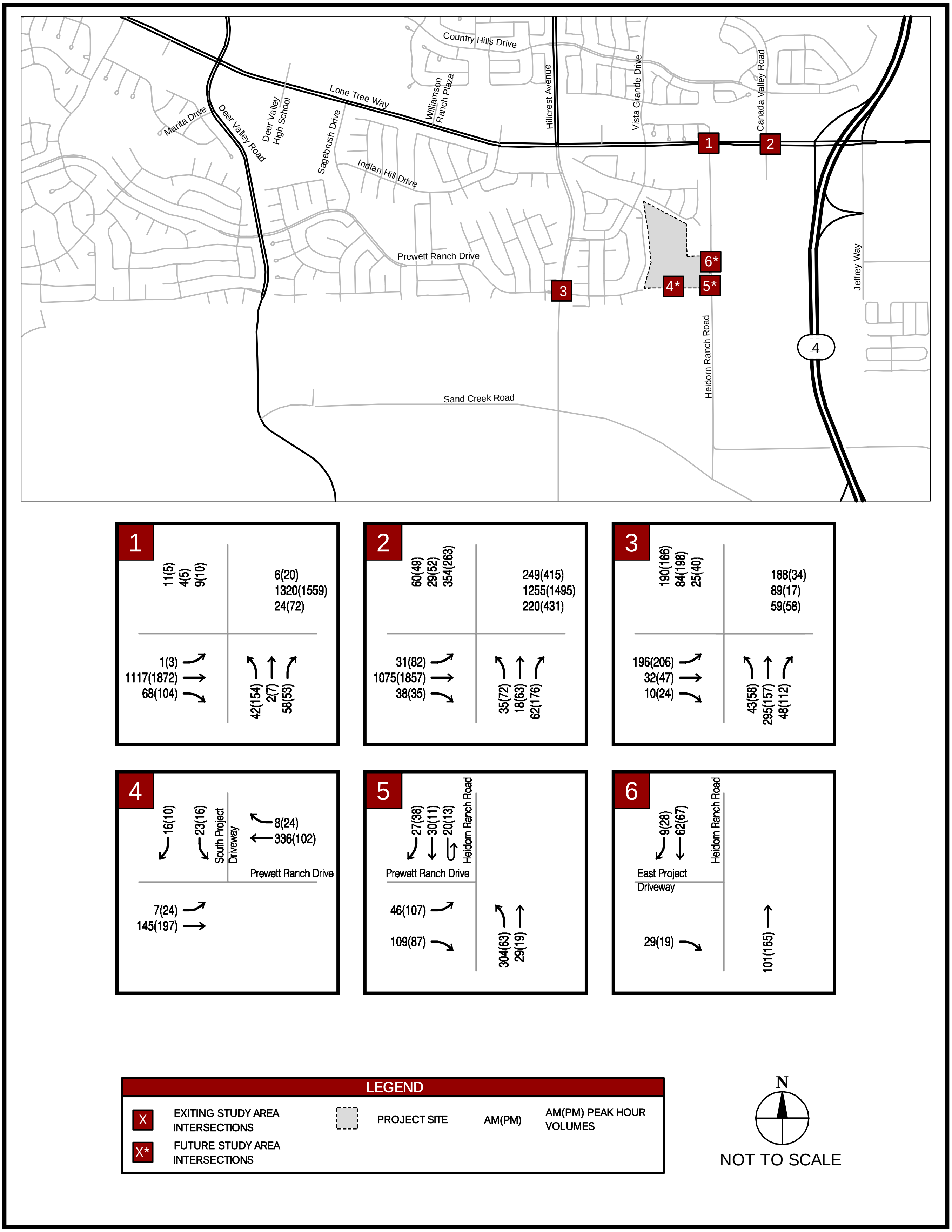


Kimley»Horn

## FIGURE 16

## LONG-TERM (2030) CONDITION PEAK HOUR TURNING MOVEMENT VOLUMES



# FIGURE 17

# LONG-TERM (2030) PLUS PROJECT CONDITION PEAK HOUR TURNING MOVEMENT VOLUMES

# APPENDIX

# APPENDIX

TURNING MOVEMENT VOLUMES

EXISTING (2014) TRAFFIC CONDITIONS

TRIP GENERATION

EXISTING (2014) PLUS PROJECT TRAFFIC CONDITIONS

NEAR-TERM TRAFFIC CONDITIONS

NEAR-TERM PLUS PROJECT TRAFFIC CONDITIONS

LONG-TERM (2030) TRAFFIC CONDITIONS

LONG-TERM (2030) PLUS PROJECT TRAFFIC CONDITIONS

QUEUING SUMMARY

# TURNING MOVEMENT VOLUMES

# ALL TRAFFIC DATA

**(916) 771-8700**
orders@atdtraffic.com

City of Antioch
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

File Name : 14-7011-018 Hillcrest Avenue-Prewett Ranch Drive.ppd
Date : 1/8/2014

**Bank 1 Count = Peds & Bikes**

| | Hillcrest Avenue<br>Southbound | | | | | Prewett Ranch Drive<br>Westbound | | | | | Hillcrest Avenue<br>Northbound | | | | | Prewett Ranch Drive<br>Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | Total | Ped Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 07:45 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| 08:15 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 5 |
| 08:30 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 1 | 6 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 10 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 16:15 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 11 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 17:00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | | | | | | | | | | | | | | | | | | | | | | |
| Grand Total | 0 | 0 | 1 | 13 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | 0 | 1 | 2 | 0 | 0 | 3 | 5 | 25 |
| Apprch % | 0.0% | 0.0% | 100.0% | | | 0.0% | 100.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 33.3% | 66.7% | 0.0% | | | | |
| Total % | 0.0% | 0.0% | 20.0% | | 20.0% | 0.0% | 20.0% | 0.0% | | 20.0% | 0.0% | 0.0% | 0.0% | | 0.0% | 20.0% | 40.0% | 0.0% | | 60.0% | 100.0% | |

| **AM PEAK HOUR** | Hillcrest Avenue<br>Southbound | | | | | Prewett Ranch Drive<br>Westbound | | | | | Hillcrest Avenue<br>Northbound | | | | | Prewett Ranch Drive<br>Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 07:30 to 08:30 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 07:30 | | | | | | | | | | | | | | | | | | | | | |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 07:45 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:15 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 |
| Total Volume | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 4 |
| % App Total | 0.0% | 0.0% | 100.0% | | | 0.0% | 100.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | |
| PHF | .000 | .000 | .250 | | .250 | .000 | .250 | .000 | | .250 | .000 | .000 | .000 | | .000 | .000 | .500 | .000 | | .500 | .500 |

| **PM PEAK HOUR** | Hillcrest Avenue<br>Southbound | | | | | Prewett Ranch Drive<br>Westbound | | | | | Hillcrest Avenue<br>Northbound | | | | | Prewett Ranch Drive<br>Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 17:00 to 18:00 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 17:00 | | | | | | | | | | | | | | | | | | | | | |
| 17:00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Volume | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % App Total | 0.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | |
| PHF | .000 | .000 | .000 | | .000 | .000 | .000 | .000 | | .000 | .000 | .000 | .000 | | .000 | .000 | .000 | .000 | | .000 | .000 |

# ALL TRAFFIC DATA

**(916) 771-8700**
orders@atdtraffic.com

City of Antioch
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

File Name : 14-7011-024 Canada Valley Road-Lone Tree Way.ppd
Date : 1/8/2014

**Bank 1 Count = Peds & Bikes**

| | Canada Valley Road | | | | | Lone Tree Way | | | | | Canada Valley Road | | | | | Lone Tree Way | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Southbound | | | | | Westbound | | | | | Northbound | | | | | Eastbound | | | | | | |
| START TIME | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | Total | Ped Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 07:30 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 07:45 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 4 |
| Total | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 3 | 5 | 5 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 3 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 3 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 16:00 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 9 |
| 16:15 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 4 | 3 |
| 16:30 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 7 |
| 16:45 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 8 |
| Total | 0 | 0 | 0 | 10 | 0 | 0 | 1 | 2 | 7 | 3 | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 4 | 6 | 9 | 27 |
| | | | | | | | | | | | | | | | | | | | | | | |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| 17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 |
| 17:30 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 4 |
| 17:45 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 |
| Total | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 6 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 2 | 14 |
| | | | | | | | | | | | | | | | | | | | | | | |
| Grand Total | 1 | 0 | 0 | 14 | 1 | 0 | 3 | 3 | 15 | 6 | 0 | 0 | 0 | 9 | 0 | 0 | 10 | 0 | 11 | 10 | 17 | 49 |
| Apprch % | 100.0% | 0.0% | 0.0% | | | 0.0% | 50.0% | 50.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | | |
| Total % | 5.9% | 0.0% | 0.0% | | 5.9% | 0.0% | 17.6% | 17.6% | | 35.3% | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 58.8% | 0.0% | | 58.8% | 100.0% | |

| **AM PEAK HOUR** | Canada Valley Road | | | | | Lone Tree Way | | | | | Canada Valley Road | | | | | Lone Tree Way | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Southbound | | | | | Westbound | | | | | Northbound | | | | | Eastbound | | | | | |
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 07:45 to 08:45 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 07:45 | | | | | | | | | | | | | | | | | | | | | |
| 07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 2 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Volume | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 1 | 2 | 3 |
| % App Total | 0.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 100.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | |
| PHF | .000 | .000 | .000 | | .000 | .000 | .000 | .250 | | .250 | .000 | .000 | .000 | | .000 | .000 | .500 | .000 | | .500 | .375 |

| **PM PEAK HOUR** | Canada Valley Road | | | | | Lone Tree Way | | | | | Canada Valley Road | | | | | Lone Tree Way | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Southbound | | | | | Westbound | | | | | Northbound | | | | | Eastbound | | | | | |
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 16:45 to 17:45 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 16:45 | | | | | | | | | | | | | | | | | | | | | |
| 16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| 17:15 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| 17:30 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Total Volume | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 6 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 5 | 3 | 5 |
| % App Total | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | |
| PHF | .000 | .000 | .000 | | .000 | .000 | .500 | .000 | | .500 | .000 | .000 | .000 | | .000 | .000 | .250 | .000 | | .250 | .417 |

# ALL TRAFFIC DATA

**(916) 771-8700**

orders@atdtraffic.com

City of Antioch
All Vehicles on Unshifted
Peds & Bikes on Bank 1
Nothing on Bank 2

File Name : 14-7011-023 Heidorn Ranch Road-Lone Tree Way.ppd
Date : 1/8/2014

**Bank 1 Count = Peds & Bikes**

| | Fairside Way Southbound | | | | | Lone Tree Way Westbound | | | | | Heidorn Ranch Road Northbound | | | | | Lone Tree Way Eastbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | LEFT | THRU | RIGHT | PEDS | APP.TOTAL | Total | Ped Total |
| 07:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 07:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:45 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 3 | 1 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 1 |
| 16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 4 |
| 16:30 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 16:45 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 8 |
| Total | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 4 | 0 | 0 | 4 | 4 | 15 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 17:15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 17:45 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 |
| Grand Total | 1 | 1 | 0 | 4 | 2 | 0 | 1 | 1 | 6 | 2 | 0 | 0 | 0 | 11 | 0 | 0 | 8 | 0 | 0 | 8 | 12 | 21 |
| Apprch % | 50.0% | 50.0% | 0.0% | | | 0.0% | 50.0% | 50.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | | |
| Total % | 8.3% | 8.3% | 0.0% | | 16.7% | 0.0% | 8.3% | 8.3% | | 16.7% | 0.0% | 0.0% | 0.0% | | 0.0% | 0.0% | 66.7% | 0.0% | | 66.7% | 100.0% | |

| AM PEAK HOUR | Fairside Way Southbound | | | | | Lone Tree Way Westbound | | | | | Heidorn Ranch Road Northbound | | | | | Lone Tree Way Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 07:45 to 08:45 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 07:45 | | | | | | | | | | | | | | | | | | | | | |
| 07:45 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Volume | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| % App Total | 100.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | |
| PHF | .250 | .000 | .000 | | .250 | .000 | .000 | .000 | | .000 | .000 | .000 | .000 | | .000 | .000 | .250 | .000 | | .250 | .500 |

| PM PEAK HOUR | Fairside Way Southbound | | | | | Lone Tree Way Westbound | | | | | Heidorn Ranch Road Northbound | | | | | Lone Tree Way Eastbound | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| START TIME | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | LEFT | THRU | RIGHT | Ped | APP.TOTAL | Total |
| Peak Hour Analysis From 16:45 to 17:45 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour For Entire Intersection Begins at 16:45 | | | | | | | | | | | | | | | | | | | | | |
| 16:45 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 2 | 2 |
| 17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 17:15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total Volume | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 1 | 4 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 2 | 4 |
| % App Total | 0.0% | 0.0% | 0.0% | | | 0.0% | 50.0% | 50.0% | | | 0.0% | 0.0% | 0.0% | | | 0.0% | 100.0% | 0.0% | | | |
| PHF | .000 | .000 | .000 | | .000 | .000 | .250 | .250 | | .500 | .000 | .000 | .000 | | .000 | .000 | .250 | .000 | | .250 | .500 |

# EXISTING (2014) TRAFFIC CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 1 | 775 | 48 | 16 | 932 | 6 | 39 | 2 | 24 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 34 | 3483 | 214 | 61 | 3797 | 25 | 198 | 167 | 141 | 107 | 42 | 110 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.07 | 1.00 | 1.00 | 0.06 | 0.09 | 0.09 | 0.06 | 0.09 | 0.09 |
| Sat Flow, veh/h | 1774 | 5203 | 320 | 1774 | 5545 | 36 | 3442 | 1863 | 1573 | 1774 | 457 | 1187 |
| Grp Volume(v), veh/h | 1 | 637 | 309 | 18 | 720 | 358 | 72 | 4 | 44 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1798 | 1774 | 1863 | 1855 | 1721 | 1863 | 1573 | 1774 | 0 | 1643 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 1.7 | 0.2 | 1.8 | 0.4 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 1.7 | 0.2 | 1.8 | 0.4 | 0.0 | 0.8 |
| Prop In Lane | 1.00 | | 0.18 | 1.00 | | 0.02 | 1.00 | | 1.00 | 1.00 | | 0.72 |
| Lane Grp Cap(c), veh/h | 34 | 2494 | 1204 | 61 | 2551 | 1271 | 198 | 167 | 141 | 107 | 0 | 152 |
| V/C Ratio(X) | 0.03 | 0.26 | 0.26 | 0.29 | 0.28 | 0.28 | 0.36 | 0.02 | 0.31 | 0.09 | 0.00 | 0.12 |
| Avail Cap(c_a), veh/h | 302 | 2494 | 1204 | 302 | 2551 | 1271 | 586 | 794 | 670 | 302 | 0 | 700 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.98 | 0.98 | 0.98 | 0.94 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 38.7 | 0.0 | 0.0 | 37.3 | 0.0 | 0.0 | 37.3 | 34.1 | 23.6 | 36.5 | 0.0 | 34.4 |
| Incr Delay (d2), s/veh | 0.5 | 0.2 | 0.5 | 3.5 | 0.3 | 0.5 | 1.6 | 0.1 | 1.8 | 0.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.2 | 0.4 | 0.1 | 0.2 | 0.7 | 0.1 | 0.9 | 0.2 | 0.0 | 0.3 |
| Lane Grp Delay (d), s/veh | 39.2 | 0.2 | 0.5 | 40.7 | 0.3 | 0.5 | 38.9 | 34.2 | 25.3 | 37.0 | 0.0 | 34.5 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 947 | | | 1096 | | | 120 | | | 28 | |
| Approach Delay, s/veh | | 0.4 | | | 1.0 | | | 33.7 | | | 35.4 | |
| Approach LOS | | A | | | A | | | C | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 | | 5.8 | 59.3 | | 7.7 | 10.4 | | 7.9 | 10.6 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 12.5 | 52.5 | | 12.5 | 52.5 | | 12.5 | 32.7 | | 12.5 | 33.5 | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 | | 2.8 | 2.0 | | 3.7 | 3.8 | | 2.4 | 2.8 | |
| Green Ext Time (p_c), s | 0.0 | 46.3 | | 0.0 | 46.3 | | 0.2 | 0.2 | | 0.0 | 0.1 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 3.0 |
| HCM 2010 LOS | | | A |

Notes

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (veh/h) | 24 | 744 | 32 | 209 | 884 | 219 | 30 | 17 | 58 | 271 | 26 | 40 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 |
| Lanes | 1 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 87 | 2431 | 678 | 351 | 2587 | 715 | 106 | 143 | 119 | 451 | 560 | 470 |
| Arrive On Green | 0.10 | 0.87 | 0.87 | 0.20 | 0.93 | 0.93 | 0.03 | 0.08 | 0.08 | 0.25 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 5588 | 1559 | 3442 | 5588 | 1545 | 3548 | 1863 | 1554 | 1774 | 1863 | 1562 |
| Grp Volume(v), veh/h | 27 | 836 | 36 | 240 | 1016 | 252 | 35 | 56 | 44 | 399 | 38 | 59 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1559 | 1721 | 1863 | 1545 | 1774 | 1863 | 1554 | 1774 | 1863 | 1562 |
| Q Serve(g_s), s | 1.3 | 2.5 | 0.3 | 5.9 | 1.9 | 0.4 | 0.9 | 2.6 | 2.4 | 19.6 | 1.3 | 1.9 |
| Cycle Q Clear(g_c), s | 1.3 | 2.5 | 0.3 | 5.9 | 1.9 | 0.4 | 0.9 | 2.6 | 2.4 | 19.6 | 1.3 | 1.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 87 | 2431 | 678 | 351 | 2587 | 715 | 106 | 143 | 119 | 451 | 560 | 470 |
| V/C Ratio(X) | 0.31 | 0.34 | 0.05 | 0.68 | 0.39 | 0.35 | 0.33 | 0.39 | 0.37 | 0.89 | 0.07 | 0.13 |
| Avail Cap(c_a), veh/h | 235 | 2431 | 678 | 759 | 2587 | 715 | 469 | 760 | 634 | 528 | 1068 | 895 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.98 | 0.98 | 0.98 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.5 | 3.5 | 3.3 | 34.7 | 1.9 | 0.1 | 43.1 | 39.9 | 39.8 | 32.6 | 22.6 | 13.4 |
| Incr Delay (d2), s/veh | 0.7 | 0.4 | 0.1 | 0.8 | 0.4 | 1.2 | 0.7 | 0.7 | 0.7 | 13.5 | 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 Back of Q (50%), veh/ln | 0.6 | 0.9 | 0.1 | 2.3 | 0.6 | 0.6 | 0.4 | 1.2 | 1.0 | 10.1 | 0.6 | 0.9 |
| Lane Grp Delay (d), s/veh | 40.3 | 3.9 | 3.5 | 35.5 | 2.3 | 1.3 | 43.8 | 40.5 | 40.5 | 46.0 | 22.7 | 13.4 |
| Lane Grp LOS | D | A | A | D | A | A | D | D | D | D | C | B |
| Approach Vol, veh/h | | 899 | | | 1508 | | | 135 | | | 496 | |
| Approach Delay, s/veh | | 5.0 | | | 7.4 | | | 41.4 | | | 40.4 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Timer | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.7 | 42.5 | | 12.3 | 45.0 | | 5.7 | 9.9 | | 26.0 | 30.3 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 30.7 | | 19.0 | 38.7 | | 11.0 | 35.8 | | 26.0 | 50.8 | |
| Max Q Clear Time (g_c+I1), s | 3.3 | 4.5 | | 7.9 | 3.9 | | 2.9 | 4.6 | | 21.6 | 3.9 | |
| Green Ext Time (p_c), s | 0.1 | 11.3 | | 0.4 | 19.5 | | 0.0 | 0.4 | | 0.4 | 0.4 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 13.6 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |

## Notes

User approved volume balancing among the lanes for turning movement.

# HCM 2010 AWSC
# 3: Hillcrest Ave & Prewitt Ranch Dr

Existing
Timing Plan: AM PEAK

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.8 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 163 | 30 | 0 | 0 | 40 | 18 | 0 | 0 | 0 | 13 | 0 | 155 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.63 | 0.63 | 0.63 | 1.00 | 1.00 | 1.00 | 0.86 | 0.86 | 0.86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 192 | 35 | 0 | 0 | 63 | 29 | 0 | 0 | 0 | 15 | 0 | 180 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.7 | 9 | 0 | 9.1 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 69% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 31% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 163 | 30 | 0 | 58 | 13 | 155 |
| LT Vol | 0 | 0 | 0 | 0 | 30 | 0 | 40 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 155 |
| RT Vol | 0 | 0 | 0 | 163 | 0 | 0 | 0 | 13 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 192 | 35 | 0 | 92 | 15 | 180 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.307 | 0.052 | 0 | 0.137 | 0.025 | 0.24 |
| Departure Headway (Hd) | 5.888 | 5.888 | 4.137 | 5.755 | 5.253 | 5.576 | 5.357 | 6 | 4.794 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 623 | 679 | 0 | 666 | 596 | 746 |
| Service Time | 3.667 | 3.667 | 1.914 | 3.512 | 3.009 | 3.341 | 3.122 | 3.747 | 2.54 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.308 | 0.052 | 0 | 0.138 | 0.025 | 0.241 |
| HCM Control Delay | 8.7 | 8.7 | 6.9 | 11.1 | 8.3 | 8.3 | 9 | 8.9 | 9.1 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.3 | 0.2 | 0 | 0.5 | 0.1 | 0.9 |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# Queues
## 1: Heidorn Ranch Rd. & Lone Tree Way

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 1 | 946 | 18 | 1078 | 72 | 4 | 44 | 10 | 18 |
| v/c Ratio | 0.01 | 0.24 | 0.14 | 0.26 | 0.26 | 0.02 | 0.15 | 0.08 | 0.11 |
| Control Delay | 75.0 | 6.1 | 80.2 | 0.8 | 57.8 | 41.5 | 1.1 | 57.8 | 27.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 75.0 | 6.1 | 80.2 | 0.8 | 57.8 | 41.5 | 1.1 | 57.8 | 27.0 |
| Queue Length 50th (ft) | 1 | 28 | 16 | 1 | 29 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m4 | 117 | m43 | 21 | 31 | 7 | 0 | 26 | 22 |
| Internal Link Dist (ft) | | 1050 | | 900 | | 972 | | | 316 |
| Turn Bay Length (ft) | 200 | | 410 | | 215 | | 200 | 50 | |
| Base Capacity (vph) | 190 | 3949 | 190 | 4108 | 369 | 501 | 490 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.24 | 0.09 | 0.26 | 0.20 | 0.01 | 0.09 | 0.05 | 0.04 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Group Flow (vph) | 27 | 836 | 36 | 240 | 1016 | 252 | 35 | 46 | 42 | 399 | 38 | 59 |
| v/c Ratio | 0.17 | 0.33 | 0.04 | 0.63 | 0.38 | 0.27 | 0.19 | 0.26 | 0.14 | 1.09 | 0.08 | 0.11 |
| Control Delay | 44.1 | 14.0 | 0.8 | 61.6 | 14.0 | 2.1 | 61.0 | 28.7 | 0.9 | 120.3 | 33.0 | 0.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.1 | 14.0 | 0.8 | 61.6 | 14.0 | 2.1 | 61.0 | 28.7 | 0.9 | 120.3 | 33.0 | 0.4 |
| Queue Length 50th (ft) | 22 | 115 | 0 | 83 | 98 | 0 | 14 | 16 | 0 | ~377 | 26 | 0 |
| Queue Length 95th (ft) | 52 | 273 | 8 | m146 | 258 | m77 | 30 | 42 | 0 | #359 | 31 | 0 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 | |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | | |
| Base Capacity (vph) | 163 | 2565 | 840 | 528 | 2659 | 925 | 316 | 475 | 551 | 367 | 754 | 720 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.17 | 0.33 | 0.04 | 0.45 | 0.38 | 0.27 | 0.11 | 0.10 | 0.08 | 1.09 | 0.05 | 0.08 |

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.
m Volume for 95th percentile queue is metered by upstream signal.

# HCM 2010 Signalized Intersection Summary
## 1: Heidorn Ranch Rd. & Lone Tree Way

Existing
Timing Plan: PM PEAK

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ |  | ↰ | ↑↑↱ |  | ↰↰ | ↑ | ↱ | ↰ | ↱ |  |
| Volume (veh/h) | 3 | 1262 | 82 | 23 | 986 | 20 | 125 | 7 | 35 | 10 | 1 | 1 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 |  | 0.98 | 1.00 |  | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 40 | 3166 | 206 | 72 | 3429 | 70 | 306 | 203 | 168 | 156 | 91 | 91 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.08 | 1.00 | 1.00 | 0.09 | 0.11 | 0.11 | 0.09 | 0.11 | 0.10 |
| Sat Flow, veh/h | 1774 | 5189 | 338 | 1774 | 5458 | 111 | 3442 | 1863 | 1544 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 925 | 447 | 25 | 740 | 366 | 147 | 8 | 41 | 23 | 0 | 4 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1802 | 1774 | 1863 | 1843 | 1721 | 1863 | 1544 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 3.2 | 0.3 | 1.5 | 0.9 | 0.0 | 0.2 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 3.2 | 0.3 | 1.5 | 0.9 | 0.0 | 0.2 |
| Prop In Lane | 1.00 |  | 0.19 | 1.00 |  | 0.06 | 1.00 |  | 1.00 | 1.00 |  | 0.50 |
| Lane Grp Cap(c), veh/h | 40 | 2273 | 1099 | 72 | 2341 | 1158 | 306 | 203 | 168 | 156 | 0 | 182 |
| V/C Ratio(X) | 0.08 | 0.41 | 0.41 | 0.35 | 0.32 | 0.32 | 0.48 | 0.04 | 0.24 | 0.15 | 0.00 | 0.02 |
| Avail Cap(c_a), veh/h | 383 | 2273 | 1099 | 383 | 2341 | 1158 | 744 | 852 | 707 | 383 | 0 | 771 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.93 | 0.93 | 0.93 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 36.8 | 0.0 | 0.0 | 35.2 | 0.0 | 0.0 | 34.1 | 31.4 | 20.7 | 33.1 | 0.0 | 31.5 |
| Incr Delay (d2), s/veh | 1.1 | 0.5 | 1.0 | 3.9 | 0.3 | 0.7 | 1.7 | 0.1 | 1.1 | 0.6 | 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 Back of Q (50%), veh/ln | 0.1 | 0.2 | 0.3 | 0.5 | 0.1 | 0.2 | 1.4 | 0.1 | 0.7 | 0.4 | 0.0 | 0.1 |
| Lane Grp Delay (d), s/veh | 37.9 | 0.5 | 1.0 | 39.0 | 0.3 | 0.7 | 35.8 | 31.5 | 21.8 | 33.7 | 0.0 | 31.5 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | C |  | C |
| Approach Vol, veh/h |  | 1375 |  |  | 1131 |  |  | 196 |  |  | 27 |  |
| Approach Delay, s/veh |  | 0.8 |  |  | 1.3 |  |  | 32.7 |  |  | 33.4 |  |
| Approach LOS |  | A |  |  | A |  |  | C |  |  | C |  |

| Timer | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 |  | 1 | 6 |  | 3 | 8 |  | 7 | 4 |  |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 |  | 6.2 | 52.4 |  | 10.0 | 11.6 |  | 9.9 | 11.5 |  |
| Change Period (Y+Rc), s | 4.5 | 5.5 |  | 4.5 | 5.5 |  | 4.5 | 5.3 |  | 4.5 | 4.5 |  |
| Max Green Setting (Gmax), s | 15.5 | 45.5 |  | 15.5 | 45.5 |  | 15.5 | 33.7 |  | 15.5 | 34.5 |  |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 |  | 3.0 | 2.0 |  | 5.2 | 3.5 |  | 2.9 | 2.2 |  |
| Green Ext Time (p_c), s | 0.0 | 42.4 |  | 0.0 | 42.4 |  | 0.5 | 0.2 |  | 0.0 | 0.1 |  |

| Intersection Summary |  |  |  |
|---|---|---|---|
| HCM 2010 Ctrl Delay |  |  | 3.6 |
| HCM 2010 LOS |  |  | A |

Notes

| | ⤴ | → | ⤵ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑ | ↱ | ↰ | ↑ | ↱ |
| Volume (veh/h) | 57 | 1271 | 29 | 425 | 939 | 307 | 56 | 60 | 165 | 200 | 51 | 34 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 |
| Lanes | 1 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 81 | 2189 | 619 | 546 | 2684 | 759 | 152 | 298 | 246 | 287 | 519 | 432 |
| Arrive On Green | 0.09 | 0.78 | 0.78 | 0.32 | 0.96 | 0.96 | 0.04 | 0.16 | 0.16 | 0.16 | 0.28 | 0.28 |
| Sat Flow, veh/h | 1774 | 5588 | 1581 | 3442 | 5588 | 1580 | 3548 | 1863 | 1543 | 1774 | 1863 | 1551 |
| Grp Volume(v), veh/h | 61 | 1352 | 31 | 443 | 978 | 320 | 64 | 158 | 128 | 233 | 59 | 40 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1581 | 1721 | 1863 | 1580 | 1774 | 1863 | 1543 | 1774 | 1863 | 1551 |
| Q Serve(g_s), s | 3.1 | 9.5 | 0.4 | 11.1 | 1.0 | 0.5 | 1.6 | 7.3 | 7.1 | 11.9 | 2.2 | 1.4 |
| Cycle Q Clear(g_c), s | 3.1 | 9.5 | 0.4 | 11.1 | 1.0 | 0.5 | 1.6 | 7.3 | 7.1 | 11.9 | 2.2 | 1.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 81 | 2189 | 619 | 546 | 2684 | 759 | 152 | 298 | 246 | 287 | 519 | 432 |
| V/C Ratio(X) | 0.75 | 0.62 | 0.05 | 0.81 | 0.36 | 0.42 | 0.42 | 0.53 | 0.52 | 0.81 | 0.11 | 0.09 |
| Avail Cap(c_a), veh/h | 227 | 2189 | 619 | 808 | 2684 | 759 | 530 | 736 | 609 | 454 | 934 | 778 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.94 | 0.94 | 0.94 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 42.1 | 7.2 | 6.2 | 30.7 | 1.0 | 0.2 | 43.7 | 36.1 | 36.1 | 37.9 | 25.2 | 15.2 |
| Incr Delay (d2), s/veh | 4.9 | 1.2 | 0.1 | 2.0 | 0.3 | 1.5 | 0.7 | 0.5 | 0.6 | 2.7 | 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 Back of Q (50%), veh/ln | 1.4 | 2.6 | 0.2 | 4.0 | 0.4 | 0.6 | 0.7 | 3.4 | 2.7 | 5.4 | 1.0 | 0.7 |
| Lane Grp Delay (d), s/veh | 47.0 | 8.4 | 6.4 | 32.7 | 1.3 | 1.7 | 44.4 | 36.7 | 36.7 | 40.6 | 25.2 | 15.2 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | D | C | B |
| Approach Vol, veh/h | | 1444 | | | 1741 | | | 350 | | | 332 | |
| Approach Delay, s/veh | | 10.0 | | | 9.4 | | | 38.1 | | | 34.8 | |
| Approach LOS | | B | | | A | | | D | | | C | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.6 | 39.7 | | 17.9 | 48.0 | | 7.0 | 18.0 | | 18.2 | 29.1 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 5.1 | 11.5 | | 13.1 | 3.0 | | 3.6 | 9.3 | | 13.9 | 4.2 | |
| Green Ext Time (p_c), s | 0.2 | 14.8 | | 0.8 | 21.2 | | 0.1 | 0.8 | | 0.3 | 0.8 | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 14.4 |
| HCM 2010 LOS | B |

**Notes**

User approved volume balancing among the lanes for turning movement.

## HCM 2010 AWSC
## 3: Hillcrest Ave & Prewett Ranch Dr

Existing
Timing Plan: PM PEAK

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.8 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 164 | 21 | 0 | 0 | 4 | 8 | 0 | 0 | 0 | 12 | 0 | 124 |
| Peak Hour Factor | 0.73 | 0.73 | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.83 | 0.83 | 0.83 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 225 | 29 | 0 | 0 | 4 | 8 | 0 | 0 | 0 | 14 | 0 | 149 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.7 | 7.9 | 0 | 8.5 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 33% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 67% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 164 | 21 | 0 | 12 | 12 | 124 |
| LT Vol | 0 | 0 | 0 | 0 | 21 | 0 | 4 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 124 |
| RT Vol | 0 | 0 | 0 | 164 | 0 | 0 | 0 | 12 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 225 | 29 | 0 | 12 | 14 | 149 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.343 | 0.04 | 0 | 0.017 | 0.023 | 0.193 |
| Departure Headway (Hd) | 5.664 | 5.664 | 3.915 | 5.49 | 4.988 | 5.531 | 5.061 | 5.846 | 4.641 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 656 | 718 | 0 | 705 | 614 | 774 |
| Service Time | 3.405 | 3.405 | 1.657 | 3.221 | 2.719 | 3.274 | 2.804 | 3.566 | 2.361 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.343 | 0.04 | 0 | 0.017 | 0.023 | 0.193 |
| HCM Control Delay | 8.4 | 8.4 | 6.7 | 11.1 | 7.9 | 8.3 | 7.9 | 8.7 | 8.5 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.5 | 0.1 | 0 | 0.1 | 0.1 | 0.7 |

### Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# 1: Heidorn Ranch Rd. & Lone Tree Way

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 3 | 1372 | 25 | 1106 | 147 | 8 | 41 | 23 | 4 |
| v/c Ratio | 0.03 | 0.38 | 0.19 | 0.29 | 0.33 | 0.04 | 0.16 | 0.17 | 0.03 |
| Control Delay | 84.7 | 5.4 | 89.4 | 2.2 | 52.8 | 46.0 | 1.3 | 58.7 | 38.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 84.7 | 5.4 | 89.4 | 2.2 | 52.8 | 46.0 | 1.3 | 58.7 | 38.0 |
| Queue Length 50th (ft) | 3 | 57 | 22 | 26 | 56 | 6 | 0 | 19 | 2 |
| Queue Length 95th (ft) | m7 | 86 | 55 | 38 | 88 | 17 | 0 | 22 | 5 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 972 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 231 | 3583 | 231 | 3837 | 507 | 515 | 500 | 231 | 475 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.38 | 0.11 | 0.29 | 0.29 | 0.02 | 0.08 | 0.10 | 0.01 |

## Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 2: Canada Valley & Lone Tree Way

|  | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Group Flow (vph) | 61 | 1352 | 31 | 443 | 978 | 320 | 64 | 134 | 122 | 233 | 59 | 40 |
| v/c Ratio | 0.41 | 0.59 | 0.04 | 0.80 | 0.35 | 0.32 | 0.31 | 0.55 | 0.35 | 0.81 | 0.13 | 0.08 |
| Control Delay | 49.4 | 19.3 | 0.1 | 60.3 | 8.6 | 0.9 | 61.9 | 44.0 | 3.7 | 74.4 | 35.9 | 0.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.4 | 19.3 | 0.1 | 60.3 | 8.6 | 0.9 | 61.9 | 44.0 | 3.7 | 74.4 | 35.9 | 0.3 |
| Queue Length 50th (ft) | 50 | 252 | 0 | 140 | 74 | 0 | 27 | 83 | 0 | 189 | 41 | 0 |
| Queue Length 95th (ft) | 80 | #512 | 0 | 201 | 178 | 1 | 49 | 122 | 7 | 265 | 59 | 0 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |  |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |  |
| Base Capacity (vph) | 163 | 2311 | 770 | 596 | 2785 | 990 | 369 | 488 | 549 | 326 | 682 | 662 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.59 | 0.04 | 0.74 | 0.35 | 0.32 | 0.17 | 0.27 | 0.22 | 0.71 | 0.09 | 0.06 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

# TRIP GENERATION

# *Trip Generation Planner (ITE 9th Edition)*

Kimley»Horn

***Weekday Trip Generation*** ***Project Name*** **Heidorn Village**
***Trips Based on Average Rates/Equations*** ***Project Number*** **097037026**

| | | | | | Trip Rates | | | Total Trips | | | | | | | Net Trips after Pass-By Reduction | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ITE Code** | **Land Use Description** | **Independent Variable** | **No. of Units** | **Avg Rate or Eq** | **Daily Rate** | **AM Rate** | **PM Rate** | **Daily Trips** | **AM Trips** | **PM Trips** | **AM Trips In** | **AM Trips Out** | **PM Trips In** | **PM Trips Out** | **Daily Trips** | **AM Trips** | **PM Trips** | **AM Trips In** | **AM Trips Out** | **PM Trips In** | **PM Trips Out** |
| 210 | Single-Family Detached Housing | Dwelling Unit(s) | 117 | Avg | 9.52 | 0.75 | 1.00 | 1114 | 88 | 117 | 22 | 66 | 74 | 43 | 1114 | 88 | 117 | 22 | 66 | 74 | 43 |
| | | | | | | | **Totals** | **1114** | **88** | **117** | **22** | **66** | **74** | **43** | **1114** | **88** | **117** | **22** | **66** | **74** | **43** |

Notes:

| | |
|---|---|
| *(1)* | AM and/or PM rates correspond to peak hour of generator |
| A | Trip generation data from ITE *Trip Generation, 8th Edition* |
| B | AM/PM rates correspond to peak of adjacent street traffic (if data available) |
| C | Includes weekday rates only |
| D | Total trips include pass-by trips w/ no internal capture |
| E | Pass-by rates from ITE *Trip Generation Handbook, 2nd Edition* |
| F | Internal capture rates from ITE *Trip Generation Handbook, 2nd Edition* |
| G | Worksheet is intended as a planning tool. Verify results w/ ITE *Trip Generation, 9th Edition* |
| H | Enter data only in green shaded cells |

# EXISTING (2014) PLUS PROJECT TRAFFIC CONDITIONS

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 1 | 775 | 54 | 29 | 932 | 6 | 57 | 2 | 64 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 33 | 3339 | 232 | 76 | 3722 | 24 | 239 | 240 | 203 | 72 | 45 | 118 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.09 | 1.00 | 1.00 | 0.07 | 0.13 | 0.13 | 0.04 | 0.10 | 0.09 |
| Sat Flow, veh/h | 1774 | 5161 | 358 | 1774 | 5545 | 36 | 3442 | 1863 | 1576 | 1774 | 457 | 1187 |
| Grp Volume(v), veh/h | 1 | 642 | 311 | 33 | 720 | 358 | 106 | 4 | 119 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1794 | 1774 | 1863 | 1855 | 1721 | 1863 | 1576 | 1774 | 0 | 1644 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 2.5 | 0.2 | 4.9 | 0.5 | 0.0 | 0.9 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 2.5 | 0.2 | 4.9 | 0.5 | 0.0 | 0.9 |
| Prop In Lane | 1.00 | | 0.20 | 1.00 | | 0.02 | 1.00 | | 1.00 | 1.00 | | 0.72 |
| Lane Grp Cap(c), veh/h | 33 | 2410 | 1160 | 76 | 2501 | 1245 | 239 | 240 | 203 | 72 | 0 | 164 |
| V/C Ratio(X) | 0.03 | 0.27 | 0.27 | 0.43 | 0.29 | 0.29 | 0.44 | 0.02 | 0.59 | 0.14 | 0.00 | 0.11 |
| Avail Cap(c_a), veh/h | 292 | 2410 | 1160 | 292 | 2501 | 1245 | 567 | 767 | 649 | 292 | 0 | 677 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.98 | 0.98 | 0.98 | 0.94 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 40.2 | 0.0 | 0.0 | 37.9 | 0.0 | 0.0 | 38.0 | 32.4 | 22.8 | 39.4 | 0.0 | 35.0 |
| Incr Delay (d2), s/veh | 0.5 | 0.3 | 0.6 | 5.1 | 0.3 | 0.5 | 1.8 | 0.0 | 3.8 | 1.3 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.2 | 0.8 | 0.1 | 0.2 | 1.1 | 0.1 | 2.0 | 0.2 | 0.0 | 0.4 |
| Lane Grp Delay (d), s/veh | 40.7 | 0.3 | 0.6 | 42.9 | 0.3 | 0.5 | 39.8 | 32.4 | 26.6 | 40.6 | 0.0 | 35.1 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | D |
| Approach Vol, veh/h | | 954 | | | 1111 | | | 229 | | | 28 | |
| Approach Delay, s/veh | | 0.4 | | | 1.6 | | | 32.8 | | | 37.1 | |
| Approach LOS | | A | | | A | | | C | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 | | 6.7 | 60.1 | | 8.9 | 13.9 | | 6.4 | 11.5 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 12.5 | 52.5 | | 12.5 | 52.5 | | 12.5 | 32.7 | | 12.5 | 33.5 | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 | | 3.5 | 2.0 | | 4.5 | 6.9 | | 2.5 | 2.9 | |
| Green Ext Time (p_c), s | 0.0 | 46.3 | | 0.0 | 46.3 | | 0.3 | 0.7 | | 0.0 | 0.1 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 4.6 |
| HCM 2010 LOS | | | A |

Notes

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↱ | ↱ | ↰ | ↑ | ↱ |
| Volume (veh/h) | 24 | 783 | 33 | 209 | 897 | 219 | 30 | 17 | 58 | 271 | 26 | 40 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 |  | 0.98 | 1.00 |  | 0.98 | 1.00 |  | 0.98 | 1.00 |  | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 |
| Lanes | 1 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 87 | 2431 | 678 | 351 | 2587 | 715 | 106 | 143 | 119 | 451 | 560 | 470 |
| Arrive On Green | 0.10 | 0.87 | 0.87 | 0.20 | 0.93 | 0.93 | 0.03 | 0.08 | 0.08 | 0.25 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 5588 | 1559 | 3442 | 5588 | 1545 | 3548 | 1863 | 1554 | 1774 | 1863 | 1562 |
| Grp Volume(v), veh/h | 27 | 880 | 37 | 240 | 1031 | 252 | 35 | 56 | 44 | 399 | 38 | 59 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1559 | 1721 | 1863 | 1545 | 1774 | 1863 | 1554 | 1774 | 1863 | 1562 |
| Q Serve(g_s), s | 1.3 | 2.7 | 0.3 | 5.9 | 2.0 | 0.4 | 0.9 | 2.6 | 2.4 | 19.6 | 1.3 | 1.9 |
| Cycle Q Clear(g_c), s | 1.3 | 2.7 | 0.3 | 5.9 | 2.0 | 0.4 | 0.9 | 2.6 | 2.4 | 19.6 | 1.3 | 1.9 |
| Prop In Lane | 1.00 |  | 1.00 | 1.00 |  | 1.00 | 1.00 |  | 1.00 | 1.00 |  | 1.00 |
| Lane Grp Cap(c), veh/h | 87 | 2431 | 678 | 351 | 2587 | 715 | 106 | 143 | 119 | 451 | 560 | 470 |
| V/C Ratio(X) | 0.31 | 0.36 | 0.05 | 0.68 | 0.40 | 0.35 | 0.33 | 0.39 | 0.37 | 0.89 | 0.07 | 0.13 |
| Avail Cap(c_a), veh/h | 235 | 2431 | 678 | 759 | 2587 | 715 | 469 | 760 | 634 | 528 | 1068 | 895 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.97 | 0.97 | 0.97 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.5 | 3.5 | 3.3 | 34.7 | 1.9 | 0.1 | 43.1 | 39.9 | 39.8 | 32.6 | 22.6 | 13.4 |
| Incr Delay (d2), s/veh | 0.7 | 0.4 | 0.1 | 0.8 | 0.4 | 1.2 | 0.7 | 0.7 | 0.7 | 13.5 | 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 Back of Q (50%), veh/ln | 0.6 | 0.9 | 0.1 | 2.3 | 0.6 | 0.6 | 0.4 | 1.2 | 1.0 | 10.1 | 0.6 | 0.9 |
| Lane Grp Delay (d), s/veh | 40.3 | 3.9 | 3.5 | 35.5 | 2.3 | 1.3 | 43.8 | 40.5 | 40.5 | 46.0 | 22.7 | 13.4 |
| Lane Grp LOS | D | A | A | D | A | A | D | D | D | D | C | B |
| Approach Vol, veh/h |  | 944 |  |  | 1523 |  |  | 135 |  |  | 496 |  |
| Approach Delay, s/veh |  | 4.9 |  |  | 7.4 |  |  | 41.4 |  |  | 40.4 |  |
| Approach LOS |  | A |  |  | A |  |  | D |  |  | D |  |
| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs | 5 | 2 |  | 1 | 6 |  | 3 | 8 |  | 7 | 4 |  |
| Phs Duration (G+Y+Rc), s | 9.7 | 42.5 |  | 12.3 | 45.0 |  | 5.7 | 9.9 |  | 26.0 | 30.3 |  |
| Change Period (Y+Rc), s | 6.3 | 6.3 |  | 4.0 | 6.3 |  | 4.0 | 4.2 |  | 4.0 | 4.2 |  |
| Max Green Setting (Gmax), s | 11.0 | 30.7 |  | 19.0 | 38.7 |  | 11.0 | 35.8 |  | 26.0 | 50.8 |  |
| Max Q Clear Time (g_c+I1), s | 3.3 | 4.7 |  | 7.9 | 4.0 |  | 2.9 | 4.6 |  | 21.6 | 3.9 |  |
| Green Ext Time (p_c), s | 0.1 | 11.9 |  | 0.4 | 19.7 |  | 0.0 | 0.4 |  | 0.4 | 0.4 |  |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 13.4 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | B |  |  |  |  |  |  |  |  |  |
| Notes |  |  |  |  |  |  |  |  |  |  |  |  |
| User approved volume balancing among the lanes for turning movement. |  |  |  |  |  |  |  |  |  |  |  |  |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.8 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 163 | 33 | 0 | 0 | 48 | 21 | 0 | 0 | 0 | 14 | 0 | 155 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.63 | 0.63 | 0.63 | 1.00 | 1.00 | 1.00 | 0.86 | 0.86 | 0.86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 192 | 39 | 0 | 0 | 76 | 33 | 0 | 0 | 0 | 16 | 0 | 180 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.7 | 9.2 | 0 | 9.2 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 70% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 30% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 163 | 33 | 0 | 69 | 14 | 155 |
| LT Vol | 0 | 0 | 0 | 0 | 33 | 0 | 48 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 155 |
| RT Vol | 0 | 0 | 0 | 163 | 0 | 0 | 0 | 14 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 192 | 39 | 0 | 110 | 16 | 180 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.309 | 0.057 | 0 | 0.164 | 0.027 | 0.243 |
| Departure Headway (Hd) | 5.955 | 5.955 | 4.202 | 5.801 | 5.298 | 5.594 | 5.379 | 6.06 | 4.852 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 617 | 672 | 0 | 663 | 589 | 737 |
| Service Time | 3.741 | 3.741 | 1.987 | 3.564 | 3.061 | 3.361 | 3.146 | 3.812 | 2.604 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.311 | 0.058 | 0 | 0.166 | 0.027 | 0.244 |
| HCM Control Delay | 8.7 | 8.7 | 7 | 11.2 | 8.4 | 8.4 | 9.2 | 9 | 9.2 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.3 | 0.2 | 0 | 0.6 | 0.1 | 1 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.7 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 0 | 3 | 9 | 34 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 0 | 3 | 10 | 38 | 9 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 13 | 0 | - | 0 | 17 | 8 |
| Stage 1 | - | - | - | - | 8 | - |
| Stage 2 | - | - | - | - | 9 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1606 | - | - | - | 1001 | 1074 |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1014 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1606 | - | - | - | 999 | 1074 |
| Mov Capacity-2 Maneuver | - | - | - | - | 999 | - |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1011 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.2 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1606 | - | - | - | 999 | 1074 |
| HCM Lane V/C Ratio | 0.003 | - | - | - | 0.038 | 0.008 |
| HCM Control Delay (s) | 7.248 | - | - | - | 8.7 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.008 | - | - | - | 0.118 | 0.025 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| | ↗ | ↘ | ↖ | ↑ | ↶ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 34 | 0 | 0 | 0 | 24 | 0 | 12 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 65 | 58 | 7 | 2484 | | 1242 | 1056 |
| Arrive On Green | 0.04 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.67 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 38 | 0 | 0 | 0 | | 0 | 13 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 0.6 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Cycle Q Clear(g_c), s | 0.6 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 65 | 58 | 7 | 2484 | | 1242 | 1056 |
| V/C Ratio(X) | 0.58 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.01 |
| Avail Cap(c_a), veh/h | 1117 | 997 | 526 | 2484 | | 1242 | 1056 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 12.8 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Incr Delay (d2), s/veh | 8.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Lane Grp Delay (d), s/veh | 20.8 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Lane Grp LOS | C | | | | | | A |
| Approach Vol, veh/h | 38 | | | 0 | | 13 | |
| Approach Delay, s/veh | 20.8 | | | 0.0 | | 1.5 | |
| Approach LOS | C | | | | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 0.0 | 22.0 | | 22.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 17.0 | | 18.0 | |
| Max Q Clear Time (g_c+I1), s | | | 0.0 | 0.0 | | 2.1 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.0 | | 0.0 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 15.9 | | | | |
| HCM 2010 LOS | | | B | | | | |
| **Notes** | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 2.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 27 | 1 | 50 | 9 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 30 | 1 | 56 | 10 | 11 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 46 | 11 | 21 | 0 | - | 0 |
| Stage 1 | 16 | - | - | - | - | - |
| Stage 2 | 30 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 958 | 1067 | 1593 | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 989 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 957 | 1067 | 1593 | - | - | - |
| Mov Capacity-2 Maneuver | 957 | - | - | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 988 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.5 | 0.1 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1593 | - | 1067 | - | - |
| HCM Lane V/C Ratio | 0.001 | - | 0.028 | - | - |
| HCM Control Delay (s) | 7.261 | 0 | 8.5 | - | - |
| HCM Lane LOS | A | A | A | | |
| HCM 95th %tile Q(veh) | 0.002 | - | 0.087 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# Queues
## 1: Heidorn Ranch Rd. & Lone Tree Way

Existing + Project
Timing Plan: AM PEAK

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 1 | 953 | 33 | 1078 | 106 | 4 | 119 | 10 | 18 |
| v/c Ratio | 0.01 | 0.26 | 0.23 | 0.27 | 0.34 | 0.02 | 0.38 | 0.08 | 0.11 |
| Control Delay | 74.0 | 7.5 | 81.0 | 0.9 | 58.1 | 41.0 | 10.4 | 57.8 | 27.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.0 | 7.5 | 81.0 | 0.9 | 58.1 | 41.0 | 10.4 | 57.8 | 27.4 |
| Queue Length 50th (ft) | 1 | 63 | 29 | 1 | 43 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m4 | 119 | 65 | 21 | 42 | 7 | 0 | 26 | 23 |
| Internal Link Dist (ft) | | 1050 | | 900 | | 972 | | | 316 |
| Turn Bay Length (ft) | 200 | | 410 | | 215 | | 200 | 50 | |
| Base Capacity (vph) | 190 | 3673 | 190 | 3959 | 369 | 501 | 506 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.26 | 0.17 | 0.27 | 0.29 | 0.01 | 0.24 | 0.05 | 0.04 |

| Intersection Summary |
|---|
| m Volume for 95th percentile queue is metered by upstream signal. |

## 2: Canada Valley & Lone Tree Way

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 27 | 880 | 37 | 240 | 1031 | 252 | 35 | 46 | 42 | 399 | 38 | 59 |
| v/c Ratio | 0.17 | 0.34 | 0.04 | 0.63 | 0.39 | 0.27 | 0.19 | 0.26 | 0.14 | 1.09 | 0.08 | 0.11 |
| Control Delay | 44.8 | 14.2 | 0.6 | 61.6 | 14.1 | 2.1 | 61.0 | 28.7 | 0.9 | 120.3 | 33.0 | 0.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 44.8 | 14.2 | 0.6 | 61.6 | 14.1 | 2.1 | 61.0 | 28.7 | 0.9 | 120.3 | 33.0 | 0.4 |
| Queue Length 50th (ft) | 21 | 121 | 0 | 83 | 100 | 0 | 14 | 16 | 0 | ~377 | 26 | 0 |
| Queue Length 95th (ft) | 53 | 291 | 5 | m146 | 262 | m77 | 30 | 42 | 0 | #359 | 31 | 0 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |  |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |  |
| Base Capacity (vph) | 163 | 2565 | 840 | 528 | 2659 | 925 | 316 | 475 | 551 | 367 | 754 | 720 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.17 | 0.34 | 0.04 | 0.45 | 0.39 | 0.27 | 0.11 | 0.10 | 0.08 | 1.09 | 0.05 | 0.08 |

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.
m Volume for 95th percentile queue is metered by upstream signal.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.8 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 163 | 33 | 0 | 0 | 48 | 21 | 0 | 0 | 0 | 14 | 0 | 155 |
| Peak Hour Factor | 0.85 | 0.85 | 0.85 | 0.63 | 0.63 | 0.63 | 1.00 | 1.00 | 1.00 | 0.86 | 0.86 | 0.86 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 192 | 39 | 0 | 0 | 76 | 33 | 0 | 0 | 0 | 16 | 0 | 180 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.7 | 9.2 | 0 | 9.2 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 70% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 30% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 163 | 33 | 0 | 69 | 14 | 155 |
| LT Vol | 0 | 0 | 0 | 0 | 33 | 0 | 48 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 155 |
| RT Vol | 0 | 0 | 0 | 163 | 0 | 0 | 0 | 14 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 192 | 39 | 0 | 110 | 16 | 180 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.309 | 0.057 | 0 | 0.164 | 0.027 | 0.243 |
| Departure Headway (Hd) | 5.955 | 5.955 | 4.202 | 5.801 | 5.298 | 5.594 | 5.379 | 6.06 | 4.852 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 617 | 672 | 0 | 663 | 589 | 737 |
| Service Time | 3.741 | 3.741 | 1.987 | 3.564 | 3.061 | 3.361 | 3.146 | 3.812 | 2.604 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.311 | 0.058 | 0 | 0.166 | 0.027 | 0.244 |
| HCM Control Delay | 8.7 | 8.7 | 7 | 11.2 | 8.4 | 8.4 | 9.2 | 9 | 9.2 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.3 | 0.2 | 0 | 0.6 | 0.1 | 1 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.7 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 0 | 3 | 9 | 34 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 0 | 3 | 10 | 38 | 9 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 13 | 0 | - | 0 | 17 | 8 |
| Stage 1 | - | - | - | - | 8 | - |
| Stage 2 | - | - | - | - | 9 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1606 | - | - | - | 1001 | 1074 |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1014 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1606 | - | - | - | 999 | 1074 |
| Mov Capacity-2 Maneuver | - | - | - | - | 999 | - |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1011 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.2 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1606 | - | - | - | 999 | 1074 |
| HCM Lane V/C Ratio | 0.003 | - | - | - | 0.038 | 0.008 |
| HCM Control Delay (s) | 7.248 | - | - | - | 8.7 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.008 | - | - | - | 0.118 | 0.025 |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# 5: Heidorn Ranch Road & Prewett Ranch Drive

| Lane Group | EBL | SBU | SBT |
|---|---|---|---|
| Lane Group Flow (vph) | 38 | 27 | 13 |
| v/c Ratio | 0.13 | 0.10 | 0.00 |
| Control Delay | 15.3 | 15.4 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.3 | 15.4 | 0.0 |
| Queue Length 50th (ft) | 7 | 5 | 0 |
| Queue Length 95th (ft) | 26 | 21 | 0 |
| Internal Link Dist (ft) | 580 |  | 322 |
| Turn Bay Length (ft) | 100 | 100 |  |
| Base Capacity (vph) | 786 | 416 | 2870 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.06 | 0.00 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 2.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 27 | 1 | 50 | 9 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 30 | 1 | 56 | 10 | 11 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 46 | 11 | 21 | 0 | - | 0 |
| Stage 1 | 16 | - | - | - | - | - |
| Stage 2 | 30 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 958 | 1067 | 1593 | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 989 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 957 | 1067 | 1593 | - | - | - |
| Mov Capacity-2 Maneuver | 957 | - | - | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 988 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.5 | 0.1 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1593 | - | 1067 | - | - |
| HCM Lane V/C Ratio | 0.001 | - | 0.028 | - | - |
| HCM Control Delay (s) | 7.261 | 0 | 8.5 | - | - |
| HCM Lane LOS | A | A | A | | |
| HCM 95th %tile Q(veh) | 0.002 | - | 0.087 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# HCM 2010 Signalized Intersection Summary
# 1: Heidorn Ranch Rd. & Lone Tree Way

Existing + Project
Timing Plan: PM PEAK

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Movement** | **EBL** | **EBT** | **EBR** | **WBL** | **WBT** | **WBR** | **NBL** | **NBT** | **NBR** | **SBL** | **SBT** | **SBR** |
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 3 | 1262 | 101 | 68 | 986 | 20 | 136 | 7 | 62 | 10 | 1 | 1 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.98 | 1.00 | | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 38 | 2963 | 237 | 128 | 3444 | 70 | 315 | 221 | 183 | 149 | 94 | 94 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.14 | 1.00 | 1.00 | 0.09 | 0.12 | 0.12 | 0.08 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 5107 | 408 | 1774 | 5458 | 111 | 3442 | 1863 | 1546 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 940 | 451 | 75 | 740 | 366 | 160 | 8 | 73 | 23 | 0 | 4 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1790 | 1774 | 1863 | 1843 | 1721 | 1863 | 1546 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 | 3.7 | 0.3 | 2.8 | 1.0 | 0.0 | 0.2 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 | 3.7 | 0.3 | 2.8 | 1.0 | 0.0 | 0.2 |
| Prop In Lane | 1.00 | | 0.23 | 1.00 | | 0.06 | 1.00 | | 1.00 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 38 | 2161 | 1038 | 128 | 2351 | 1163 | 315 | 221 | 183 | 149 | 0 | 187 |
| V/C Ratio(X) | 0.08 | 0.43 | 0.43 | 0.59 | 0.31 | 0.31 | 0.51 | 0.04 | 0.40 | 0.15 | 0.00 | 0.02 |
| Avail Cap(c_a), veh/h | 365 | 2161 | 1038 | 365 | 2351 | 1163 | 707 | 811 | 673 | 365 | 0 | 734 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.93 | 0.93 | 0.93 | 0.94 | 0.94 | 0.94 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 38.8 | 0.0 | 0.0 | 34.2 | 0.0 | 0.0 | 35.8 | 32.3 | 20.1 | 35.2 | 0.0 | 32.9 |
| Incr Delay (d2), s/veh | 1.2 | 0.6 | 1.2 | 5.6 | 0.3 | 0.7 | 1.8 | 0.1 | 2.0 | 0.7 | 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 Back of Q (50%), veh/ln | 0.1 | 0.2 | 0.4 | 1.5 | 0.1 | 0.2 | 1.6 | 0.1 | 1.4 | 0.5 | 0.0 | 0.1 |
| Lane Grp Delay (d), s/veh | 40.0 | 0.6 | 1.2 | 39.8 | 0.3 | 0.7 | 37.6 | 32.4 | 22.1 | 35.8 | 0.0 | 32.9 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 1394 | | | 1181 | | | 241 | | | 27 | |
| Approach Delay, s/veh | | 0.9 | | | 2.9 | | | 32.8 | | | 35.4 | |
| Approach LOS | | A | | | A | | | C | | | D | |
| **Timer** | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 | | 9.0 | 55.2 | | 10.6 | 12.8 | | 10.0 | 12.2 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 15.5 | 45.5 | | 15.5 | 45.5 | | 15.5 | 33.7 | | 15.5 | 34.5 | |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 | | 5.3 | 2.0 | | 5.7 | 4.8 | | 3.0 | 2.2 | |
| Green Ext Time (p_c), s | 0.0 | 42.4 | | 0.2 | 42.4 | | 0.6 | 0.4 | | 0.0 | 0.1 | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 4.8 | | | | | | | | | |
| HCM 2010 LOS | | | A | | | | | | | | | |
| **Notes** | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑→ | ↱ | ↰ | ↑ | ↱ |
| Volume (veh/h) | 57 | 1297 | 30 | 425 | 982 | 307 | 58 | 60 | 165 | 200 | 51 | 34 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 |
| Lanes | 1 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 81 | 2189 | 619 | 546 | 2684 | 759 | 155 | 298 | 246 | 287 | 518 | 431 |
| Arrive On Green | 0.09 | 0.78 | 0.78 | 0.32 | 0.96 | 0.96 | 0.04 | 0.16 | 0.16 | 0.16 | 0.28 | 0.28 |
| Sat Flow, veh/h | 1774 | 5588 | 1581 | 3442 | 5588 | 1580 | 3548 | 1863 | 1543 | 1774 | 1863 | 1551 |
| Grp Volume(v), veh/h | 61 | 1380 | 32 | 443 | 1023 | 320 | 66 | 158 | 128 | 233 | 59 | 40 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1581 | 1721 | 1863 | 1580 | 1774 | 1863 | 1543 | 1774 | 1863 | 1551 |
| Q Serve(g_s), s | 3.1 | 9.9 | 0.4 | 11.1 | 1.1 | 0.5 | 1.7 | 7.3 | 7.1 | 11.9 | 2.2 | 1.4 |
| Cycle Q Clear(g_c), s | 3.1 | 9.9 | 0.4 | 11.1 | 1.1 | 0.5 | 1.7 | 7.3 | 7.1 | 11.9 | 2.2 | 1.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 81 | 2189 | 619 | 546 | 2684 | 759 | 155 | 298 | 246 | 287 | 518 | 431 |
| V/C Ratio(X) | 0.76 | 0.63 | 0.05 | 0.81 | 0.38 | 0.42 | 0.43 | 0.53 | 0.52 | 0.81 | 0.11 | 0.09 |
| Avail Cap(c_a), veh/h | 227 | 2189 | 619 | 808 | 2684 | 759 | 530 | 736 | 609 | 454 | 935 | 778 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.92 | 0.92 | 0.92 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 42.1 | 7.2 | 6.2 | 30.7 | 1.0 | 0.2 | 43.7 | 36.1 | 36.1 | 37.9 | 25.2 | 15.2 |
| Incr Delay (d2), s/veh | 4.9 | 1.3 | 0.1 | 2.0 | 0.4 | 1.5 | 0.7 | 0.5 | 0.6 | 2.7 | 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 Back of Q (50%), veh/ln | 1.4 | 2.6 | 0.2 | 4.0 | 0.4 | 0.6 | 0.8 | 3.4 | 2.7 | 5.4 | 1.0 | 0.7 |
| Lane Grp Delay (d), s/veh | 47.0 | 8.5 | 6.4 | 32.7 | 1.3 | 1.7 | 44.3 | 36.7 | 36.7 | 40.6 | 25.3 | 15.2 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | D | C | B |
| Approach Vol, veh/h | | 1473 | | | 1786 | | | 352 | | | 332 | |
| Approach Delay, s/veh | | 10.1 | | | 9.2 | | | 38.1 | | | 34.8 | |
| Approach LOS | | B | | | A | | | D | | | C | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.6 | 39.7 | | 17.9 | 48.0 | | 7.1 | 18.0 | | 18.2 | 29.0 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 5.1 | 11.9 | | 13.1 | 3.1 | | 3.7 | 9.3 | | 13.9 | 4.2 | |
| Green Ext Time (p_c), s | 0.2 | 14.8 | | 0.8 | 22.0 | | 0.1 | 0.8 | | 0.3 | 0.8 | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 14.3 |
| HCM 2010 LOS | B |

| Notes |
|---|
| User approved volume balancing among the lanes for turning movement. |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.7 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 164 | 28 | 0 | 0 | 7 | 11 | 0 | 0 | 0 | 16 | 0 | 124 |
| Peak Hour Factor | 0.73 | 0.73 | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.83 | 0.83 | 0.83 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 225 | 38 | 0 | 0 | 7 | 11 | 0 | 0 | 0 | 19 | 0 | 149 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.6 | 8 | 0 | 8.5 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 39% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 61% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 164 | 28 | 0 | 18 | 16 | 124 |
| LT Vol | 0 | 0 | 0 | 0 | 28 | 0 | 7 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 124 |
| RT Vol | 0 | 0 | 0 | 164 | 0 | 0 | 0 | 16 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 225 | 38 | 0 | 18 | 19 | 149 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.344 | 0.053 | 0 | 0.026 | 0.032 | 0.194 |
| Departure Headway (Hd) | 5.716 | 5.716 | 3.967 | 5.52 | 5.018 | 5.566 | 5.136 | 5.885 | 4.68 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 652 | 713 | 0 | 695 | 610 | 768 |
| Service Time | 3.461 | 3.461 | 1.712 | 3.254 | 2.752 | 3.312 | 2.881 | 3.607 | 2.401 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.345 | 0.053 | 0 | 0.026 | 0.031 | 0.194 |
| HCM Control Delay | 8.5 | 8.5 | 6.7 | 11.1 | 8 | 8.3 | 8 | 8.8 | 8.5 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.5 | 0.2 | 0 | 0.1 | 0.1 | 0.7 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# 4: Prewett Ranch Dr & South Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 4.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 0 | 1 | 30 | 23 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 0 | 1 | 33 | 26 | 6 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 34 | 0 | - | 0 | 42 | 18 |
| Stage 1 | - | - | - | - | 18 | - |
| Stage 2 | - | - | - | - | 24 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1578 | - | - | - | 969 | 1061 |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 999 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1578 | - | - | - | 962 | 1061 |
| Mov Capacity-2 Maneuver | - | - | - | - | 962 | - |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 991 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.3 | 0 | 8.7 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1578 | - | - | - | 962 | 1061 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.027 | 0.005 |
| HCM Control Delay (s) | 7.299 | - | - | - | 8.8 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.023 | - | - | - | 0.082 | 0.016 |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

| | ↗ | ↘ | ↖ | ↑ | ↶ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 23 | 0 | 0 | 0 | 15 | 0 | 31 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 46 | 41 | 6 | 2553 | | 1277 | 1085 |
| Arrive On Green | 0.03 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.69 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 26 | 0 | 0 | 0 | | 0 | 34 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 0.4 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.2 |
| Cycle Q Clear(g_c), s | 0.4 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 46 | 41 | 6 | 2553 | | 1277 | 1085 |
| V/C Ratio(X) | 0.56 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.03 |
| Avail Cap(c_a), veh/h | 1024 | 914 | 512 | 2553 | | 1277 | 1085 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.4 |
| Incr Delay (d2), s/veh | 10.1 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Lane Grp Delay (d), s/veh | 23.5 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Lane Grp LOS | C | | | | | | A |
| Approach Vol, veh/h | 26 | | | 0 | | 34 | |
| Approach Delay, s/veh | 23.5 | | | 0.0 | | 1.5 | |
| Approach LOS | C | | | | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 0.0 | 23.0 | | 23.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 18.0 | | 19.0 | |
| Max Q Clear Time (g_c+I1), s | | | 0.0 | 0.0 | | 2.2 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.0 | | 0.1 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 11.0 | | | | |
| HCM 2010 LOS | | | B | | | | |
| **Notes** | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 17 | 0 | 23 | 29 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 19 | 0 | 26 | 32 | 39 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 36 | 71 | 0 | - | 0 |
| Stage 1 | 52 | - | - | - | - | - |
| Stage 2 | 13 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Mov Capacity-2 Maneuver | 933 | - | - | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1527 | - | 1029 | - | - |
| HCM Lane V/C Ratio | - | - | 0.018 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.056 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

## 1: Heidorn Ranch Rd. & Lone Tree Way

|  | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 3 | 1391 | 75 | 1106 | 160 | 8 | 73 | 23 | 4 |
| v/c Ratio | 0.03 | 0.41 | 0.41 | 0.29 | 0.36 | 0.04 | 0.27 | 0.17 | 0.03 |
| Control Delay | 84.7 | 7.0 | 92.4 | 2.1 | 53.0 | 46.0 | 6.0 | 58.7 | 38.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 84.7 | 7.0 | 92.4 | 2.1 | 53.0 | 46.0 | 6.0 | 58.7 | 38.5 |
| Queue Length 50th (ft) | 3 | 59 | 67 | 25 | 61 | 6 | 0 | 19 | 2 |
| Queue Length 95th (ft) | m7 | 399 | 122 | 38 | 94 | 17 | 18 | 22 | 5 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 972 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 231 | 3358 | 232 | 3831 | 507 | 515 | 500 | 231 | 475 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.41 | 0.32 | 0.29 | 0.32 | 0.02 | 0.15 | 0.10 | 0.01 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 2: Canada Valley & Lone Tree Way

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Group Flow (vph) | 61 | 1380 | 32 | 443 | 1023 | 320 | 66 | 134 | 122 | 233 | 59 | 40 |
| v/c Ratio | 0.41 | 0.60 | 0.04 | 0.80 | 0.37 | 0.32 | 0.32 | 0.55 | 0.35 | 0.81 | 0.13 | 0.08 |
| Control Delay | 52.6 | 21.0 | 0.3 | 60.3 | 8.8 | 0.9 | 62.0 | 44.0 | 3.7 | 74.4 | 36.0 | 0.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 52.6 | 21.0 | 0.3 | 60.3 | 8.8 | 0.9 | 62.0 | 44.0 | 3.7 | 74.4 | 36.0 | 0.3 |
| Queue Length 50th (ft) | 49 | 299 | 0 | 140 | 78 | 0 | 27 | 83 | 0 | 189 | 41 | 0 |
| Queue Length 95th (ft) | 79 | #519 | 0 | 201 | 194 | 1 | 51 | 122 | 7 | 265 | 59 | 0 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 | |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | | |
| Base Capacity (vph) | 163 | 2311 | 770 | 596 | 2785 | 990 | 369 | 488 | 549 | 326 | 682 | 662 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.60 | 0.04 | 0.74 | 0.37 | 0.32 | 0.18 | 0.27 | 0.22 | 0.71 | 0.09 | 0.06 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 9.7 |
| Intersection LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vol, veh/h | 164 | 28 | 0 | 0 | 7 | 11 | 0 | 0 | 0 | 16 | 0 | 124 |
| Peak Hour Factor | 0.73 | 0.73 | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.83 | 0.83 | 0.83 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 225 | 38 | 0 | 0 | 7 | 11 | 0 | 0 | 0 | 19 | 0 | 149 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 1 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 3 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 3 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 3 | 2 | 2 | 2 |
| HCM Control Delay | 10.6 | 8 | 0 | 8.5 |
| HCM LOS | B | A | - | A |

| Lane | NBLn1 | NBLn2 | NBLn3 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 0% | 0% | 0% | 100% | 0% | 0% | 0% | 100% | 0% |
| Vol Thru, % | 100% | 100% | 100% | 0% | 100% | 100% | 39% | 0% | 0% |
| Vol Right, % | 0% | 0% | 0% | 0% | 0% | 0% | 61% | 0% | 100% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 0 | 0 | 0 | 164 | 28 | 0 | 18 | 16 | 124 |
| LT Vol | 0 | 0 | 0 | 0 | 28 | 0 | 7 | 0 | 0 |
| Through Vol | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 124 |
| RT Vol | 0 | 0 | 0 | 164 | 0 | 0 | 0 | 16 | 0 |
| Lane Flow Rate | 0 | 0 | 0 | 225 | 38 | 0 | 18 | 19 | 149 |
| Geometry Grp | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Degree of Util (X) | 0 | 0 | 0 | 0.344 | 0.053 | 0 | 0.026 | 0.032 | 0.194 |
| Departure Headway (Hd) | 5.716 | 5.716 | 3.967 | 5.52 | 5.018 | 5.566 | 5.136 | 5.885 | 4.68 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 0 | 0 | 0 | 652 | 713 | 0 | 695 | 610 | 768 |
| Service Time | 3.461 | 3.461 | 1.712 | 3.254 | 2.752 | 3.312 | 2.881 | 3.607 | 2.401 |
| HCM Lane V/C Ratio | 0 | 0 | 0 | 0.345 | 0.053 | 0 | 0.026 | 0.031 | 0.194 |
| HCM Control Delay | 8.5 | 8.5 | 6.7 | 11.1 | 8 | 8.3 | 8 | 8.8 | 8.5 |
| HCM Lane LOS | N | N | N | B | A | N | A | A | A |
| HCM 95th-tile Q | 0 | 0 | 0 | 1.5 | 0.2 | 0 | 0.1 | 0.1 | 0.7 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# HCM 2010 TWSC
## 4: Prewett Ranch Dr & South Project Driveway

Existing + Project
Timing Plan: PM PEAK

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 4.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 0 | 1 | 30 | 23 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 0 | 1 | 33 | 26 | 6 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 34 | 0 | - | 0 | 42 | 18 |
| Stage 1 | - | - | - | - | 18 | - |
| Stage 2 | - | - | - | - | 24 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1578 | - | - | - | 969 | 1061 |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 999 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1578 | - | - | - | 962 | 1061 |
| Mov Capacity-2 Maneuver | - | - | - | - | 962 | - |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 991 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.3 | 0 | 8.7 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1578 | - | - | - | 962 | 1061 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.027 | 0.005 |
| HCM Control Delay (s) | 7.299 | - | - | - | 8.8 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.023 | - | - | - | 0.082 | 0.016 |

**Notes**

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# Queues
## 5: Heidorn Ranch Road & Prewett Ranch Dr

| Lane Group | EBL | SBU | SBT |
|---|---|---|---|
| Lane Group Flow (vph) | 26 | 17 | 34 |
| v/c Ratio | 0.09 | 0.06 | 0.01 |
| Control Delay | 16.1 | 16.1 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 16.1 | 16.1 | 0.0 |
| Queue Length 50th (ft) | 5 | 3 | 0 |
| Queue Length 95th (ft) | 22 | 17 | 0 |
| Internal Link Dist (ft) | 580 |  | 322 |
| Turn Bay Length (ft) | 100 | 100 |  |
| Base Capacity (vph) | 718 | 404 | 2881 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.04 | 0.04 | 0.01 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 17 | 0 | 23 | 29 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 19 | 0 | 26 | 32 | 39 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 36 | 71 | 0 | - | 0 |
| Stage 1 | 52 | - | - | - | - | - |
| Stage 2 | 13 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Mov Capacity-2 Maneuver | 933 | - | - | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1527 | - | 1029 | - | - |
| HCM Lane V/C Ratio | - | - | 0.018 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.056 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# NEAR-TERM TRAFFIC CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ |  | ↰ | ↑↑↱ |  | ↰↰ | ↑ | ↱ | ↰ | ↱ |  |
| Volume (veh/h) | 1 | 1031 | 54 | 16 | 1281 | 6 | 39 | 2 | 25 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 |  | 0.98 | 1.00 |  | 0.98 | 1.00 |  | 0.99 | 1.00 |  | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 34 | 3518 | 184 | 61 | 3803 | 18 | 198 | 168 | 142 | 106 | 42 | 110 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.07 | 1.00 | 1.00 | 0.06 | 0.09 | 0.09 | 0.06 | 0.09 | 0.09 |
| Sat Flow, veh/h | 1774 | 5258 | 275 | 1774 | 5556 | 26 | 3442 | 1863 | 1573 | 1774 | 457 | 1187 |
| Grp Volume(v), veh/h | 1 | 840 | 407 | 18 | 987 | 492 | 72 | 4 | 46 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1807 | 1774 | 1863 | 1857 | 1721 | 1863 | 1573 | 1774 | 0 | 1644 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 1.7 | 0.2 | 1.8 | 0.4 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 1.7 | 0.2 | 1.8 | 0.4 | 0.0 | 0.8 |
| Prop In Lane | 1.00 |  | 0.15 | 1.00 |  | 0.01 | 1.00 |  | 1.00 | 1.00 |  | 0.72 |
| Lane Grp Cap(c), veh/h | 34 | 2493 | 1209 | 61 | 2550 | 1271 | 198 | 168 | 142 | 106 | 0 | 153 |
| V/C Ratio(X) | 0.03 | 0.34 | 0.34 | 0.29 | 0.39 | 0.39 | 0.36 | 0.02 | 0.32 | 0.09 | 0.00 | 0.12 |
| Avail Cap(c_a), veh/h | 302 | 2493 | 1209 | 302 | 2550 | 1271 | 586 | 793 | 670 | 302 | 0 | 700 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.98 | 0.98 | 0.98 | 0.86 | 0.86 | 0.86 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 38.8 | 0.0 | 0.0 | 37.3 | 0.0 | 0.0 | 37.3 | 34.1 | 23.6 | 36.5 | 0.0 | 34.4 |
| Incr Delay (d2), s/veh | 0.5 | 0.4 | 0.7 | 3.2 | 0.4 | 0.8 | 1.6 | 0.1 | 1.9 | 0.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.2 | 0.4 | 0.1 | 0.3 | 0.7 | 0.1 | 0.9 | 0.2 | 0.0 | 0.3 |
| Lane Grp Delay (d), s/veh | 39.2 | 0.4 | 0.7 | 40.5 | 0.4 | 0.8 | 38.9 | 34.2 | 25.4 | 37.1 | 0.0 | 34.5 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D |  | C |
| Approach Vol, veh/h |  | 1248 |  |  | 1497 |  |  | 122 |  |  | 28 |  |
| Approach Delay, s/veh |  | 0.5 |  |  | 1.0 |  |  | 33.6 |  |  | 35.4 |  |
| Approach LOS |  | A |  |  | A |  |  | C |  |  | D |  |

| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 |  | 1 | 6 |  | 3 | 8 |  | 7 | 4 |  |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 |  | 5.8 | 59.3 |  | 7.7 | 10.4 |  | 7.9 | 10.6 |  |
| Change Period (Y+Rc), s | 4.5 | 5.5 |  | 4.5 | 5.5 |  | 4.5 | 5.3 |  | 4.5 | 4.5 |  |
| Max Green Setting (Gmax), s | 12.5 | 52.5 |  | 12.5 | 52.5 |  | 12.5 | 32.7 |  | 12.5 | 33.5 |  |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 |  | 2.8 | 2.0 |  | 3.7 | 3.8 |  | 2.4 | 2.8 |  |
| Green Ext Time (p_c), s | 0.0 | 49.7 |  | 0.0 | 49.7 |  | 0.2 | 0.2 |  | 0.0 | 0.1 |  |

| Intersection Summary |  |  |  |
|---|---|---|---|
| HCM 2010 Ctrl Delay |  |  | 2.5 |
| HCM 2010 LOS |  |  | A |

Notes

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↱ | ↱ | ↰↰ | ↱ | |
| Volume (veh/h) | 31 | 991 | 34 | 220 | 1214 | 245 | 32 | 18 | 62 | 341 | 28 | 58 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 166 | 2684 | 749 | 376 | 2869 | 801 | 116 | 139 | 116 | 650 | 124 | 257 |
| Arrive On Green | 0.10 | 0.96 | 0.96 | 0.22 | 1.00 | 1.00 | 0.03 | 0.07 | 0.07 | 0.19 | 0.23 | 0.23 |
| Sat Flow, veh/h | 3442 | 5588 | 1560 | 3442 | 5588 | 1561 | 3548 | 1863 | 1553 | 3442 | 536 | 1112 |
| Grp Volume(v), veh/h | 35 | 1113 | 38 | 253 | 1395 | 282 | 38 | 60 | 47 | 501 | 0 | 126 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1560 | 1721 | 1863 | 1561 | 1774 | 1863 | 1553 | 1721 | 0 | 1648 |
| Q Serve(g_s), s | 0.8 | 1.1 | 0.1 | 5.5 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 11.3 | 0.0 | 5.2 |
| Cycle Q Clear(g_c), s | 0.8 | 1.1 | 0.1 | 5.5 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 11.3 | 0.0 | 5.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.67 |
| Lane Grp Cap(c), veh/h | 166 | 2684 | 749 | 376 | 2869 | 801 | 116 | 139 | 116 | 650 | 0 | 381 |
| V/C Ratio(X) | 0.21 | 0.41 | 0.05 | 0.67 | 0.49 | 0.35 | 0.33 | 0.43 | 0.40 | 0.77 | 0.00 | 0.33 |
| Avail Cap(c_a), veh/h | 505 | 2684 | 749 | 841 | 2869 | 801 | 520 | 842 | 703 | 1136 | 0 | 1047 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.96 | 0.96 | 0.96 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 35.5 | 0.9 | 0.8 | 30.6 | 0.0 | 0.0 | 38.7 | 36.2 | 36.1 | 31.5 | 0.0 | 26.2 |
| Incr Delay (d2), s/veh | 0.2 | 0.5 | 0.1 | 0.7 | 0.5 | 1.1 | 0.6 | 0.8 | 0.8 | 0.7 | 0.0 | 0.2 |
| 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 Back of Q (50%), veh/ln | 0.3 | 0.4 | 0.1 | 2.1 | 0.1 | 0.2 | 0.4 | 1.2 | 0.9 | 4.7 | 0.0 | 2.0 |
| Lane Grp Delay (d), s/veh | 35.8 | 1.3 | 1.0 | 31.3 | 0.5 | 1.1 | 39.3 | 37.0 | 36.9 | 32.2 | 0.0 | 26.4 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | C | | C |
| Approach Vol, veh/h | | 1186 | | | 1930 | | | 145 | | | 627 | |
| Approach Delay, s/veh | | 2.3 | | | 4.6 | | | 37.6 | | | 31.1 | |
| Approach LOS | | A | | | A | | | D | | | C | |
| Timer | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.2 | 42.3 | | 11.9 | 45.0 | | 5.7 | 9.1 | | 18.5 | 21.9 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 30.7 | | 19.0 | 38.7 | | 11.0 | 35.8 | | 26.0 | 50.8 | |
| Max Q Clear Time (g_c+I1), s | 2.8 | 3.1 | | 7.5 | 2.0 | | 2.9 | 4.5 | | 13.3 | 7.2 | |
| Green Ext Time (p_c), s | 0.2 | 15.6 | | 0.5 | 26.7 | | 0.0 | 0.5 | | 1.1 | 0.5 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 9.4 | | | | | | | | | |
| HCM 2010 LOS | | | A | | | | | | | | | |

Notes

User approved volume balancing among the lanes for turning movement.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ |  | ↰ | ↱ |  | ↰ | ↑↱ |  | ↰ | ↑↱ |  |
| Volume (veh/h) | 190 | 32 | 1 | 13 | 54 | 73 | 6 | 30 | 10 | 23 | 7 | 181 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 457 | 465 | 12 | 457 | 186 | 250 | 9 | 676 | 214 | 35 | 491 | 417 |
| Arrive On Green | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.00 | 0.25 | 0.25 | 0.02 | 0.26 | 0.26 |
| Sat Flow, veh/h | 1774 | 1807 | 48 | 1774 | 720 | 971 | 1774 | 2715 | 859 | 1774 | 1863 | 1583 |
| Grp Volume(v), veh/h | 224 | 0 | 39 | 21 | 0 | 202 | 6 | 20 | 20 | 27 | 8 | 210 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1854 | 1774 | 0 | 1691 | 1774 | 1863 | 1711 | 1774 | 1863 | 1583 |
| Q Serve(g_s), s | 3.9 | 0.0 | 0.6 | 0.3 | 0.0 | 3.7 | 0.1 | 0.3 | 0.3 | 0.6 | 0.1 | 4.1 |
| Cycle Q Clear(g_c), s | 3.9 | 0.0 | 0.6 | 0.3 | 0.0 | 3.7 | 0.1 | 0.3 | 0.3 | 0.6 | 0.1 | 4.1 |
| Prop In Lane | 1.00 |  | 0.03 | 1.00 |  | 0.57 | 1.00 |  | 0.50 | 1.00 |  | 1.00 |
| Lane Grp Cap(c), veh/h | 457 | 0 | 478 | 457 | 0 | 436 | 9 | 463 | 426 | 35 | 491 | 417 |
| V/C Ratio(X) | 0.49 | 0.00 | 0.08 | 0.05 | 0.00 | 0.46 | 0.70 | 0.04 | 0.05 | 0.77 | 0.02 | 0.50 |
| Avail Cap(c_a), veh/h | 1628 | 0 | 1702 | 1628 | 0 | 1552 | 1142 | 2332 | 2142 | 1142 | 2332 | 1982 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 11.5 | 0.0 | 10.3 | 10.2 | 0.0 | 11.4 | 18.1 | 10.4 | 10.4 | 17.8 | 9.9 | 11.4 |
| Incr Delay (d2), s/veh | 1.2 | 0.0 | 0.1 | 0.1 | 0.0 | 1.1 | 89.5 | 0.1 | 0.2 | 39.1 | 0.0 | 3.4 |
| 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 Back of Q (50%), veh/ln | 1.6 | 0.0 | 0.2 | 0.1 | 0.0 | 1.4 | 0.3 | 0.1 | 0.1 | 0.6 | 0.0 | 1.6 |
| Lane Grp Delay (d), s/veh | 12.7 | 0.0 | 10.4 | 10.2 | 0.0 | 12.5 | 107.6 | 10.6 | 10.6 | 56.9 | 10.0 | 14.8 |
| Lane Grp LOS | B |  | B | B |  | B | F | B | B | E | A | B |
| Approach Vol, veh/h |  | 263 |  |  | 223 |  |  | 46 |  |  | 245 |  |
| Approach Delay, s/veh |  | 12.3 |  |  | 12.3 |  |  | 23.2 |  |  | 19.3 |  |
| Approach LOS |  | B |  |  | B |  |  | C |  |  | B |  |

| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs |  | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Phs Duration (G+Y+Rc), s |  | 14.9 |  |  | 14.9 |  | 5.7 | 15.4 |  | 6.2 | 15.9 |  |
| Change Period (Y+Rc), s |  | 5.5 |  |  | 5.5 |  | 5.5 | 6.3 |  | 5.5 | 6.3 |  |
| Max Green Setting (Gmax), s |  | 33.5 |  |  | 33.5 |  | 23.5 | 45.7 |  | 23.5 | 45.7 |  |
| Max Q Clear Time (g_c+I1), s |  | 5.9 |  |  | 5.7 |  | 2.1 | 2.3 |  | 2.6 | 6.1 |  |
| Green Ext Time (p_c), s |  | 3.6 |  |  | 3.6 |  | 0.0 | 4.2 |  | 0.1 | 4.1 |  |

| Intersection Summary |  |  |  |
|---|---|---|---|
| HCM 2010 Ctrl Delay |  |  | 15.2 |
| HCM 2010 LOS |  |  | B |

Notes

## 1: Heidorn Ranch Rd. & Lone Tree Way

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 1 | 1247 | 18 | 1479 | 72 | 4 | 46 | 10 | 18 |
| v/c Ratio | 0.01 | 0.32 | 0.14 | 0.36 | 0.26 | 0.02 | 0.16 | 0.08 | 0.11 |
| Control Delay | 74.0 | 7.2 | 77.0 | 0.9 | 57.8 | 41.5 | 1.2 | 57.8 | 27.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.0 | 7.2 | 77.0 | 0.9 | 57.8 | 41.5 | 1.2 | 57.8 | 27.0 |
| Queue Length 50th (ft) | 1 | 41 | 0 | 1 | 29 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m4 | 291 | m33 | 32 | 31 | 7 | 0 | 26 | 22 |
| Internal Link Dist (ft) | | 1050 | | 900 | | 972 | | | 316 |
| Turn Bay Length (ft) | 200 | | 410 | | 215 | | 200 | 50 | |
| Base Capacity (vph) | 190 | 3958 | 190 | 4109 | 369 | 501 | 490 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.32 | 0.09 | 0.36 | 0.20 | 0.01 | 0.09 | 0.05 | 0.04 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 2: Canada Valley & Lone Tree Way

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 35 | 1113 | 38 | 253 | 1395 | 282 | 38 | 49 | 45 | 501 | 126 |
| v/c Ratio | 0.11 | 0.42 | 0.04 | 0.64 | 0.50 | 0.29 | 0.21 | 0.27 | 0.15 | 0.80 | 0.29 |
| Control Delay | 41.4 | 14.0 | 0.6 | 66.4 | 16.1 | 3.0 | 61.2 | 28.3 | 1.0 | 61.2 | 14.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.4 | 14.0 | 0.6 | 66.4 | 16.1 | 3.0 | 61.2 | 28.3 | 1.0 | 61.2 | 14.3 |
| Queue Length 50th (ft) | 13 | 159 | 0 | 96 | 151 | 6 | 15 | 17 | 0 | 209 | 29 |
| Queue Length 95th (ft) | 32 | 375 | 6 | m152 | 378 | m91 | 32 | 44 | 0 | 190 | 34 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |
| Base Capacity (vph) | 316 | 2674 | 871 | 528 | 2789 | 964 | 316 | 476 | 551 | 713 | 722 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.11 | 0.42 | 0.04 | 0.48 | 0.50 | 0.29 | 0.12 | 0.10 | 0.08 | 0.70 | 0.17 |

**Intersection Summary**

m Volume for 95th percentile queue is metered by upstream signal.

## 3: Hillcrest Ave & Prewitt Ranch Dr

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
| Lane Group Flow (vph) | 224 | 39 | 21 | 202 | 6 | 40 | 27 | 218 |
| v/c Ratio | 0.50 | 0.08 | 0.05 | 0.49 | 0.03 | 0.07 | 0.12 | 0.28 |
| Control Delay | 26.7 | 21.4 | 24.0 | 23.9 | 33.5 | 24.7 | 32.2 | 6.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 26.7 | 21.4 | 24.0 | 23.9 | 33.5 | 24.7 | 32.2 | 6.4 |
| Queue Length 50th (ft) | 61 | 9 | 5 | 45 | 2 | 4 | 8 | 1 |
| Queue Length 95th (ft) | 160 | 37 | 19 | 88 | 15 | 23 | 37 | 28 |
| Internal Link Dist (ft) | | 1118 | | 1529 | | 1312 | | 2575 |
| Turn Bay Length (ft) | 95 | | 115 | | 130 | | 230 | |
| Base Capacity (vph) | 1016 | 1065 | 1016 | 994 | 713 | 2646 | 713 | 2399 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.22 | 0.04 | 0.02 | 0.20 | 0.01 | 0.02 | 0.04 | 0.09 |

Intersection Summary

# HCM 2010 Signalized Intersection Summary
## 1: Heidorn Ranch Rd. & Lone Tree Way

Near-Term
Timing Plan: PM PEAK

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 3 | 1813 | 87 | 26 | 1458 | 20 | 131 | 7 | 35 | 10 | 2 | 2 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.98 | 1.00 | | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 39 | 3202 | 154 | 76 | 3443 | 47 | 314 | 202 | 167 | 163 | 92 | 92 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.09 | 1.00 | 1.00 | 0.09 | 0.11 | 0.11 | 0.09 | 0.11 | 0.10 |
| Sat Flow, veh/h | 1774 | 5288 | 254 | 1774 | 5499 | 76 | 3442 | 1863 | 1544 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 1302 | 637 | 29 | 1085 | 539 | 154 | 8 | 41 | 23 | 0 | 10 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1817 | 1774 | 1863 | 1849 | 1721 | 1863 | 1544 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 3.4 | 0.3 | 1.5 | 0.9 | 0.0 | 0.4 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 3.4 | 0.3 | 1.5 | 0.9 | 0.0 | 0.4 |
| Prop In Lane | 1.00 | | 0.14 | 1.00 | | 0.04 | 1.00 | | 1.00 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 39 | 2256 | 1100 | 76 | 2333 | 1158 | 314 | 202 | 167 | 163 | 0 | 184 |
| V/C Ratio(X) | 0.08 | 0.58 | 0.58 | 0.38 | 0.47 | 0.47 | 0.49 | 0.04 | 0.25 | 0.14 | 0.00 | 0.05 |
| Avail Cap(c_a), veh/h | 380 | 2256 | 1100 | 380 | 2333 | 1158 | 738 | 846 | 701 | 380 | 0 | 766 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.93 | 0.93 | 0.93 | 0.85 | 0.85 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 37.1 | 0.0 | 0.0 | 35.3 | 0.0 | 0.0 | 34.3 | 31.6 | 20.8 | 33.1 | 0.0 | 31.7 |
| Incr Delay (d2), s/veh | 1.1 | 1.0 | 2.1 | 3.8 | 0.6 | 1.1 | 1.7 | 0.1 | 1.1 | 0.6 | 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 Back of Q (50%), veh/ln | 0.1 | 0.3 | 0.6 | 0.6 | 0.2 | 0.4 | 1.5 | 0.1 | 0.8 | 0.4 | 0.0 | 0.2 |
| Lane Grp Delay (d), s/veh | 38.2 | 1.0 | 2.1 | 39.1 | 0.6 | 1.1 | 36.0 | 31.8 | 21.9 | 33.7 | 0.0 | 31.8 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | C | | C |
| Approach Vol, veh/h | | 1942 | | | 1653 | | | 203 | | | 33 | |
| Approach Delay, s/veh | | 1.4 | | | 1.4 | | | 33.0 | | | 33.1 | |
| Approach LOS | | A | | | A | | | C | | | C | |
| **Timer** | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 | | 6.4 | 52.6 | | 10.2 | 11.6 | | 10.3 | 11.7 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 15.5 | 45.5 | | 15.5 | 45.5 | | 15.5 | 33.7 | | 15.5 | 34.5 | |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 | | 3.2 | 2.0 | | 5.4 | 3.5 | | 2.9 | 2.4 | |
| Green Ext Time (p_c), s | 0.0 | 43.4 | | 0.0 | 43.4 | | 0.5 | 0.2 | | 0.1 | 0.1 | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 3.4 | | | | | | | | | |
| HCM 2010 LOS | | | A | | | | | | | | | |
| **Notes** | | | | | | | | | | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 80 | 1800 | 30 | 431 | 1397 | 400 | 60 | 63 | 176 | 262 | 52 | 48 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 157 | 2299 | 651 | 557 | 2806 | 794 | 160 | 311 | 258 | 432 | 217 | 203 |
| Arrive On Green | 0.09 | 0.82 | 0.82 | 0.32 | 1.00 | 1.00 | 0.05 | 0.17 | 0.17 | 0.13 | 0.25 | 0.25 |
| Sat Flow, veh/h | 3442 | 5588 | 1581 | 3442 | 5588 | 1581 | 3548 | 1863 | 1543 | 3442 | 878 | 819 |
| Grp Volume(v), veh/h | 85 | 1915 | 32 | 449 | 1455 | 417 | 68 | 168 | 136 | 305 | 0 | 116 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1581 | 1721 | 1863 | 1581 | 1774 | 1863 | 1543 | 1721 | 0 | 1697 |
| Q Serve(g_s), s | 2.1 | 17.3 | 0.3 | 10.7 | 0.0 | 0.0 | 1.7 | 7.4 | 7.2 | 7.6 | 0.0 | 4.9 |
| Cycle Q Clear(g_c), s | 2.1 | 17.3 | 0.3 | 10.7 | 0.0 | 0.0 | 1.7 | 7.4 | 7.2 | 7.6 | 0.0 | 4.9 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.48 |
| Lane Grp Cap(c), veh/h | 157 | 2299 | 651 | 557 | 2806 | 794 | 160 | 311 | 258 | 432 | 0 | 420 |
| V/C Ratio(X) | 0.54 | 0.83 | 0.05 | 0.81 | 0.52 | 0.53 | 0.42 | 0.54 | 0.53 | 0.71 | 0.00 | 0.28 |
| Avail Cap(c_a), veh/h | 461 | 2299 | 651 | 845 | 2806 | 794 | 554 | 769 | 637 | 922 | 0 | 890 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.83 | 0.83 | 0.83 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.8 | 6.2 | 4.7 | 29.0 | 0.0 | 0.0 | 41.7 | 34.2 | 34.1 | 37.6 | 0.0 | 27.2 |
| Incr Delay (d2), s/veh | 0.9 | 3.1 | 0.1 | 1.6 | 0.6 | 2.2 | 0.7 | 0.5 | 0.6 | 0.8 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.9 | 3.3 | 0.1 | 3.8 | 0.2 | 0.5 | 0.8 | 3.4 | 2.8 | 3.3 | 0.0 | 2.0 |
| Lane Grp Delay (d), s/veh | 40.7 | 9.3 | 4.8 | 30.6 | 0.6 | 2.2 | 42.3 | 34.7 | 34.7 | 38.4 | 0.0 | 27.4 |
| Lane Grp LOS | D | A | A | C | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 2032 | | | 2321 | | | 372 | | | 421 | |
| Approach Delay, s/veh | | 10.6 | | | 6.7 | | | 36.1 | | | 35.3 | |
| Approach LOS | | B | | | A | | | D | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.4 | 39.9 | | 17.5 | 48.0 | | 7.1 | 18.0 | | 14.3 | 25.2 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 4.1 | 19.3 | | 12.7 | 2.0 | | 3.7 | 9.4 | | 9.6 | 6.9 | |
| Green Ext Time (p_c), s | 0.3 | 11.5 | | 0.8 | 31.1 | | 0.1 | 0.9 | | 0.6 | 0.9 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 12.7 |
| HCM 2010 LOS | | | B |

Notes

User approved volume balancing among the lanes for turning movement.

# HCM 2010 Signalized Intersection Summary
## 3: Hillcrest Ave & Prewitt Ranch Dr

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ |  | ↰ | ↱ |  | ↰ | ↑↱ |  | ↰ | ↑↱ |  |
| Volume (veh/h) | 206 | 31 | 3 | 12 | 9 | 30 | 11 | 11 | 24 | 33 | 4 | 166 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 457 | 432 | 41 | 457 | 97 | 325 | 15 | 436 | 370 | 49 | 471 | 400 |
| Arrive On Green | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.01 | 0.23 | 0.23 | 0.03 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 1675 | 160 | 1774 | 378 | 1260 | 1774 | 1863 | 1583 | 1774 | 1863 | 1583 |
| Grp Volume(v), veh/h | 282 | 0 | 46 | 12 | 0 | 39 | 11 | 11 | 24 | 40 | 5 | 200 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1834 | 1774 | 0 | 1639 | 1774 | 1863 | 1583 | 1774 | 1863 | 1583 |
| Q Serve(g_s), s | 5.0 | 0.0 | 0.7 | 0.2 | 0.0 | 0.7 | 0.2 | 0.2 | 0.4 | 0.8 | 0.1 | 3.9 |
| Cycle Q Clear(g_c), s | 5.0 | 0.0 | 0.7 | 0.2 | 0.0 | 0.7 | 0.2 | 0.2 | 0.4 | 0.8 | 0.1 | 3.9 |
| Prop In Lane | 1.00 |  | 0.09 | 1.00 |  | 0.77 | 1.00 |  | 1.00 | 1.00 |  | 1.00 |
| Lane Grp Cap(c), veh/h | 457 | 0 | 473 | 457 | 0 | 422 | 15 | 436 | 370 | 49 | 471 | 400 |
| V/C Ratio(X) | 0.62 | 0.00 | 0.10 | 0.03 | 0.00 | 0.09 | 0.71 | 0.03 | 0.06 | 0.82 | 0.01 | 0.50 |
| Avail Cap(c_a), veh/h | 1652 | 0 | 1708 | 1652 | 0 | 1526 | 1159 | 2366 | 2011 | 1159 | 2366 | 2011 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 11.8 | 0.0 | 10.2 | 10.0 | 0.0 | 10.2 | 17.8 | 10.6 | 10.7 | 17.4 | 10.1 | 11.5 |
| Incr Delay (d2), s/veh | 1.9 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 61.0 | 0.1 | 0.3 | 36.0 | 0.0 | 3.5 |
| 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 Back of Q (50%), veh/ln | 2.0 | 0.0 | 0.3 | 0.1 | 0.0 | 0.2 | 0.3 | 0.1 | 0.2 | 0.8 | 0.0 | 1.5 |
| Lane Grp Delay (d), s/veh | 13.7 | 0.0 | 10.3 | 10.0 | 0.0 | 10.3 | 78.8 | 10.7 | 11.0 | 53.4 | 10.1 | 15.0 |
| Lane Grp LOS | B |  | B | B |  | B | E | B | B | D | B | B |
| Approach Vol, veh/h |  | 328 |  |  | 51 |  |  | 46 |  |  | 245 |  |
| Approach Delay, s/veh |  | 13.2 |  |  | 10.2 |  |  | 27.1 |  |  | 21.1 |  |
| Approach LOS |  | B |  |  | B |  |  | C |  |  | C |  |
| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs |  | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Phs Duration (G+Y+Rc), s |  | 14.8 |  |  | 14.8 |  | 5.8 | 14.7 |  | 6.5 | 15.4 |  |
| Change Period (Y+Rc), s |  | 5.5 |  |  | 5.5 |  | 5.5 | 6.3 |  | 5.5 | 6.3 |  |
| Max Green Setting (Gmax), s |  | 33.5 |  |  | 33.5 |  | 23.5 | 45.7 |  | 23.5 | 45.7 |  |
| Max Q Clear Time (g_c+I1), s |  | 7.0 |  |  | 2.7 |  | 2.2 | 2.4 |  | 2.8 | 5.9 |  |
| Green Ext Time (p_c), s |  | 2.3 |  |  | 2.3 |  | 0.0 | 3.9 |  | 0.1 | 3.8 |  |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 16.9 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | B |  |  |  |  |  |  |  |  |  |
| Notes |  |  |  |  |  |  |  |  |  |  |  |  |

# 1: Heidorn Ranch Rd. & Lone Tree Way

|  | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 3 | 1939 | 29 | 1624 | 154 | 8 | 41 | 23 | 10 |
| v/c Ratio | 0.03 | 0.54 | 0.21 | 0.42 | 0.34 | 0.04 | 0.15 | 0.17 | 0.06 |
| Control Delay | 76.3 | 8.9 | 88.8 | 2.0 | 52.9 | 46.0 | 1.2 | 58.7 | 36.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.3 | 8.9 | 88.8 | 2.0 | 52.9 | 46.0 | 1.2 | 58.7 | 36.0 |
| Queue Length 50th (ft) | 3 | 120 | 25 | 38 | 58 | 6 | 0 | 19 | 4 |
| Queue Length 95th (ft) | m9 | 586 | m51 | 54 | 91 | 17 | 0 | 22 | 7 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 972 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 231 | 3578 | 231 | 3838 | 507 | 515 | 500 | 231 | 477 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.54 | 0.13 | 0.42 | 0.30 | 0.02 | 0.08 | 0.10 | 0.02 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# Queues
## 2: Canada Valley & Lone Tree Way

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 85 | 1915 | 32 | 449 | 1455 | 417 | 68 | 142 | 130 | 305 | 116 |
| v/c Ratio | 0.27 | 0.79 | 0.04 | 0.78 | 0.52 | 0.41 | 0.32 | 0.57 | 0.37 | 0.68 | 0.29 |
| Control Delay | 49.1 | 26.1 | 0.7 | 63.4 | 11.9 | 1.4 | 62.0 | 45.3 | 4.3 | 61.8 | 27.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.1 | 26.1 | 0.7 | 63.4 | 11.9 | 1.4 | 62.0 | 45.3 | 4.3 | 61.8 | 27.3 |
| Queue Length 50th (ft) | 35 | 474 | 0 | 167 | 135 | 2 | 28 | 89 | 0 | 128 | 56 |
| Queue Length 95th (ft) | 54 | #869 | m2 | 199 | 417 | 5 | 51 | 129 | 13 | 162 | 81 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |
| Base Capacity (vph) | 316 | 2424 | 802 | 613 | 2810 | 1021 | 369 | 488 | 549 | 633 | 645 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.27 | 0.79 | 0.04 | 0.73 | 0.52 | 0.41 | 0.18 | 0.29 | 0.24 | 0.48 | 0.18 |

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

## 3: Hillcrest Ave & Prewitt Ranch Dr

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
| Lane Group Flow (vph) | 282 | 46 | 12 | 39 | 11 | 35 | 40 | 205 |
| v/c Ratio | 0.51 | 0.08 | 0.04 | 0.14 | 0.04 | 0.06 | 0.14 | 0.21 |
| Control Delay | 22.3 | 17.1 | 28.8 | 16.2 | 29.3 | 16.2 | 27.9 | 5.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 22.3 | 17.1 | 28.8 | 16.2 | 29.3 | 16.2 | 27.9 | 5.3 |
| Queue Length 50th (ft) | 95 | 12 | 4 | 3 | 4 | 2 | 14 | 0 |
| Queue Length 95th (ft) | 136 | 29 | 20 | 30 | 19 | 15 | 40 | 22 |
| Internal Link Dist (ft) | | 1118 | | 1529 | | 1312 | | 2575 |
| Turn Bay Length (ft) | 95 | | 115 | | 130 | | 230 | |
| Base Capacity (vph) | 1226 | 1273 | 1226 | 1139 | 900 | 2544 | 900 | 2456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.23 | 0.04 | 0.01 | 0.03 | 0.01 | 0.01 | 0.04 | 0.08 |

Intersection Summary

# NEAR-TERM PLUS PROJECT TRAFFIC CONDITIONS

# Queues
## 1: Heidorn Ranch Rd. & Lone Tree Way

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 1254 | 33 | 1479 | 106 | 4 | 120 | 10 | 18 |
| v/c Ratio | 0.01 | 0.34 | 0.23 | 0.37 | 0.34 | 0.02 | 0.38 | 0.08 | 0.11 |
| Control Delay | 74.0 | 8.6 | 78.5 | 0.9 | 58.1 | 41.0 | 10.4 | 57.8 | 27.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.0 | 8.6 | 78.5 | 0.9 | 58.1 | 41.0 | 10.4 | 57.8 | 27.4 |
| Queue Length 50th (ft) | 1 | 96 | 29 | 1 | 43 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m4 | 313 | m60 | 32 | 42 | 7 | 0 | 26 | 23 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 972 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 190 | 3681 | 190 | 3960 | 369 | 501 | 507 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.34 | 0.17 | 0.37 | 0.29 | 0.01 | 0.24 | 0.05 | 0.04 |

### Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# Queues

## 2: Canada Valley & Lone Tree Way

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 35 | 1157 | 39 | 253 | 1410 | 282 | 38 | 49 | 45 | 501 | 126 |
| v/c Ratio | 0.11 | 0.43 | 0.04 | 0.64 | 0.51 | 0.29 | 0.21 | 0.27 | 0.15 | 0.80 | 0.29 |
| Control Delay | 41.8 | 14.0 | 0.5 | 66.3 | 16.2 | 3.1 | 61.2 | 28.3 | 1.0 | 61.2 | 14.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 41.8 | 14.0 | 0.5 | 66.3 | 16.2 | 3.1 | 61.2 | 28.3 | 1.0 | 61.2 | 14.3 |
| Queue Length 50th (ft) | 13 | 168 | 1 | 96 | 153 | 7 | 15 | 17 | 0 | 209 | 29 |
| Queue Length 95th (ft) | 31 | 393 | 4 | m151 | 385 | m92 | 32 | 44 | 0 | 190 | 34 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | |
| Base Capacity (vph) | 316 | 2674 | 871 | 528 | 2789 | 963 | 316 | 476 | 551 | 713 | 722 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.11 | 0.43 | 0.04 | 0.48 | 0.51 | 0.29 | 0.12 | 0.10 | 0.08 | 0.70 | 0.17 |

### Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# Queues
## 3: Hillcrest Ave & Prewitt Ranch Dr

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 224 | 42 | 21 | 219 | 6 | 40 | 28 | 218 |
| v/c Ratio | 0.50 | 0.09 | 0.05 | 0.52 | 0.03 | 0.08 | 0.12 | 0.29 |
| Control Delay | 27.3 | 21.9 | 23.8 | 24.9 | 34.7 | 25.3 | 33.1 | 6.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 27.3 | 21.9 | 23.8 | 24.9 | 34.7 | 25.3 | 33.1 | 6.6 |
| Queue Length 50th (ft) | 63 | 10 | 5 | 52 | 2 | 4 | 9 | 1 |
| Queue Length 95th (ft) | 163 | 40 | 19 | 98 | 15 | 23 | 38 | 29 |
| Internal Link Dist (ft) |  | 1118 |  | 1894 |  | 1312 |  | 2575 |
| Turn Bay Length (ft) | 95 |  | 115 |  | 130 |  | 230 |  |
| Base Capacity (vph) | 995 | 1044 | 995 | 976 | 698 | 2601 | 698 | 2362 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.23 | 0.04 | 0.02 | 0.22 | 0.01 | 0.02 | 0.04 | 0.09 |

Intersection Summary

## 4: Prewett Ranch Dr/Prewett Ranch Drive & South Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.7 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 0 | 3 | 9 | 34 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 0 | 3 | 10 | 38 | 9 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 13 | 0 | - | 0 | 17 | 8 |
| Stage 1 | - | - | - | - | 8 | - |
| Stage 2 | - | - | - | - | 9 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1606 | - | - | - | 1001 | 1074 |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1014 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1606 | - | - | - | 999 | 1074 |
| Mov Capacity-2 Maneuver | - | - | - | - | 999 | - |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1011 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.2 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1606 | - | - | - | 999 | 1074 |
| HCM Lane V/C Ratio | 0.003 | - | - | - | 0.038 | 0.008 |
| HCM Control Delay (s) | 7.248 | - | - | - | 8.7 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.008 | - | - | - | 0.118 | 0.025 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# Queues
## 5: Heidorn Ranch Road & Prewett Ranch Drive

| Lane Group | EBL | SBU | SBT |
|---|---|---|---|
| Lane Group Flow (vph) | 38 | 27 | 13 |
| v/c Ratio | 0.13 | 0.10 | 0.00 |
| Control Delay | 15.3 | 15.4 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.3 | 15.4 | 0.0 |
| Queue Length 50th (ft) | 7 | 5 | 0 |
| Queue Length 95th (ft) | 26 | 21 | 0 |
| Internal Link Dist (ft) | 580 |  | 322 |
| Turn Bay Length (ft) | 100 | 100 |  |
| Base Capacity (vph) | 786 | 416 | 2870 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.05 | 0.06 | 0.00 |

| Intersection Summary |
|---|

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 2.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 27 | 0 | 50 | 9 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 30 | 0 | 56 | 10 | 11 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 44 | 11 | 21 | 0 | - | 0 |
| Stage 1 | 16 | - | - | - | - | - |
| Stage 2 | 28 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 961 | 1067 | 1593 | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 991 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 961 | 1067 | 1593 | - | - | - |
| Mov Capacity-2 Maneuver | 961 | - | - | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 991 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.5 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1593 | - | 1067 | - | - |
| HCM Lane V/C Ratio | - | - | 0.028 | - | - |
| HCM Control Delay (s) | 0 | - | 8.5 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.087 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# HCM 2010 Signalized Intersection Summary
## 1: Heidorn Ranch Rd. & Lone Tree Way

Near-Term + Project
Timing Plan: AM PEAK

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 1 | 1031 | 60 | 29 | 1281 | 6 | 57 | 2 | 65 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 33 | 3380 | 197 | 76 | 3729 | 18 | 239 | 241 | 204 | 71 | 46 | 118 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.09 | 1.00 | 1.00 | 0.07 | 0.13 | 0.13 | 0.04 | 0.10 | 0.09 |
| Sat Flow, veh/h | 1774 | 5226 | 304 | 1774 | 5556 | 26 | 3442 | 1863 | 1576 | 1774 | 457 | 1187 |
| Grp Volume(v), veh/h | 1 | 845 | 409 | 33 | 987 | 492 | 106 | 4 | 120 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1804 | 1774 | 1863 | 1857 | 1721 | 1863 | 1576 | 1774 | 0 | 1644 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 2.5 | 0.2 | 4.9 | 0.5 | 0.0 | 0.9 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 2.5 | 0.2 | 4.9 | 0.5 | 0.0 | 0.9 |
| Prop In Lane | 1.00 | | 0.17 | 1.00 | | 0.01 | 1.00 | | 1.00 | 1.00 | | 0.72 |
| Lane Grp Cap(c), veh/h | 33 | 2410 | 1167 | 76 | 2500 | 1247 | 239 | 241 | 204 | 71 | 0 | 164 |
| V/C Ratio(X) | 0.03 | 0.35 | 0.35 | 0.43 | 0.39 | 0.39 | 0.44 | 0.02 | 0.59 | 0.14 | 0.00 | 0.11 |
| Avail Cap(c_a), veh/h | 292 | 2410 | 1167 | 292 | 2500 | 1247 | 567 | 767 | 649 | 292 | 0 | 677 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.98 | 0.98 | 0.98 | 0.86 | 0.86 | 0.86 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 40.2 | 0.0 | 0.0 | 37.9 | 0.0 | 0.0 | 38.0 | 32.3 | 22.8 | 39.4 | 0.0 | 35.0 |
| Incr Delay (d2), s/veh | 0.5 | 0.4 | 0.8 | 4.6 | 0.4 | 0.8 | 1.8 | 0.0 | 3.8 | 1.3 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.3 | 0.7 | 0.1 | 0.3 | 1.1 | 0.1 | 2.0 | 0.2 | 0.0 | 0.4 |
| Lane Grp Delay (d), s/veh | 40.7 | 0.4 | 0.8 | 42.5 | 0.4 | 0.8 | 39.8 | 32.4 | 26.6 | 40.7 | 0.0 | 35.1 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | D |
| Approach Vol, veh/h | | 1255 | | | 1512 | | | 230 | | | 28 | |
| Approach Delay, s/veh | | 0.6 | | | 1.5 | | | 32.8 | | | 37.1 | |
| Approach LOS | | A | | | A | | | C | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 | | 6.7 | 60.1 | | 8.9 | 14.0 | | 6.4 | 11.5 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 12.5 | 52.5 | | 12.5 | 52.5 | | 12.5 | 32.7 | | 12.5 | 33.5 | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 | | 3.5 | 2.0 | | 4.5 | 6.9 | | 2.5 | 2.9 | |
| Green Ext Time (p_c), s | 0.0 | 49.7 | | 0.0 | 49.7 | | 0.3 | 0.7 | | 0.0 | 0.1 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 3.8 |
| HCM 2010 LOS | | | A |

Notes

# HCM 2010 Signalized Intersection Summary
## 2: Canada Valley & Lone Tree Way

Near-Term + Project
Timing Plan: AM PEAK

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 31 | 1030 | 35 | 220 | 1227 | 245 | 32 | 18 | 62 | 341 | 28 | 58 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 164 | 2650 | 740 | 375 | 2837 | 792 | 115 | 155 | 130 | 648 | 128 | 266 |
| Arrive On Green | 0.10 | 0.95 | 0.95 | 0.22 | 1.00 | 1.00 | 0.03 | 0.08 | 0.08 | 0.19 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3442 | 5588 | 1560 | 3442 | 5588 | 1561 | 3548 | 1863 | 1555 | 3442 | 536 | 1112 |
| Grp Volume(v), veh/h | 35 | 1157 | 39 | 253 | 1410 | 282 | 38 | 60 | 47 | 501 | 0 | 126 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1560 | 1721 | 1863 | 1561 | 1774 | 1863 | 1555 | 1721 | 0 | 1648 |
| Q Serve(g_s), s | 0.8 | 1.5 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 11.4 | 0.0 | 5.2 |
| Cycle Q Clear(g_c), s | 0.8 | 1.5 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 11.4 | 0.0 | 5.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.67 |
| Lane Grp Cap(c), veh/h | 164 | 2650 | 740 | 375 | 2837 | 792 | 115 | 155 | 130 | 648 | 0 | 394 |
| V/C Ratio(X) | 0.21 | 0.44 | 0.05 | 0.67 | 0.50 | 0.36 | 0.33 | 0.39 | 0.36 | 0.77 | 0.00 | 0.32 |
| Avail Cap(c_a), veh/h | 499 | 2650 | 740 | 832 | 2837 | 792 | 515 | 833 | 695 | 1123 | 0 | 1036 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.95 | 0.95 | 0.95 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 36.0 | 1.2 | 1.1 | 31.0 | 0.0 | 0.0 | 39.1 | 35.9 | 35.8 | 31.9 | 0.0 | 25.9 |
| Incr Delay (d2), s/veh | 0.2 | 0.5 | 0.1 | 0.7 | 0.5 | 1.1 | 0.6 | 0.6 | 0.6 | 0.8 | 0.0 | 0.2 |
| 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 Back of Q (50%), veh/ln | 0.3 | 0.5 | 0.1 | 2.2 | 0.1 | 0.2 | 0.4 | 1.2 | 0.9 | 4.9 | 0.0 | 2.0 |
| Lane Grp Delay (d), s/veh | 36.2 | 1.7 | 1.3 | 31.7 | 0.5 | 1.1 | 39.8 | 36.5 | 36.5 | 32.6 | 0.0 | 26.1 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | C | | C |
| Approach Vol, veh/h | | 1231 | | | 1945 | | | 145 | | | 627 | |
| Approach Delay, s/veh | | 2.6 | | | 4.7 | | | 37.3 | | | 31.3 | |
| Approach LOS | | A | | | A | | | D | | | C | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.2 | 42.2 | | 12.0 | 45.0 | | 5.7 | 9.9 | | 18.6 | 22.8 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 30.7 | | 19.0 | 38.7 | | 11.0 | 35.8 | | 26.0 | 50.8 | |
| Max Q Clear Time (g_c+I1), s | 2.8 | 3.5 | | 7.6 | 2.0 | | 2.9 | 4.5 | | 13.4 | 7.2 | |
| Green Ext Time (p_c), s | 0.2 | 16.1 | | 0.5 | 26.9 | | 0.0 | 0.5 | | 1.1 | 0.5 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 9.5 |
| HCM 2010 LOS | | | A |

**Notes**

User approved volume balancing among the lanes for turning movement.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Volume (veh/h) | 190 | 35 | 1 | 13 | 62 | 76 | 6 | 30 | 10 | 24 | 7 | 181 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 464 | 474 | 12 | 464 | 199 | 245 | 9 | 700 | 221 | 36 | 509 | 432 |
| Arrive On Green | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.00 | 0.26 | 0.26 | 0.02 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1774 | 1811 | 44 | 1774 | 760 | 938 | 1774 | 2715 | 859 | 1774 | 1863 | 1583 |
| Grp Volume(v), veh/h | 224 | 0 | 42 | 21 | 0 | 219 | 6 | 20 | 20 | 28 | 8 | 210 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1855 | 1774 | 0 | 1697 | 1774 | 1863 | 1711 | 1774 | 1863 | 1583 |
| Q Serve(g_s), s | 4.0 | 0.0 | 0.6 | 0.3 | 0.0 | 4.1 | 0.1 | 0.3 | 0.3 | 0.6 | 0.1 | 4.2 |
| Cycle Q Clear(g_c), s | 4.0 | 0.0 | 0.6 | 0.3 | 0.0 | 4.1 | 0.1 | 0.3 | 0.3 | 0.6 | 0.1 | 4.2 |
| Prop In Lane | 1.00 | | 0.02 | 1.00 | | 0.55 | 1.00 | | 0.50 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 464 | 0 | 485 | 464 | 0 | 444 | 9 | 480 | 441 | 36 | 509 | 432 |
| V/C Ratio(X) | 0.48 | 0.00 | 0.09 | 0.05 | 0.00 | 0.49 | 0.70 | 0.04 | 0.05 | 0.78 | 0.02 | 0.49 |
| Avail Cap(c_a), veh/h | 1582 | 0 | 1655 | 1582 | 0 | 1514 | 1110 | 2267 | 2082 | 1110 | 2267 | 1927 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 11.7 | 0.0 | 10.5 | 10.4 | 0.0 | 11.8 | 18.7 | 10.5 | 10.5 | 18.3 | 10.0 | 11.4 |
| Incr Delay (d2), s/veh | 1.1 | 0.0 | 0.1 | 0.1 | 0.0 | 1.2 | 89.7 | 0.1 | 0.2 | 39.2 | 0.0 | 3.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 1.6 | 0.0 | 0.3 | 0.1 | 0.0 | 1.6 | 0.3 | 0.1 | 0.1 | 0.6 | 0.0 | 1.6 |
| Lane Grp Delay (d), s/veh | 12.8 | 0.0 | 10.6 | 10.4 | 0.0 | 13.0 | 108.4 | 10.6 | 10.6 | 57.5 | 10.0 | 14.5 |
| Lane Grp LOS | B | | B | B | | B | F | B | B | E | B | B |
| Approach Vol, veh/h | | 266 | | | 240 | | | 46 | | | 246 | |
| Approach Delay, s/veh | | 12.5 | | | 12.7 | | | 23.4 | | | 19.2 | |
| Approach LOS | | B | | | B | | | C | | | B | |
| **Timer** | | | | | | | | | | | | |
| Assigned Phs | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Phs Duration (G+Y+Rc), s | | 15.3 | | | 15.3 | | 5.7 | 16.0 | | 6.3 | 16.6 | |
| Change Period (Y+Rc), s | | 5.5 | | | 5.5 | | 5.5 | 6.3 | | 5.5 | 6.3 | |
| Max Green Setting (Gmax), s | | 33.5 | | | 33.5 | | 23.5 | 45.7 | | 23.5 | 45.7 | |
| Max Q Clear Time (g_c+I1), s | | 6.0 | | | 6.1 | | 2.1 | 2.3 | | 2.6 | 6.2 | |
| Green Ext Time (p_c), s | | 3.8 | | | 3.8 | | 0.0 | 4.2 | | 0.1 | 4.1 | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 15.3 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |
| **Notes** | | | | | | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 6.7 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 4 | 0 | 3 | 9 | 34 | 8 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 0 | 3 | 10 | 38 | 9 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 13 | 0 | - | 0 | 17 | 8 |
| Stage 1 | - | - | - | - | 8 | - |
| Stage 2 | - | - | - | - | 9 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1606 | - | - | - | 1001 | 1074 |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1014 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1606 | - | - | - | 999 | 1074 |
| Mov Capacity-2 Maneuver | - | - | - | - | 999 | - |
| Stage 1 | - | - | - | - | 1015 | - |
| Stage 2 | - | - | - | - | 1011 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.2 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1606 | - | - | - | 999 | 1074 |
| HCM Lane V/C Ratio | 0.003 | - | - | - | 0.038 | 0.008 |
| HCM Control Delay (s) | 7.248 | - | - | - | 8.7 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.008 | - | - | - | 0.118 | 0.025 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| | ↗ | ↘ | ↖ | ↑ | ↰ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 34 | 0 | 0 | 0 | 24 | 0 | 12 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 65 | 58 | 7 | 2484 | | 1242 | 1056 |
| Arrive On Green | 0.04 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.67 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 38 | 0 | 0 | 0 | | 0 | 13 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 0.6 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Cycle Q Clear(g_c), s | 0.6 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 65 | 58 | 7 | 2484 | | 1242 | 1056 |
| V/C Ratio(X) | 0.58 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.01 |
| Avail Cap(c_a), veh/h | 1117 | 997 | 526 | 2484 | | 1242 | 1056 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 12.8 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Incr Delay (d2), s/veh | 8.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Lane Grp Delay (d), s/veh | 20.8 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Lane Grp LOS | C | | | | | | A |
| Approach Vol, veh/h | 38 | | | 0 | | 13 | |
| Approach Delay, s/veh | 20.8 | | | 0.0 | | 1.5 | |
| Approach LOS | C | | | | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 0.0 | 22.0 | | 22.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 17.0 | | 18.0 | |
| Max Q Clear Time (g_c+I1), s | | | 0.0 | 0.0 | | 2.1 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.0 | | 0.0 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 15.9 | | | | |
| HCM 2010 LOS | | | B | | | | |
| **Notes** | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 2.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 27 | 0 | 50 | 9 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 30 | 0 | 56 | 10 | 11 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 44 | 11 | 21 | 0 | - | 0 |
| Stage 1 | 16 | - | - | - | - | - |
| Stage 2 | 28 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 961 | 1067 | 1593 | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 991 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 961 | 1067 | 1593 | - | - | - |
| Mov Capacity-2 Maneuver | 961 | - | - | - | - | - |
| Stage 1 | 1004 | - | - | - | - | - |
| Stage 2 | 991 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.5 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1593 | - | 1067 | - | - |
| HCM Lane V/C Ratio | - | - | 0.028 | - | - |
| HCM Control Delay (s) | 0 | - | 8.5 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.087 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# Queues
## 1: Heidorn Ranch Rd. & Lone Tree Way

| | ⤴ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 3 | 1958 | 78 | 1624 | 167 | 8 | 73 | 23 | 10 |
| v/c Ratio | 0.03 | 0.58 | 0.43 | 0.42 | 0.37 | 0.04 | 0.27 | 0.17 | 0.06 |
| Control Delay | 78.3 | 11.8 | 91.2 | 2.0 | 53.2 | 46.0 | 5.9 | 58.7 | 36.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.3 | 11.8 | 91.2 | 2.0 | 53.2 | 46.0 | 5.9 | 58.7 | 36.0 |
| Queue Length 50th (ft) | 3 | 327 | 69 | 37 | 64 | 6 | 0 | 19 | 4 |
| Queue Length 95th (ft) | m9 | 638 | 123 | 53 | 97 | 17 | 18 | 22 | 7 |
| Internal Link Dist (ft) | | 1050 | | 900 | | 972 | | | 316 |
| Turn Bay Length (ft) | 200 | | 410 | | 215 | | 200 | 50 | |
| Base Capacity (vph) | 231 | 3356 | 233 | 3831 | 507 | 515 | 500 | 231 | 477 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.58 | 0.33 | 0.42 | 0.33 | 0.02 | 0.15 | 0.10 | 0.02 |

### Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 2: Canada Valley & Lone Tree Way

Timing Plan: PM PEAK

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 85 | 1943 | 33 | 449 | 1500 | 417 | 70 | 142 | 130 | 305 | 116 |
| v/c Ratio | 0.27 | 0.80 | 0.04 | 0.78 | 0.53 | 0.41 | 0.33 | 0.57 | 0.37 | 0.68 | 0.29 |
| Control Delay | 49.6 | 25.9 | 1.1 | 63.4 | 12.3 | 1.5 | 62.0 | 45.3 | 4.3 | 61.8 | 27.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.6 | 25.9 | 1.1 | 63.4 | 12.3 | 1.5 | 62.0 | 45.3 | 4.3 | 61.8 | 27.4 |
| Queue Length 50th (ft) | 35 | 357 | 0 | 168 | 142 | 3 | 29 | 89 | 0 | 128 | 56 |
| Queue Length 95th (ft) | m52 | #886 | m3 | 200 | 455 | 7 | 53 | 129 | 13 | 162 | 82 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | |
| Base Capacity (vph) | 316 | 2424 | 802 | 613 | 2810 | 1016 | 369 | 488 | 549 | 633 | 645 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.27 | 0.80 | 0.04 | 0.73 | 0.53 | 0.41 | 0.19 | 0.29 | 0.24 | 0.48 | 0.18 |

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

## 3: Hillcrest Ave & Prewitt Ranch Dr/Prewett Ranch Drive

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 282 | 56 | 12 | 45 | 11 | 35 | 45 | 205 |
| v/c Ratio | 0.51 | 0.10 | 0.04 | 0.16 | 0.04 | 0.06 | 0.15 | 0.21 |
| Control Delay | 22.4 | 17.6 | 28.8 | 16.4 | 29.6 | 16.4 | 28.1 | 5.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 22.4 | 17.6 | 28.8 | 16.4 | 29.6 | 16.4 | 28.1 | 5.3 |
| Queue Length 50th (ft) | 95 | 16 | 4 | 4 | 4 | 2 | 16 | 0 |
| Queue Length 95th (ft) | 138 | 34 | 20 | 34 | 19 | 15 | 44 | 23 |
| Internal Link Dist (ft) |  | 1118 |  | 1894 |  | 1312 |  | 2575 |
| Turn Bay Length (ft) | 95 |  | 115 |  | 130 |  | 230 |  |
| Base Capacity (vph) | 1222 | 1271 | 1222 | 1143 | 896 | 2533 | 896 | 2447 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.23 | 0.04 | 0.01 | 0.04 | 0.01 | 0.01 | 0.05 | 0.08 |

Intersection Summary

## 4: Prewett Ranch Drive/Prewett Ranch Dr & South Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 4.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 0 | 1 | 30 | 23 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 0 | 1 | 33 | 26 | 6 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 34 | 0 | - | 0 | 42 | 18 |
| Stage 1 | - | - | - | - | 18 | - |
| Stage 2 | - | - | - | - | 24 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1578 | - | - | - | 969 | 1061 |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 999 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1578 | - | - | - | 962 | 1061 |
| Mov Capacity-2 Maneuver | - | - | - | - | 962 | - |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 991 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.3 | 0 | 8.7 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1578 | - | - | - | 962 | 1061 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.027 | 0.005 |
| HCM Control Delay (s) | 7.299 | - | - | - | 8.8 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.023 | - | - | - | 0.082 | 0.016 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

## 5: Heidorn Ranch Road & Prewett Ranch Dr

| | ↗ | ↶ | ↓ |
|---|---|---|---|
| Lane Group | EBL | SBU | SBT |
| Lane Group Flow (vph) | 26 | 17 | 34 |
| v/c Ratio | 0.09 | 0.06 | 0.01 |
| Control Delay | 16.1 | 16.1 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 |
| Total Delay | 16.1 | 16.1 | 0.0 |
| Queue Length 50th (ft) | 5 | 3 | 0 |
| Queue Length 95th (ft) | 22 | 17 | 0 |
| Internal Link Dist (ft) | 580 | | 322 |
| Turn Bay Length (ft) | 100 | 100 | |
| Base Capacity (vph) | 718 | 404 | 2881 |
| Starvation Cap Reductn | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.04 | 0.04 | 0.01 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 17 | 0 | 23 | 29 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 19 | 0 | 26 | 32 | 39 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 36 | 71 | 0 | - | 0 |
| Stage 1 | 52 | - | - | - | - | - |
| Stage 2 | 13 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Mov Capacity-2 Maneuver | 933 | - | - | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1527 | - | 1029 | - | - |
| HCM Lane V/C Ratio | - | - | 0.018 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.056 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 3 | 1813 | 106 | 71 | 1458 | 20 | 142 | 7 | 62 | 10 | 2 | 2 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.98 | 1.00 | | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 38 | 3015 | 176 | 132 | 3462 | 48 | 322 | 220 | 183 | 154 | 94 | 94 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.15 | 1.00 | 1.00 | 0.09 | 0.12 | 0.12 | 0.09 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 5229 | 305 | 1774 | 5499 | 76 | 3442 | 1863 | 1546 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 1317 | 641 | 78 | 1085 | 539 | 167 | 8 | 73 | 23 | 0 | 10 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1808 | 1774 | 1863 | 1849 | 1721 | 1863 | 1546 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 3.8 | 0.3 | 2.8 | 1.0 | 0.0 | 0.4 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 3.8 | 0.3 | 2.8 | 1.0 | 0.0 | 0.4 |
| Prop In Lane | 1.00 | | 0.17 | 1.00 | | 0.04 | 1.00 | | 1.00 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 38 | 2148 | 1043 | 132 | 2345 | 1164 | 322 | 220 | 183 | 154 | 0 | 188 |
| V/C Ratio(X) | 0.08 | 0.61 | 0.62 | 0.59 | 0.46 | 0.46 | 0.52 | 0.04 | 0.40 | 0.15 | 0.00 | 0.05 |
| Avail Cap(c_a), veh/h | 362 | 2148 | 1043 | 362 | 2345 | 1164 | 703 | 805 | 668 | 362 | 0 | 729 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.93 | 0.93 | 0.93 | 0.84 | 0.84 | 0.84 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.1 | 0.0 | 0.0 | 34.3 | 0.0 | 0.0 | 35.9 | 32.5 | 20.2 | 35.2 | 0.0 | 33.2 |
| Incr Delay (d2), s/veh | 1.2 | 1.2 | 2.5 | 5.0 | 0.6 | 1.1 | 1.8 | 0.1 | 2.0 | 0.6 | 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 Back of Q (50%), veh/ln | 0.1 | 0.4 | 0.7 | 1.6 | 0.2 | 0.4 | 1.7 | 0.2 | 1.4 | 0.5 | 0.0 | 0.2 |
| Lane Grp Delay (d), s/veh | 40.3 | 1.2 | 2.5 | 39.3 | 0.6 | 1.1 | 37.8 | 32.6 | 22.2 | 35.8 | 0.0 | 33.2 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 1961 | | | 1702 | | | 248 | | | 33 | |
| Approach Delay, s/veh | | 1.7 | | | 2.5 | | | 33.0 | | | 35.0 | |
| Approach LOS | | A | | | A | | | C | | | D | |
| **Timer** | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 | | 9.2 | 55.4 | | 10.8 | 12.8 | | 10.2 | 12.3 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 15.5 | 45.5 | | 15.5 | 45.5 | | 15.5 | 33.7 | | 15.5 | 34.5 | |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 | | 5.4 | 2.0 | | 5.8 | 4.8 | | 3.0 | 2.4 | |
| Green Ext Time (p_c), s | 0.0 | 43.4 | | 0.2 | 43.4 | | 0.6 | 0.4 | | 0.1 | 0.1 | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 4.3 | | | | | | | | | |
| HCM 2010 LOS | | | A | | | | | | | | | |
| **Notes** | | | | | | | | | | | | |

# HCM 2010 Signalized Intersection Summary
## 2: Canada Valley & Lone Tree Way

Near-Term + Project
Timing Plan: PM PEAK

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 80 | 1826 | 31 | 431 | 1440 | 400 | 62 | 63 | 176 | 262 | 52 | 48 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 157 | 2299 | 650 | 557 | 2806 | 794 | 163 | 311 | 258 | 432 | 217 | 202 |
| Arrive On Green | 0.09 | 0.82 | 0.82 | 0.32 | 1.00 | 1.00 | 0.05 | 0.17 | 0.17 | 0.13 | 0.25 | 0.25 |
| Sat Flow, veh/h | 3442 | 5588 | 1581 | 3442 | 5588 | 1581 | 3548 | 1863 | 1543 | 3442 | 878 | 819 |
| Grp Volume(v), veh/h | 85 | 1943 | 33 | 449 | 1500 | 417 | 70 | 168 | 136 | 305 | 0 | 116 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1581 | 1721 | 1863 | 1581 | 1774 | 1863 | 1543 | 1721 | 0 | 1697 |
| Q Serve(g_s), s | 2.1 | 18.1 | 0.3 | 10.7 | 0.0 | 0.0 | 1.7 | 7.4 | 7.2 | 7.6 | 0.0 | 5.0 |
| Cycle Q Clear(g_c), s | 2.1 | 18.1 | 0.3 | 10.7 | 0.0 | 0.0 | 1.7 | 7.4 | 7.2 | 7.6 | 0.0 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.48 |
| Lane Grp Cap(c), veh/h | 157 | 2299 | 650 | 557 | 2806 | 794 | 163 | 311 | 258 | 432 | 0 | 419 |
| V/C Ratio(X) | 0.54 | 0.85 | 0.05 | 0.81 | 0.53 | 0.53 | 0.43 | 0.54 | 0.53 | 0.71 | 0.00 | 0.28 |
| Avail Cap(c_a), veh/h | 461 | 2299 | 650 | 845 | 2806 | 794 | 554 | 769 | 637 | 922 | 0 | 890 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.80 | 0.80 | 0.80 | 0.87 | 0.87 | 0.87 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.8 | 6.3 | 4.7 | 29.0 | 0.0 | 0.0 | 41.6 | 34.2 | 34.1 | 37.6 | 0.0 | 27.3 |
| Incr Delay (d2), s/veh | 0.9 | 3.3 | 0.1 | 1.6 | 0.6 | 2.2 | 0.7 | 0.5 | 0.6 | 0.8 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.9 | 3.3 | 0.1 | 3.8 | 0.2 | 0.5 | 0.8 | 3.4 | 2.8 | 3.3 | 0.0 | 2.0 |
| Lane Grp Delay (d), s/veh | 40.7 | 9.5 | 4.8 | 30.6 | 0.6 | 2.2 | 42.3 | 34.7 | 34.7 | 38.4 | 0.0 | 27.4 |
| Lane Grp LOS | D | A | A | C | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 2061 | | | 2366 | | | 374 | | | 421 | |
| Approach Delay, s/veh | | 10.8 | | | 6.6 | | | 36.1 | | | 35.4 | |
| Approach LOS | | B | | | A | | | D | | | D | |
| Timer | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.4 | 39.9 | | 17.5 | 48.0 | | 7.1 | 18.0 | | 14.3 | 25.1 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 4.1 | 20.1 | | 12.7 | 2.0 | | 3.7 | 9.4 | | 9.6 | 7.0 | |
| Green Ext Time (p_c), s | 0.2 | 10.8 | | 0.8 | 31.7 | | 0.1 | 0.9 | | 0.6 | 0.9 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 12.7 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |

Notes

User approved volume balancing among the lanes for turning movement.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Volume (veh/h) | 206 | 38 | 3 | 12 | 12 | 33 | 11 | 11 | 24 | 37 | 4 | 166 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 463 | 446 | 34 | 463 | 115 | 316 | 15 | 430 | 366 | 54 | 471 | 400 |
| Arrive On Green | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.01 | 0.23 | 0.23 | 0.03 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 1708 | 131 | 1774 | 439 | 1208 | 1774 | 1863 | 1583 | 1774 | 1863 | 1583 |
| Grp Volume(v), veh/h | 282 | 0 | 56 | 12 | 0 | 45 | 11 | 11 | 24 | 45 | 5 | 200 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1839 | 1774 | 0 | 1648 | 1774 | 1863 | 1583 | 1774 | 1863 | 1583 |
| Q Serve(g_s), s | 5.1 | 0.0 | 0.8 | 0.2 | 0.0 | 0.8 | 0.2 | 0.2 | 0.4 | 0.9 | 0.1 | 3.9 |
| Cycle Q Clear(g_c), s | 5.1 | 0.0 | 0.8 | 0.2 | 0.0 | 0.8 | 0.2 | 0.2 | 0.4 | 0.9 | 0.1 | 3.9 |
| Prop In Lane | 1.00 | | 0.07 | 1.00 | | 0.73 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 463 | 0 | 480 | 463 | 0 | 430 | 15 | 430 | 366 | 54 | 471 | 400 |
| V/C Ratio(X) | 0.61 | 0.00 | 0.12 | 0.03 | 0.00 | 0.10 | 0.71 | 0.03 | 0.07 | 0.83 | 0.01 | 0.50 |
| Avail Cap(c_a), veh/h | 1640 | 0 | 1700 | 1640 | 0 | 1523 | 1150 | 2349 | 1997 | 1150 | 2349 | 1997 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 11.8 | 0.0 | 10.2 | 10.0 | 0.0 | 10.2 | 17.9 | 10.8 | 10.9 | 17.5 | 10.1 | 11.6 |
| Incr Delay (d2), s/veh | 1.8 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 61.1 | 0.1 | 0.3 | 35.0 | 0.0 | 3.5 |
| 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 Back of Q (50%), veh/ln | 2.0 | 0.0 | 0.3 | 0.1 | 0.0 | 0.3 | 0.3 | 0.1 | 0.2 | 0.8 | 0.0 | 1.6 |
| Lane Grp Delay (d), s/veh | 13.6 | 0.0 | 10.4 | 10.0 | 0.0 | 10.3 | 79.0 | 10.9 | 11.2 | 52.4 | 10.2 | 15.1 |
| Lane Grp LOS | B | | B | A | | B | E | B | B | D | B | B |
| Approach Vol, veh/h | | 338 | | | 57 | | | 46 | | | 250 | |
| Approach Delay, s/veh | | 13.1 | | | 10.2 | | | 27.3 | | | 21.7 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Phs Duration (G+Y+Rc), s | | 15.0 | | | 15.0 | | 5.8 | 14.7 | | 6.6 | 15.5 | |
| Change Period (Y+Rc), s | | 5.5 | | | 5.5 | | 5.5 | 6.3 | | 5.5 | 6.3 | |
| Max Green Setting (Gmax), s | | 33.5 | | | 33.5 | | 23.5 | 45.7 | | 23.5 | 45.7 | |
| Max Q Clear Time (g_c+I1), s | | 7.1 | | | 2.8 | | 2.2 | 2.4 | | 2.9 | 5.9 | |
| Green Ext Time (p_c), s | | 2.4 | | | 2.5 | | 0.0 | 3.9 | | 0.1 | 3.8 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 16.9 |
| HCM 2010 LOS | | | B |

Notes

## 4: Prewett Ranch Drive/Prewett Ranch Dr & South Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 4.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 11 | 0 | 1 | 30 | 23 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 0 | 1 | 33 | 26 | 6 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 34 | 0 | - | 0 | 42 | 18 |
| Stage 1 | - | - | - | - | 18 | - |
| Stage 2 | - | - | - | - | 24 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1578 | - | - | - | 969 | 1061 |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 999 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1578 | - | - | - | 962 | 1061 |
| Mov Capacity-2 Maneuver | - | - | - | - | 962 | - |
| Stage 1 | - | - | - | - | 1005 | - |
| Stage 2 | - | - | - | - | 991 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 7.3 | 0 | 8.7 |
| HCM LOS | | | A |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1578 | - | - | - | 962 | 1061 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.027 | 0.005 |
| HCM Control Delay (s) | 7.299 | - | - | - | 8.8 | 8.4 |
| HCM Lane LOS | A | | | | A | A |
| HCM 95th %tile Q(veh) | 0.023 | - | - | - | 0.082 | 0.016 |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 23 | 0 | 0 | 0 | 15 | 0 | 31 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 46 | 41 | 6 | 2553 | | 1277 | 1085 |
| Arrive On Green | 0.03 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.69 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 26 | 0 | 0 | 0 | | 0 | 34 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 0.4 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.2 |
| Cycle Q Clear(g_c), s | 0.4 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 46 | 41 | 6 | 2553 | | 1277 | 1085 |
| V/C Ratio(X) | 0.56 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.03 |
| Avail Cap(c_a), veh/h | 1024 | 914 | 512 | 2553 | | 1277 | 1085 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.4 |
| Incr Delay (d2), s/veh | 10.1 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.3 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Lane Grp Delay (d), s/veh | 23.5 | 0.0 | 0.0 | 0.0 | | 0.0 | 1.5 |
| Lane Grp LOS | C | | | | | | A |
| Approach Vol, veh/h | 26 | | | 0 | | 34 | |
| Approach Delay, s/veh | 23.5 | | | 0.0 | | 1.5 | |
| Approach LOS | C | | | | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 0.0 | 23.0 | | 23.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 18.0 | | 19.0 | |
| Max Q Clear Time (g_c+I1), s | | | 0.0 | 0.0 | | 2.2 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.0 | | 0.1 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 11.0 | | | | |
| HCM 2010 LOS | | | B | | | | |
| **Notes** | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.4 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 17 | 0 | 23 | 29 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 19 | 0 | 26 | 32 | 39 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 65 | 36 | 71 | 0 | - | 0 |
| Stage 1 | 52 | - | - | - | - | - |
| Stage 2 | 13 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 933 | 1029 | 1527 | - | - | - |
| Mov Capacity-2 Maneuver | 933 | - | - | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 1008 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1527 | - | 1029 | - | - |
| HCM Lane V/C Ratio | - | - | 0.018 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.056 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# LONG-TERM (2030) TRAFFIC CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↑↱ | | ↰ | ↑↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↑↱ | |
| Volume (veh/h) | 1 | 1117 | 65 | 13 | 1320 | 6 | 32 | 2 | 27 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 34 | 3512 | 205 | 58 | 3809 | 18 | 187 | 172 | 145 | 100 | 43 | 112 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.06 | 1.00 | 1.00 | 0.05 | 0.09 | 0.09 | 0.06 | 0.09 | 0.09 |
| Sat Flow, veh/h | 1774 | 5224 | 305 | 1774 | 5557 | 26 | 3442 | 1863 | 1573 | 1774 | 457 | 1187 |
| Grp Volume(v), veh/h | 1 | 916 | 443 | 15 | 1017 | 507 | 59 | 4 | 50 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1804 | 1774 | 1863 | 1858 | 1721 | 1863 | 1573 | 1774 | 0 | 1644 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 1.3 | 0.2 | 2.0 | 0.4 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 1.3 | 0.2 | 2.0 | 0.4 | 0.0 | 0.8 |
| Prop In Lane | 1.00 | | 0.17 | 1.00 | | 0.01 | 1.00 | | 1.00 | 1.00 | | 0.72 |
| Lane Grp Cap(c), veh/h | 34 | 2505 | 1213 | 58 | 2553 | 1273 | 187 | 172 | 145 | 100 | 0 | 155 |
| V/C Ratio(X) | 0.03 | 0.37 | 0.37 | 0.26 | 0.40 | 0.40 | 0.31 | 0.02 | 0.34 | 0.10 | 0.00 | 0.12 |
| Avail Cap(c_a), veh/h | 304 | 2505 | 1213 | 304 | 2553 | 1273 | 589 | 797 | 673 | 304 | 0 | 703 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.95 | 0.95 | 0.95 | 0.85 | 0.85 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 38.6 | 0.0 | 0.0 | 37.3 | 0.0 | 0.0 | 37.2 | 33.8 | 23.5 | 36.6 | 0.0 | 34.1 |
| Incr Delay (d2), s/veh | 0.5 | 0.4 | 0.8 | 2.9 | 0.4 | 0.8 | 1.4 | 0.1 | 2.0 | 0.6 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.3 | 0.3 | 0.1 | 0.3 | 0.6 | 0.1 | 1.0 | 0.2 | 0.0 | 0.3 |
| Lane Grp Delay (d), s/veh | 39.0 | 0.4 | 0.8 | 40.2 | 0.4 | 0.8 | 38.6 | 33.9 | 25.5 | 37.3 | 0.0 | 34.2 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 1360 | | | 1539 | | | 113 | | | 28 | |
| Approach Delay, s/veh | | 0.6 | | | 0.9 | | | 32.6 | | | 35.3 | |
| Approach LOS | | A | | | A | | | C | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 | | 5.7 | 59.1 | | 7.5 | 10.5 | | 7.6 | 10.7 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 12.5 | 52.5 | | 12.5 | 52.5 | | 12.5 | 32.7 | | 12.5 | 33.5 | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 | | 2.7 | 2.0 | | 3.3 | 4.0 | | 2.4 | 2.8 | |
| Green Ext Time (p_c), s | 0.0 | 49.9 | | 0.0 | 49.9 | | 0.1 | 0.2 | | 0.0 | 0.1 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 2.3 |
| HCM 2010 LOS | | | A |

Notes

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 31 | 1045 | 36 | 220 | 1244 | 249 | 35 | 18 | 62 | 354 | 29 | 60 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 163 | 2628 | 733 | 374 | 2816 | 786 | 120 | 155 | 129 | 667 | 132 | 269 |
| Arrive On Green | 0.09 | 0.94 | 0.94 | 0.22 | 1.00 | 1.00 | 0.03 | 0.08 | 0.08 | 0.19 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3442 | 5588 | 1560 | 3442 | 5588 | 1561 | 3548 | 1863 | 1555 | 3442 | 541 | 1107 |
| Grp Volume(v), veh/h | 35 | 1174 | 40 | 253 | 1430 | 286 | 41 | 60 | 47 | 521 | 0 | 131 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1560 | 1721 | 1863 | 1561 | 1774 | 1863 | 1555 | 1721 | 0 | 1649 |
| Q Serve(g_s), s | 0.8 | 1.8 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 12.0 | 0.0 | 5.4 |
| Cycle Q Clear(g_c), s | 0.8 | 1.8 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 12.0 | 0.0 | 5.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.67 |
| Lane Grp Cap(c), veh/h | 163 | 2628 | 733 | 374 | 2816 | 786 | 120 | 155 | 129 | 667 | 0 | 401 |
| V/C Ratio(X) | 0.21 | 0.45 | 0.05 | 0.68 | 0.51 | 0.36 | 0.34 | 0.39 | 0.36 | 0.78 | 0.00 | 0.33 |
| Avail Cap(c_a), veh/h | 495 | 2628 | 733 | 826 | 2816 | 786 | 511 | 827 | 690 | 1115 | 0 | 1028 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.95 | 0.95 | 0.95 | 0.79 | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 36.3 | 1.4 | 1.3 | 31.3 | 0.0 | 0.0 | 39.4 | 36.2 | 36.1 | 31.9 | 0.0 | 25.9 |
| Incr Delay (d2), s/veh | 0.2 | 0.5 | 0.1 | 0.6 | 0.5 | 1.0 | 0.6 | 0.6 | 0.6 | 0.8 | 0.0 | 0.2 |
| 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 Back of Q (50%), veh/ln | 0.3 | 0.6 | 0.1 | 2.2 | 0.1 | 0.2 | 0.4 | 1.2 | 0.9 | 5.1 | 0.0 | 2.2 |
| Lane Grp Delay (d), s/veh | 36.5 | 1.9 | 1.5 | 31.9 | 0.5 | 1.0 | 40.0 | 36.8 | 36.8 | 32.7 | 0.0 | 26.1 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | C | | C |
| Approach Vol, veh/h | | 1249 | | | 1969 | | | 148 | | | 652 | |
| Approach Delay, s/veh | | 2.9 | | | 4.6 | | | 37.7 | | | 31.4 | |
| Approach LOS | | A | | | A | | | D | | | C | |
| **Timer** | | | | | | | | | | | | |
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.3 | 42.2 | | 12.1 | 45.0 | | 5.8 | 9.9 | | 19.2 | 23.3 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 30.7 | | 19.0 | 38.7 | | 11.0 | 35.8 | | 26.0 | 50.8 | |
| Max Q Clear Time (g_c+I1), s | 2.8 | 3.8 | | 7.6 | 2.0 | | 2.9 | 4.5 | | 14.0 | 7.4 | |
| Green Ext Time (p_c), s | 0.2 | 16.2 | | 0.5 | 27.3 | | 0.0 | 0.5 | | 1.2 | 0.5 | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 9.6 | | | | | | | | | |
| HCM 2010 LOS | | | A | | | | | | | | | |

**Notes**

User approved volume balancing among the lanes for turning movement.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ |  | ↰ | ↱ |  | ↰ | ↑↱ |  | ↰↰ | ↑↱ |  |
| Volume (veh/h) | 196 | 32 | 10 | 55 | 77 | 182 | 43 | 295 | 47 | 23 | 84 | 190 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 2 | 2 | 0 |
| Cap, veh/h | 627 | 480 | 152 | 627 | 174 | 412 | 117 | 972 | 153 | 63 | 461 | 392 |
| Arrive On Green | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.07 | 0.31 | 0.31 | 0.02 | 0.25 | 0.25 |
| Sat Flow, veh/h | 1774 | 1358 | 429 | 1774 | 492 | 1165 | 1774 | 3143 | 495 | 3442 | 1863 | 1583 |
| Grp Volume(v), veh/h | 231 | 0 | 50 | 87 | 0 | 411 | 43 | 173 | 169 | 27 | 98 | 221 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1787 | 1774 | 0 | 1657 | 1774 | 1863 | 1775 | 1721 | 1863 | 1583 |
| Q Serve(g_s), s | 5.4 | 0.0 | 1.0 | 1.9 | 0.0 | 11.9 | 1.3 | 4.0 | 4.0 | 0.4 | 2.3 | 6.8 |
| Cycle Q Clear(g_c), s | 5.4 | 0.0 | 1.0 | 1.9 | 0.0 | 11.9 | 1.3 | 4.0 | 4.0 | 0.4 | 2.3 | 6.8 |
| Prop In Lane | 1.00 |  | 0.24 | 1.00 |  | 0.70 | 1.00 |  | 0.28 | 1.00 |  | 1.00 |
| Lane Grp Cap(c), veh/h | 627 | 0 | 632 | 627 | 0 | 586 | 117 | 576 | 549 | 63 | 461 | 392 |
| V/C Ratio(X) | 0.37 | 0.00 | 0.08 | 0.14 | 0.00 | 0.70 | 0.37 | 0.30 | 0.31 | 0.43 | 0.21 | 0.56 |
| Avail Cap(c_a), veh/h | 1064 | 0 | 1072 | 1048 | 0 | 979 | 747 | 1524 | 1453 | 1448 | 1524 | 1296 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.4 | 0.0 | 12.0 | 12.3 | 0.0 | 15.5 | 25.0 | 14.7 | 14.7 | 27.1 | 16.7 | 18.4 |
| Incr Delay (d2), s/veh | 0.5 | 0.0 | 0.1 | 0.1 | 0.0 | 2.2 | 2.7 | 1.1 | 1.1 | 6.4 | 0.8 | 4.6 |
| 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 Back of Q (50%), veh/ln | 2.3 | 0.0 | 0.4 | 0.8 | 0.0 | 4.8 | 0.6 | 1.8 | 1.7 | 0.2 | 1.1 | 2.9 |
| Lane Grp Delay (d), s/veh | 13.9 | 0.0 | 12.1 | 12.4 | 0.0 | 17.7 | 27.7 | 15.7 | 15.9 | 33.5 | 17.5 | 23.0 |
| Lane Grp LOS | B |  | B | B |  | B | C | B | B | C | B | C |
| Approach Vol, veh/h |  | 281 |  |  | 498 |  |  | 385 |  |  | 346 |  |
| Approach Delay, s/veh |  | 13.6 |  |  | 16.8 |  |  | 17.1 |  |  | 22.2 |  |
| Approach LOS |  | B |  |  | B |  |  | B |  |  | C |  |

| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs |  | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Phs Duration (G+Y+Rc), s |  | 25.7 |  |  | 25.7 |  | 10.0 | 23.6 |  | 6.5 | 20.1 |  |
| Change Period (Y+Rc), s |  | 6.0 |  |  | 6.0 |  | 6.3 | 6.3 |  | 5.5 | 6.3 |  |
| Max Green Setting (Gmax), s |  | 33.5 |  |  | 33.0 |  | 23.5 | 45.7 |  | 23.5 | 45.7 |  |
| Max Q Clear Time (g_c+I1), s |  | 7.4 |  |  | 13.9 |  | 3.3 | 6.0 |  | 2.4 | 8.8 |  |
| Green Ext Time (p_c), s |  | 6.6 |  |  | 5.8 |  | 4.3 | 5.4 |  | 0.1 | 5.0 |  |

| Intersection Summary |  |
|---|---|
| HCM 2010 Ctrl Delay | 17.5 |
| HCM 2010 LOS | B |

Notes

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ⮌ | ↑↱ | |
| Volume (veh/h) | 19 | 106 | 302 | 29 | 0 | 27 | 16 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 | 0.90 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 180 | 161 | 452 | 2149 | | 348 | 189 |
| Arrive On Green | 0.10 | 0.10 | 0.25 | 0.58 | | 0.16 | 0.16 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 2161 | 1172 |
| Grp Volume(v), veh/h | 21 | 118 | 336 | 32 | | 25 | 23 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1470 |
| Q Serve(g_s), s | 0.3 | 1.8 | 4.3 | 0.1 | | 0.3 | 0.3 |
| Cycle Q Clear(g_c), s | 0.3 | 1.8 | 4.3 | 0.1 | | 0.3 | 0.3 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 0.80 |
| Lane Grp Cap(c), veh/h | 180 | 161 | 452 | 2149 | | 300 | 236 |
| V/C Ratio(X) | 0.12 | 0.73 | 0.74 | 0.01 | | 0.08 | 0.10 |
| Avail Cap(c_a), veh/h | 1142 | 1019 | 1142 | 3597 | | 1199 | 946 |
| 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 | 10.2 | 10.8 | 8.5 | 2.2 | | 8.9 | 8.9 |
| Incr Delay (d2), s/veh | 0.3 | 6.4 | 2.4 | 0.0 | | 0.1 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.1 | 0.3 | 1.4 | 0.0 | | 0.1 | 0.1 |
| Lane Grp Delay (d), s/veh | 10.4 | 17.2 | 10.9 | 2.2 | | 9.0 | 9.1 |
| Lane Grp LOS | B | B | B | A | | A | A |
| Approach Vol, veh/h | 139 | | | 368 | | 48 | |
| Approach Delay, s/veh | 16.2 | | | 10.2 | | 9.0 | |
| Approach LOS | B | | | B | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 10.3 | 18.3 | | 8.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 16.0 | 24.0 | | 16.0 | |
| Max Q Clear Time (g_c+I1), s | | | 6.3 | 2.1 | | 2.3 | |
| Green Ext Time (p_c), s | | | 0.7 | 0.3 | | 0.2 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 11.6 | | | | |
| HCM 2010 LOS | | | B | | | | |
| **Notes** | | | | | | | |

# Queues
## 1: Heidorn Ranch Rd. & Lone Tree Way

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 1359 | 15 | 1524 | 59 | 4 | 50 | 10 | 18 |
| v/c Ratio | 0.01 | 0.34 | 0.12 | 0.37 | 0.22 | 0.02 | 0.18 | 0.08 | 0.11 |
| Control Delay | 74.0 | 6.1 | 74.5 | 0.9 | 57.8 | 42.0 | 1.5 | 57.8 | 26.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.0 | 6.1 | 74.5 | 0.9 | 57.8 | 42.0 | 1.5 | 57.8 | 26.7 |
| Queue Length 50th (ft) | 1 | 43 | 13 | 1 | 24 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m2 | 167 | m27 | 34 | 27 | 7 | 0 | 26 | 22 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 2503 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 190 | 3972 | 190 | 4120 | 369 | 501 | 490 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.34 | 0.08 | 0.37 | 0.16 | 0.01 | 0.10 | 0.05 | 0.04 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# Queues
## 2: Canada Valley & Lone Tree Way

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 35 | 1174 | 40 | 253 | 1430 | 286 | 41 | 49 | 45 | 521 | 131 |
| v/c Ratio | 0.11 | 0.44 | 0.05 | 0.64 | 0.52 | 0.30 | 0.22 | 0.27 | 0.15 | 0.82 | 0.29 |
| Control Delay | 39.8 | 14.2 | 0.6 | 70.6 | 13.6 | 2.0 | 61.2 | 28.3 | 1.0 | 61.7 | 14.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 39.8 | 14.2 | 0.6 | 70.6 | 13.6 | 2.0 | 61.2 | 28.3 | 1.0 | 61.7 | 14.4 |
| Queue Length 50th (ft) | 13 | 161 | 0 | 106 | 126 | 0 | 17 | 17 | 0 | 217 | 30 |
| Queue Length 95th (ft) | 32 | 400 | 7 | m141 | 423 | m78 | 34 | 44 | 0 | 197 | 34 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | |
| Base Capacity (vph) | 316 | 2653 | 865 | 528 | 2767 | 957 | 316 | 476 | 551 | 713 | 722 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.11 | 0.44 | 0.05 | 0.48 | 0.52 | 0.30 | 0.13 | 0.10 | 0.08 | 0.73 | 0.18 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 3: Hillcrest Ave & Prewitt Ranch Dr

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 231 | 50 | 87 | 411 | 43 | 342 | 27 | 319 |
| v/c Ratio | 0.65 | 0.14 | 0.14 | 0.66 | 0.21 | 0.51 | 0.10 | 0.48 |
| Control Delay | 46.7 | 30.3 | 28.1 | 31.8 | 44.8 | 38.5 | 48.9 | 16.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.7 | 30.3 | 28.1 | 31.8 | 44.8 | 38.5 | 48.9 | 16.5 |
| Queue Length 50th (ft) | 142 | 22 | 40 | 197 | 25 | 103 | 8 | 31 |
| Queue Length 95th (ft) | 223 | 54 | 64 | 216 | 65 | 164 | 24 | 71 |
| Internal Link Dist (ft) |  | 1118 |  | 2495 |  | 753 |  | 2575 |
| Turn Bay Length (ft) | 95 |  | 115 |  | 130 |  | 230 |  |
| Base Capacity (vph) | 625 | 640 | 615 | 624 | 438 | 1675 | 850 | 1642 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.08 | 0.14 | 0.66 | 0.10 | 0.20 | 0.03 | 0.19 |

Intersection Summary

## 5: Heidorn Ranch Rd. & Prewitt Ranch Dr

Timing Plan: AM PEAK

| | ↗ | ↘ | ↖ | ↑ | ↓ |
|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBT |
| Lane Group Flow (vph) | 21 | 118 | 336 | 32 | 48 |
| v/c Ratio | 0.06 | 0.30 | 0.53 | 0.01 | 0.06 |
| Control Delay | 14.4 | 6.4 | 12.9 | 2.9 | 11.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 14.4 | 6.4 | 12.9 | 2.9 | 11.4 |
| Queue Length 50th (ft) | 4 | 0 | 51 | 1 | 2 |
| Queue Length 95th (ft) | 17 | 30 | 117 | 4 | 13 |
| Internal Link Dist (ft) | 2495 | | | 1842 | 2503 |
| Turn Bay Length (ft) | 100 | | 100 | | |
| Base Capacity (vph) | 876 | 843 | 876 | 2674 | 1663 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.02 | 0.14 | 0.38 | 0.01 | 0.03 |

Intersection Summary

|  | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↰ | ↑↑↱ |  | ↰ | ↑↑↱ |  | ↰↰ | ↑ | ↱ | ↰ | ↱ |  |
| Volume (veh/h) | 3 | 1872 | 93 | 37 | 1559 | 20 | 148 | 7 | 35 | 10 | 5 | 5 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 |  | 0.97 | 1.00 |  | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 39 | 3139 | 156 | 86 | 3419 | 44 | 335 | 199 | 165 | 180 | 94 | 94 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.10 | 1.00 | 1.00 | 0.10 | 0.11 | 0.11 | 0.10 | 0.11 | 0.10 |
| Sat Flow, veh/h | 1774 | 5279 | 262 | 1774 | 5505 | 71 | 3442 | 1863 | 1544 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 1346 | 659 | 41 | 1159 | 576 | 174 | 8 | 41 | 23 | 0 | 24 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1816 | 1774 | 1863 | 1850 | 1721 | 1863 | 1544 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 3.9 | 0.3 | 1.6 | 1.0 | 0.0 | 1.0 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 3.9 | 0.3 | 1.6 | 1.0 | 0.0 | 1.0 |
| Prop In Lane | 1.00 |  | 0.14 | 1.00 |  | 0.04 | 1.00 |  | 1.00 | 1.00 |  | 0.50 |
| Lane Grp Cap(c), veh/h | 39 | 2215 | 1080 | 86 | 2314 | 1149 | 335 | 199 | 165 | 180 | 0 | 187 |
| V/C Ratio(X) | 0.08 | 0.61 | 0.61 | 0.48 | 0.50 | 0.50 | 0.52 | 0.04 | 0.25 | 0.13 | 0.00 | 0.13 |
| Avail Cap(c_a), veh/h | 374 | 2215 | 1080 | 374 | 2314 | 1149 | 725 | 831 | 688 | 374 | 0 | 752 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.78 | 0.78 | 0.78 | 0.83 | 0.83 | 0.83 | 0.98 | 0.98 | 0.98 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 37.8 | 0.0 | 0.0 | 35.5 | 0.0 | 0.0 | 34.6 | 32.3 | 21.1 | 33.0 | 0.0 | 32.5 |
| Incr Delay (d2), s/veh | 0.9 | 1.0 | 2.0 | 4.8 | 0.6 | 1.3 | 1.7 | 0.1 | 1.1 | 0.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.1 | 0.3 | 0.6 | 0.9 | 0.2 | 0.4 | 1.7 | 0.1 | 0.8 | 0.4 | 0.0 | 0.4 |
| Lane Grp Delay (d), s/veh | 38.8 | 1.0 | 2.0 | 40.3 | 0.6 | 1.3 | 36.4 | 32.4 | 22.2 | 33.5 | 0.0 | 32.6 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | C |  | C |
| Approach Vol, veh/h |  | 2008 |  |  | 1776 |  |  | 223 |  |  | 47 |  |
| Approach Delay, s/veh |  | 1.4 |  |  | 1.8 |  |  | 33.6 |  |  | 33.0 |  |
| Approach LOS |  | A |  |  | A |  |  | C |  |  | C |  |
| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs | 5 | 2 |  | 1 | 6 |  | 3 | 8 |  | 7 | 4 |  |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 |  | 6.9 | 53.1 |  | 10.9 | 11.6 |  | 11.2 | 12.0 |  |
| Change Period (Y+Rc), s | 4.5 | 5.5 |  | 4.5 | 5.5 |  | 4.5 | 5.3 |  | 4.5 | 4.5 |  |
| Max Green Setting (Gmax), s | 15.5 | 45.5 |  | 15.5 | 45.5 |  | 15.5 | 33.7 |  | 15.5 | 34.5 |  |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 |  | 3.8 | 2.0 |  | 5.9 | 3.6 |  | 3.0 | 3.0 |  |
| Green Ext Time (p_c), s | 0.0 | 43.4 |  | 0.1 | 43.4 |  | 0.6 | 0.2 |  | 0.1 | 0.1 |  |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 3.7 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | A |  |  |  |  |  |  |  |  |  |
| Notes |  |  |  |  |  |  |  |  |  |  |  |  |

# HCM 2010 Signalized Intersection Summary
## 2: Canada Valley & Lone Tree Way

Long-Term
Timing Plan: PM PEAK

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 82 | 1838 | 34 | 431 | 1462 | 415 | 70 | 63 | 176 | 263 | 52 | 49 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 161 | 2300 | 651 | 557 | 2800 | 792 | 178 | 311 | 258 | 433 | 211 | 201 |
| Arrive On Green | 0.09 | 0.82 | 0.82 | 0.32 | 1.00 | 1.00 | 0.05 | 0.17 | 0.17 | 0.13 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3442 | 5588 | 1581 | 3442 | 5588 | 1581 | 3548 | 1863 | 1543 | 3442 | 869 | 826 |
| Grp Volume(v), veh/h | 87 | 1955 | 36 | 449 | 1523 | 432 | 80 | 168 | 136 | 306 | 0 | 117 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1581 | 1721 | 1863 | 1581 | 1774 | 1863 | 1543 | 1721 | 0 | 1695 |
| Q Serve(g_s), s | 2.2 | 18.5 | 0.4 | 10.7 | 0.0 | 0.0 | 2.0 | 7.4 | 7.2 | 7.7 | 0.0 | 5.0 |
| Cycle Q Clear(g_c), s | 2.2 | 18.5 | 0.4 | 10.7 | 0.0 | 0.0 | 2.0 | 7.4 | 7.2 | 7.7 | 0.0 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.49 |
| Lane Grp Cap(c), veh/h | 161 | 2300 | 651 | 557 | 2800 | 792 | 178 | 311 | 258 | 433 | 0 | 412 |
| V/C Ratio(X) | 0.54 | 0.85 | 0.06 | 0.81 | 0.54 | 0.55 | 0.45 | 0.54 | 0.53 | 0.71 | 0.00 | 0.28 |
| Avail Cap(c_a), veh/h | 460 | 2300 | 651 | 843 | 2800 | 792 | 553 | 767 | 636 | 920 | 0 | 887 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.79 | 0.79 | 0.79 | 0.70 | 0.70 | 0.70 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.8 | 6.3 | 4.7 | 29.1 | 0.0 | 0.0 | 41.4 | 34.2 | 34.2 | 37.7 | 0.0 | 27.7 |
| Incr Delay (d2), s/veh | 0.8 | 3.3 | 0.1 | 1.3 | 0.5 | 1.9 | 0.7 | 0.5 | 0.6 | 0.8 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.9 | 3.4 | 0.2 | 3.8 | 0.1 | 0.4 | 0.9 | 3.4 | 2.8 | 3.3 | 0.0 | 2.1 |
| Lane Grp Delay (d), s/veh | 40.6 | 9.6 | 4.8 | 30.4 | 0.5 | 1.9 | 42.1 | 34.8 | 34.8 | 38.5 | 0.0 | 27.8 |
| Lane Grp LOS | D | A | A | C | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 2078 | | | 2404 | | | 384 | | | 423 | |
| Approach Delay, s/veh | | 10.9 | | | 6.3 | | | 36.3 | | | 35.5 | |
| Approach LOS | | B | | | A | | | D | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.5 | 40.0 | | 17.5 | 48.0 | | 7.5 | 18.0 | | 14.3 | 24.8 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 4.2 | 20.5 | | 12.7 | 2.0 | | 4.0 | 9.4 | | 9.7 | 7.0 | |
| Green Ext Time (p_c), s | 0.2 | 10.5 | | 0.8 | 32.1 | | 0.1 | 0.9 | | 0.6 | 0.9 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 12.6 |
| HCM 2010 LOS | | | B |

Notes

User approved volume balancing among the lanes for turning movement.

# HCM 2010 Signalized Intersection Summary
## 3: Hillcrest Ave & Prewitt Ranch Dr

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ |  | ↰ | ↱ |  | ↰ | ↑↱ |  | ↰ | ↑↱ |  |
| Volume (veh/h) | 206 | 35 | 24 | 55 | 10 | 30 | 58 | 157 | 107 | 33 | 198 | 166 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 430 | 250 | 172 | 430 | 100 | 299 | 74 | 817 | 523 | 49 | 710 | 569 |
| Arrive On Green | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.04 | 0.38 | 0.38 | 0.03 | 0.37 | 0.37 |
| Sat Flow, veh/h | 1774 | 1029 | 708 | 1774 | 411 | 1233 | 1774 | 2124 | 1361 | 1774 | 1918 | 1537 |
| Grp Volume(v), veh/h | 282 | 0 | 81 | 55 | 0 | 40 | 58 | 136 | 128 | 40 | 232 | 207 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1737 | 1774 | 0 | 1643 | 1774 | 1863 | 1623 | 1774 | 1863 | 1592 |
| Q Serve(g_s), s | 7.2 | 0.0 | 1.9 | 1.2 | 0.0 | 0.9 | 1.6 | 2.4 | 2.6 | 1.1 | 4.5 | 4.7 |
| Cycle Q Clear(g_c), s | 7.2 | 0.0 | 1.9 | 1.2 | 0.0 | 0.9 | 1.6 | 2.4 | 2.6 | 1.1 | 4.5 | 4.7 |
| Prop In Lane | 1.00 |  | 0.41 | 1.00 |  | 0.75 | 1.00 |  | 0.84 | 1.00 |  | 0.97 |
| Lane Grp Cap(c), veh/h | 430 | 0 | 421 | 430 | 0 | 399 | 74 | 716 | 624 | 49 | 690 | 589 |
| V/C Ratio(X) | 0.66 | 0.00 | 0.19 | 0.13 | 0.00 | 0.10 | 0.78 | 0.19 | 0.20 | 0.82 | 0.34 | 0.35 |
| Avail Cap(c_a), veh/h | 1187 | 0 | 1162 | 1187 | 0 | 1099 | 833 | 1700 | 1481 | 833 | 1700 | 1453 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 17.1 | 0.0 | 15.1 | 14.8 | 0.0 | 14.7 | 23.8 | 10.2 | 10.3 | 24.2 | 11.3 | 11.4 |
| Incr Delay (d2), s/veh | 2.4 | 0.0 | 0.3 | 0.2 | 0.0 | 0.2 | 21.9 | 0.5 | 0.6 | 36.2 | 1.0 | 1.3 |
| 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 Back of Q (50%), veh/ln | 3.1 | 0.0 | 0.8 | 0.5 | 0.0 | 0.4 | 1.1 | 1.0 | 0.9 | 0.9 | 1.9 | 1.7 |
| Lane Grp Delay (d), s/veh | 19.5 | 0.0 | 15.4 | 15.0 | 0.0 | 14.9 | 45.6 | 10.7 | 10.9 | 60.4 | 12.4 | 12.7 |
| Lane Grp LOS | B |  | B | B |  | B | D | B | B | E | B | B |
| Approach Vol, veh/h |  | 363 |  |  | 95 |  |  | 322 |  |  | 479 |  |
| Approach Delay, s/veh |  | 18.6 |  |  | 15.0 |  |  | 17.1 |  |  | 16.5 |  |
| Approach LOS |  | B |  |  | B |  |  | B |  |  | B |  |
| **Timer** |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs |  | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Phs Duration (G+Y+Rc), s |  | 17.6 |  |  | 17.6 |  | 7.6 | 25.6 |  | 6.9 | 24.8 |  |
| Change Period (Y+Rc), s |  | 5.5 |  |  | 5.5 |  | 5.5 | 6.3 |  | 5.5 | 6.3 |  |
| Max Green Setting (Gmax), s |  | 33.5 |  |  | 33.5 |  | 23.5 | 45.7 |  | 23.5 | 45.7 |  |
| Max Q Clear Time (g_c+I1), s |  | 9.2 |  |  | 3.2 |  | 3.6 | 4.6 |  | 3.1 | 6.7 |  |
| Green Ext Time (p_c), s |  | 2.8 |  |  | 2.9 |  | 0.2 | 12.0 |  | 0.1 | 11.8 |  |
| **Intersection Summary** |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 17.1 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | B |  |  |  |  |  |  |  |  |  |
| **Notes** |  |  |  |  |  |  |  |  |  |  |  |  |

# HCM 2010 Signalized Intersection Summary
## 5: Heidorn Ranch Rd. & Prewitt Ranch Dr

Long-Term
Timing Plan: PM PEAK

| | ↗ | ↘ | ↖ | ↑ | ↶ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 93 | 85 | 57 | 19 | 0 | 9 | 16 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 237 | 212 | 105 | 1724 | | 376 | 320 |
| Arrive On Green | 0.13 | 0.13 | 0.06 | 0.46 | | 0.20 | 0.20 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 103 | 94 | 63 | 21 | | 10 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 1.1 | 1.1 | 0.7 | 0.1 | | 0.1 | 0.2 |
| Cycle Q Clear(g_c), s | 1.1 | 1.1 | 0.7 | 0.1 | | 0.1 | 0.2 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 237 | 212 | 105 | 1724 | | 376 | 320 |
| V/C Ratio(X) | 0.43 | 0.44 | 0.60 | 0.01 | | 0.03 | 0.06 |
| Avail Cap(c_a), veh/h | 1522 | 1358 | 716 | 3383 | | 1692 | 1438 |
| 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 | 7.9 | 7.9 | 9.1 | 2.9 | | 6.3 | 6.4 |
| Incr Delay (d2), s/veh | 1.3 | 1.5 | 5.4 | 0.0 | | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.4 | 0.1 | 0.3 | 0.0 | | 0.0 | 0.0 |
| Lane Grp Delay (d), s/veh | 9.2 | 9.4 | 14.5 | 2.9 | | 6.4 | 6.5 |
| Lane Grp LOS | A | A | B | A | | A | A |
| Approach Vol, veh/h | 197 | | | 84 | | 28 | |
| Approach Delay, s/veh | 9.3 | | | 11.6 | | 6.4 | |
| Approach LOS | A | | | B | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 5.2 | 13.2 | | 8.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 18.0 | | 18.0 | |
| Max Q Clear Time (g_c+I1), s | | | 2.7 | 2.1 | | 2.2 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.1 | | 0.1 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 9.6 | | | | |
| HCM 2010 LOS | | | A | | | | |
| **Notes** | | | | | | | |

# Queues

## 1: Heidorn Ranch Rd. & Lone Tree Way

Long-Term
Timing Plan: PM PEAK

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 3 | 2005 | 41 | 1735 | 174 | 8 | 41 | 23 | 24 |
| v/c Ratio | 0.03 | 0.59 | 0.28 | 0.46 | 0.47 | 0.04 | 0.15 | 0.16 | 0.15 |
| Control Delay | 78.0 | 7.3 | 84.4 | 2.5 | 58.2 | 46.0 | 1.2 | 56.8 | 33.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.0 | 7.3 | 84.4 | 2.5 | 58.2 | 46.0 | 1.2 | 56.8 | 33.3 |
| Queue Length 50th (ft) | 3 | 87 | 36 | 46 | 72 | 6 | 0 | 18 | 10 |
| Queue Length 95th (ft) | m5 | 631 | m70 | 65 | 101 | 17 | 0 | 22 | 11 |
| Internal Link Dist (ft) | | 1050 | | 900 | | 2503 | | | 316 |
| Turn Bay Length (ft) | 200 | | 410 | | 215 | | 200 | 50 | |
| Base Capacity (vph) | 231 | 3403 | 231 | 3783 | 448 | 515 | 500 | 231 | 482 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.59 | 0.18 | 0.46 | 0.39 | 0.02 | 0.08 | 0.10 | 0.05 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 87 | 1955 | 36 | 449 | 1523 | 432 | 80 | 142 | 130 | 306 | 117 |
| v/c Ratio | 0.28 | 0.81 | 0.04 | 0.78 | 0.54 | 0.42 | 0.36 | 0.57 | 0.37 | 0.69 | 0.32 |
| Control Delay | 46.3 | 23.3 | 1.0 | 76.9 | 11.9 | 2.2 | 62.3 | 45.3 | 4.3 | 61.9 | 27.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.3 | 23.3 | 1.0 | 76.9 | 11.9 | 2.2 | 62.3 | 45.3 | 4.3 | 61.9 | 27.8 |
| Queue Length 50th (ft) | 36 | 224 | 0 | 205 | 102 | 0 | 34 | 89 | 0 | 128 | 56 |
| Queue Length 95th (ft) | m53 | #894 | m3 | 211 | 326 | 45 | 58 | 129 | 13 | 162 | 82 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |
| Base Capacity (vph) | 316 | 2424 | 802 | 613 | 2810 | 1019 | 369 | 488 | 549 | 633 | 644 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.28 | 0.81 | 0.04 | 0.73 | 0.54 | 0.42 | 0.22 | 0.29 | 0.24 | 0.48 | 0.18 |

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# Queues

## 3: Hillcrest Ave & Prewitt Ranch Dr

Long-Term
Timing Plan: PM PEAK

| | ↗ | → | ↙ | ← | ↖ | ↑ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
| Lane Group Flow (vph) | 282 | 81 | 55 | 40 | 58 | 264 | 40 | 439 |
| v/c Ratio | 0.58 | 0.16 | 0.23 | 0.16 | 0.24 | 0.26 | 0.18 | 0.49 |
| Control Delay | 32.0 | 20.4 | 38.9 | 19.8 | 38.9 | 16.8 | 39.3 | 21.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 32.0 | 20.4 | 38.9 | 19.8 | 38.9 | 16.8 | 39.3 | 21.8 |
| Queue Length 50th (ft) | 122 | 23 | 25 | 4 | 26 | 32 | 18 | 67 |
| Queue Length 95th (ft) | 182 | 50 | 71 | 38 | 74 | 78 | 53 | 124 |
| Internal Link Dist (ft) | | 1118 | | 2495 | | 753 | | 2575 |
| Turn Bay Length (ft) | 95 | | 115 | | 130 | | 230 | |
| Base Capacity (vph) | 924 | 917 | 924 | 868 | 656 | 2163 | 656 | 2158 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.09 | 0.06 | 0.05 | 0.09 | 0.12 | 0.06 | 0.20 |

Intersection Summary

# Queues
## 5: Heidorn Ranch Rd. & Prewitt Ranch Dr

Long-Term
Timing Plan: PM PEAK

| | ↗ | ↘ | ↖ | ↑ | ↓ |
|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBT |
| Lane Group Flow (vph) | 103 | 94 | 63 | 21 | 28 |
| v/c Ratio | 0.23 | 0.20 | 0.15 | 0.01 | 0.02 |
| Control Delay | 10.8 | 4.4 | 11.0 | 4.3 | 7.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 10.8 | 4.4 | 11.0 | 4.3 | 7.8 |
| Queue Length 50th (ft) | 7 | 0 | 5 | 1 | 0 |
| Queue Length 95th (ft) | 38 | 19 | 28 | 3 | 7 |
| Internal Link Dist (ft) | 2495 | | | 1842 | 2503 |
| Turn Bay Length (ft) | 100 | | 100 | | |
| Base Capacity (vph) | 1065 | 990 | 501 | 2446 | 2214 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.09 | 0.13 | 0.01 | 0.01 |

Intersection Summary

# LONG-TERM (2030) PLUS PROJECT TRAFFIC CONDITIONS

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ |  | ↰ | ↑↑↱ |  | ↰↰ | ↑ | ↱ | ↰ | ↱ |  |
| Volume (veh/h) | 1 | 1117 | 68 | 24 | 1320 | 6 | 42 | 2 | 58 | 9 | 4 | 11 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 |  | 0.99 | 1.00 |  | 0.98 | 1.00 |  | 1.00 | 1.00 |  | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 34 | 3426 | 208 | 72 | 3775 | 17 | 200 | 229 | 194 | 63 | 46 | 119 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.08 | 1.00 | 1.00 | 0.06 | 0.12 | 0.12 | 0.04 | 0.10 | 0.09 |
| Sat Flow, veh/h | 1774 | 5211 | 317 | 1774 | 5557 | 26 | 3442 | 1863 | 1576 | 1774 | 457 | 1188 |
| Grp Volume(v), veh/h | 1 | 918 | 444 | 28 | 1017 | 507 | 78 | 4 | 107 | 10 | 0 | 18 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1802 | 1774 | 1863 | 1858 | 1721 | 1863 | 1576 | 1774 | 0 | 1644 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 1.8 | 0.2 | 4.3 | 0.5 | 0.0 | 0.8 |
| Cycle Q Clear(g_c), s | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 1.8 | 0.2 | 4.3 | 0.5 | 0.0 | 0.8 |
| Prop In Lane | 1.00 |  | 0.18 | 1.00 |  | 0.01 | 1.00 |  | 1.00 | 1.00 |  | 0.72 |
| Lane Grp Cap(c), veh/h | 34 | 2449 | 1185 | 72 | 2530 | 1262 | 200 | 229 | 194 | 63 | 0 | 165 |
| V/C Ratio(X) | 0.03 | 0.37 | 0.37 | 0.39 | 0.40 | 0.40 | 0.39 | 0.02 | 0.55 | 0.16 | 0.00 | 0.11 |
| Avail Cap(c_a), veh/h | 297 | 2449 | 1185 | 297 | 2530 | 1262 | 576 | 779 | 659 | 297 | 0 | 688 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.95 | 0.95 | 0.95 | 0.85 | 0.85 | 0.85 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.5 | 0.0 | 0.0 | 37.4 | 0.0 | 0.0 | 38.0 | 32.3 | 22.6 | 39.1 | 0.0 | 34.4 |
| Incr Delay (d2), s/veh | 0.5 | 0.4 | 0.9 | 4.0 | 0.4 | 0.8 | 1.8 | 0.0 | 3.5 | 1.7 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.0 | 0.1 | 0.3 | 0.6 | 0.1 | 0.3 | 0.8 | 0.1 | 2.1 | 0.2 | 0.0 | 0.4 |
| Lane Grp Delay (d), s/veh | 40.0 | 0.4 | 0.9 | 41.5 | 0.4 | 0.8 | 39.7 | 32.3 | 26.1 | 40.8 | 0.0 | 34.5 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D |  | C |
| Approach Vol, veh/h |  | 1363 |  |  | 1552 |  |  | 189 |  |  | 28 |  |
| Approach Delay, s/veh |  | 0.6 |  |  | 1.3 |  |  | 31.8 |  |  | 36.8 |  |
| Approach LOS |  | A |  |  | A |  |  | C |  |  | D |  |
| **Timer** |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs | 5 | 2 |  | 1 | 6 |  | 3 | 8 |  | 7 | 4 |  |
| Phs Duration (G+Y+Rc), s | 4.6 | 58.0 |  | 6.4 | 59.8 |  | 7.9 | 13.3 |  | 6.0 | 11.4 |  |
| Change Period (Y+Rc), s | 4.5 | 5.5 |  | 4.5 | 5.5 |  | 4.5 | 5.3 |  | 4.5 | 4.5 |  |
| Max Green Setting (Gmax), s | 12.5 | 52.5 |  | 12.5 | 52.5 |  | 12.5 | 32.7 |  | 12.5 | 33.5 |  |
| Max Q Clear Time (g_c+I1), s | 2.0 | 2.0 |  | 3.3 | 2.0 |  | 3.8 | 6.3 |  | 2.5 | 2.8 |  |
| Green Ext Time (p_c), s | 0.0 | 50.0 |  | 0.0 | 50.0 |  | 0.2 | 0.6 |  | 0.0 | 0.1 |  |
| **Intersection Summary** |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 3.1 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | A |  |  |  |  |  |  |  |  |  |
| **Notes** |  |  |  |  |  |  |  |  |  |  |  |  |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 31 | 1075 | 38 | 220 | 1255 | 249 | 35 | 18 | 62 | 354 | 29 | 60 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 163 | 2628 | 733 | 374 | 2816 | 786 | 120 | 155 | 129 | 667 | 132 | 269 |
| Arrive On Green | 0.09 | 0.94 | 0.94 | 0.22 | 1.00 | 1.00 | 0.03 | 0.08 | 0.08 | 0.19 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3442 | 5588 | 1560 | 3442 | 5588 | 1561 | 3548 | 1863 | 1555 | 3442 | 541 | 1107 |
| Grp Volume(v), veh/h | 35 | 1208 | 43 | 253 | 1443 | 286 | 41 | 60 | 47 | 521 | 0 | 131 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1560 | 1721 | 1863 | 1561 | 1774 | 1863 | 1555 | 1721 | 0 | 1649 |
| Q Serve(g_s), s | 0.8 | 1.9 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 12.0 | 0.0 | 5.4 |
| Cycle Q Clear(g_c), s | 0.8 | 1.9 | 0.1 | 5.6 | 0.0 | 0.0 | 0.9 | 2.5 | 2.4 | 12.0 | 0.0 | 5.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.67 |
| Lane Grp Cap(c), veh/h | 163 | 2628 | 733 | 374 | 2816 | 786 | 120 | 155 | 129 | 667 | 0 | 401 |
| V/C Ratio(X) | 0.21 | 0.46 | 0.06 | 0.68 | 0.51 | 0.36 | 0.34 | 0.39 | 0.36 | 0.78 | 0.00 | 0.33 |
| Avail Cap(c_a), veh/h | 495 | 2628 | 733 | 826 | 2816 | 786 | 511 | 827 | 690 | 1115 | 0 | 1029 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.94 | 0.94 | 0.94 | 0.79 | 0.79 | 0.79 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 36.3 | 1.4 | 1.3 | 31.3 | 0.0 | 0.0 | 39.4 | 36.2 | 36.1 | 31.9 | 0.0 | 25.9 |
| Incr Delay (d2), s/veh | 0.2 | 0.5 | 0.1 | 0.6 | 0.5 | 1.0 | 0.6 | 0.6 | 0.6 | 0.8 | 0.0 | 0.2 |
| 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 Back of Q (50%), veh/ln | 0.3 | 0.6 | 0.1 | 2.2 | 0.1 | 0.2 | 0.4 | 1.2 | 0.9 | 5.1 | 0.0 | 2.2 |
| Lane Grp Delay (d), s/veh | 36.5 | 1.9 | 1.5 | 31.9 | 0.5 | 1.0 | 40.0 | 36.8 | 36.8 | 32.7 | 0.0 | 26.1 |
| Lane Grp LOS | D | A | A | C | A | A | D | D | D | C | | C |
| Approach Vol, veh/h | | 1286 | | | 1982 | | | 148 | | | 652 | |
| Approach Delay, s/veh | | 2.8 | | | 4.6 | | | 37.7 | | | 31.4 | |
| Approach LOS | | A | | | A | | | D | | | C | |

| Timer | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | 1 | 6 | 3 | 8 | 7 | 4 |
| Phs Duration (G+Y+Rc), s | 9.3 | 42.2 | 12.1 | 45.0 | 5.8 | 9.9 | 19.2 | 23.3 |
| Change Period (Y+Rc), s | 6.3 | 6.3 | 4.0 | 6.3 | 4.0 | 4.2 | 4.0 | 4.2 |
| Max Green Setting (Gmax), s | 11.0 | 30.7 | 19.0 | 38.7 | 11.0 | 35.8 | 26.0 | 50.8 |
| Max Q Clear Time (g_c+I1), s | 2.8 | 3.9 | 7.6 | 2.0 | 2.9 | 4.5 | 14.0 | 7.4 |
| Green Ext Time (p_c), s | 0.2 | 16.6 | 0.5 | 27.5 | 0.0 | 0.5 | 1.2 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 9.5 |
| HCM 2010 LOS | A |

Notes

User approved volume balancing among the lanes for turning movement.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ |  | ↰ | ↱ |  | ↰ | ↑↱ |  | ↰ | ↑↱ |  |
| Volume (veh/h) | 196 | 32 | 10 | 59 | 89 | 188 | 43 | 295 | 48 | 25 | 84 | 190 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 640 | 490 | 155 | 640 | 193 | 408 | 54 | 1043 | 168 | 34 | 600 | 510 |
| Arrive On Green | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 | 0.03 | 0.33 | 0.33 | 0.02 | 0.32 | 0.32 |
| Sat Flow, veh/h | 1774 | 1358 | 429 | 1774 | 534 | 1129 | 1774 | 3133 | 504 | 1774 | 1863 | 1583 |
| Grp Volume(v), veh/h | 231 | 0 | 50 | 94 | 0 | 439 | 43 | 174 | 169 | 29 | 98 | 221 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1787 | 1774 | 0 | 1663 | 1774 | 1863 | 1774 | 1774 | 1863 | 1583 |
| Q Serve(g_s), s | 5.8 | 0.0 | 1.1 | 2.2 | 0.0 | 13.8 | 1.5 | 4.1 | 4.2 | 1.0 | 2.3 | 6.6 |
| Cycle Q Clear(g_c), s | 5.8 | 0.0 | 1.1 | 2.2 | 0.0 | 13.8 | 1.5 | 4.1 | 4.2 | 1.0 | 2.3 | 6.6 |
| Prop In Lane | 1.00 |  | 0.24 | 1.00 |  | 0.68 | 1.00 |  | 0.28 | 1.00 |  | 1.00 |
| Lane Grp Cap(c), veh/h | 640 | 0 | 645 | 640 | 0 | 601 | 54 | 620 | 591 | 34 | 600 | 510 |
| V/C Ratio(X) | 0.36 | 0.00 | 0.08 | 0.15 | 0.00 | 0.73 | 0.80 | 0.28 | 0.29 | 0.84 | 0.16 | 0.43 |
| Avail Cap(c_a), veh/h | 985 | 0 | 992 | 985 | 0 | 923 | 691 | 1410 | 1343 | 691 | 1410 | 1199 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 14.2 | 0.0 | 12.7 | 13.0 | 0.0 | 16.7 | 29.1 | 14.8 | 14.8 | 29.5 | 14.6 | 16.1 |
| Incr Delay (d2), s/veh | 0.5 | 0.0 | 0.1 | 0.1 | 0.0 | 2.5 | 30.8 | 0.9 | 1.0 | 50.3 | 0.5 | 2.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 2.4 | 0.0 | 0.5 | 0.9 | 0.0 | 5.7 | 1.1 | 1.8 | 1.8 | 0.9 | 1.0 | 2.6 |
| Lane Grp Delay (d), s/veh | 14.7 | 0.0 | 12.8 | 13.2 | 0.0 | 19.2 | 59.9 | 15.7 | 15.8 | 79.8 | 15.1 | 18.2 |
| Lane Grp LOS | B |  | B | B |  | B | E | B | B | E | B | B |
| Approach Vol, veh/h |  | 281 |  |  | 533 |  |  | 386 |  |  | 348 |  |
| Approach Delay, s/veh |  | 14.3 |  |  | 18.1 |  |  | 20.7 |  |  | 22.5 |  |
| Approach LOS |  | B |  |  | B |  |  | C |  |  | C |  |
| Timer |  |  |  |  |  |  |  |  |  |  |  |  |
| Assigned Phs |  | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Phs Duration (G+Y+Rc), s |  | 27.3 |  |  | 27.3 |  | 7.3 | 26.4 |  | 6.7 | 25.7 |  |
| Change Period (Y+Rc), s |  | 5.5 |  |  | 5.5 |  | 5.5 | 6.3 |  | 5.5 | 6.3 |  |
| Max Green Setting (Gmax), s |  | 33.5 |  |  | 33.5 |  | 23.5 | 45.7 |  | 23.5 | 45.7 |  |
| Max Q Clear Time (g_c+I1), s |  | 7.8 |  |  | 15.8 |  | 3.5 | 6.2 |  | 3.0 | 8.6 |  |
| Green Ext Time (p_c), s |  | 6.9 |  |  | 6.0 |  | 0.1 | 11.0 |  | 0.1 | 10.8 |  |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |
| HCM 2010 Ctrl Delay |  |  | 19.0 |  |  |  |  |  |  |  |  |  |
| HCM 2010 LOS |  |  | B |  |  |  |  |  |  |  |  |  |
| Notes |  |  |  |  |  |  |  |  |  |  |  |  |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 7 | 145 | 336 | 8 | 23 | 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 | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 8 | 161 | 373 | 9 | 26 | 18 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 382 | 0 | - | 0 | 555 | 378 |
| Stage 1 | - | - | - | - | 378 | - |
| Stage 2 | - | - | - | - | 177 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1176 | - | - | - | 493 | 669 |
| Stage 1 | - | - | - | - | 693 | - |
| Stage 2 | - | - | - | - | 854 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1176 | - | - | - | 490 | 669 |
| Mov Capacity-2 Maneuver | - | - | - | - | 490 | - |
| Stage 1 | - | - | - | - | 693 | - |
| Stage 2 | - | - | - | - | 848 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.4 | 0 | 11.9 |
| HCM LOS | | | B |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1176 | - | - | - | 490 | 669 |
| HCM Lane V/C Ratio | 0.007 | - | - | - | 0.052 | 0.027 |
| HCM Control Delay (s) | 8.082 | - | - | - | 12.8 | 10.5 |
| HCM Lane LOS | A | | | | B | B |
| HCM 95th %tile Q(veh) | 0.02 | - | - | - | 0.165 | 0.082 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 46 | 109 | 304 | 29 | 20 | 30 | 27 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 208 | 185 | 453 | 2121 | | 302 | 240 |
| Arrive On Green | 0.12 | 0.12 | 0.26 | 0.57 | | 0.16 | 0.16 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1922 | 1533 |
| Grp Volume(v), veh/h | 51 | 121 | 338 | 32 | | 32 | 31 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1592 |
| Q Serve(g_s), s | 0.7 | 1.9 | 4.5 | 0.1 | | 0.4 | 0.4 |
| Cycle Q Clear(g_c), s | 0.7 | 1.9 | 4.5 | 0.1 | | 0.4 | 0.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 0.96 |
| Lane Grp Cap(c), veh/h | 208 | 185 | 453 | 2121 | | 292 | 250 |
| V/C Ratio(X) | 0.25 | 0.65 | 0.75 | 0.02 | | 0.11 | 0.12 |
| Avail Cap(c_a), veh/h | 1113 | 994 | 1113 | 3507 | | 1169 | 999 |
| 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 | 10.2 | 10.8 | 8.7 | 2.4 | | 9.2 | 9.2 |
| Incr Delay (d2), s/veh | 0.6 | 3.9 | 2.5 | 0.0 | | 0.2 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.3 | 0.2 | 1.4 | 0.0 | | 0.1 | 0.1 |
| Lane Grp Delay (d), s/veh | 10.8 | 14.6 | 11.2 | 2.4 | | 9.4 | 9.5 |
| Lane Grp LOS | B | B | B | A | | A | A |
| Approach Vol, veh/h | 172 | | | 370 | | 63 | |
| Approach Delay, s/veh | 13.5 | | | 10.4 | | 9.4 | |
| Approach LOS | B | | | B | | A | |

| Timer | | | | | | | |
|---|---|---|---|---|---|---|---|
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 10.5 | 18.5 | | 8.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 16.0 | 24.0 | | 16.0 | |
| Max Q Clear Time (g_c+I1), s | | | 6.5 | 2.1 | | 2.4 | |
| Green Ext Time (p_c), s | | | 0.7 | 0.4 | | 0.3 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 11.2 |
| HCM 2010 LOS | | | B |

Notes

# 6: Heidorn Ranch Rd. & East Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.2 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 29 | 0 | 101 | 62 | 9 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 32 | 0 | 112 | 69 | 10 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 130 | 39 | 79 | 0 | - | 0 |
| Stage 1 | 74 | - | - | - | - | - |
| Stage 2 | 56 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 851 | 1024 | 1517 | - | - | - |
| Stage 1 | 940 | - | - | - | - | - |
| Stage 2 | 960 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 851 | 1024 | 1517 | - | - | - |
| Mov Capacity-2 Maneuver | 851 | - | - | - | - | - |
| Stage 1 | 940 | - | - | - | - | - |
| Stage 2 | 960 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1517 | - | 1024 | - | - |
| HCM Lane V/C Ratio | - | - | 0.031 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.097 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# 1: Heidorn Ranch Rd. & Lone Tree Way

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 1 | 1362 | 28 | 1524 | 78 | 4 | 107 | 10 | 18 |
| v/c Ratio | 0.01 | 0.37 | 0.21 | 0.38 | 0.27 | 0.02 | 0.36 | 0.08 | 0.11 |
| Control Delay | 74.0 | 7.4 | 76.1 | 0.9 | 57.9 | 41.5 | 10.8 | 57.8 | 27.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 74.0 | 7.4 | 76.1 | 0.9 | 57.9 | 41.5 | 10.8 | 57.8 | 27.0 |
| Queue Length 50th (ft) | 1 | 92 | 25 | 1 | 32 | 3 | 0 | 8 | 4 |
| Queue Length 95th (ft) | m2 | 168 | m49 | 34 | 34 | 7 | 0 | 26 | 23 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 2101 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 190 | 3715 | 190 | 3988 | 369 | 501 | 498 | 190 | 456 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.37 | 0.15 | 0.38 | 0.21 | 0.01 | 0.21 | 0.05 | 0.04 |

## Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

## 2: Canada Valley & Lone Tree Way

| | ↗ | → | ↘ | ↙ | ← | ↖ | ↖ | ↑ | ↗ | ↘ | ↓ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
| Lane Group Flow (vph) | 35 | 1208 | 43 | 253 | 1443 | 286 | 41 | 49 | 45 | 521 | 131 |
| v/c Ratio | 0.11 | 0.46 | 0.05 | 0.64 | 0.52 | 0.30 | 0.22 | 0.27 | 0.15 | 0.82 | 0.29 |
| Control Delay | 40.1 | 14.2 | 0.6 | 70.6 | 13.7 | 2.0 | 61.2 | 28.3 | 1.0 | 61.7 | 14.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 40.1 | 14.2 | 0.6 | 70.6 | 13.7 | 2.0 | 61.2 | 28.3 | 1.0 | 61.7 | 14.4 |
| Queue Length 50th (ft) | 14 | 168 | 1 | 106 | 127 | 0 | 17 | 17 | 0 | 217 | 30 |
| Queue Length 95th (ft) | 31 | 415 | 5 | m141 | 428 | m79 | 34 | 44 | 0 | 197 | 34 |
| Internal Link Dist (ft) | | 900 | | | 775 | | | 542 | | | 1064 |
| Turn Bay Length (ft) | 300 | | 620 | 285 | | 245 | 70 | | | 160 | |
| Base Capacity (vph) | 316 | 2653 | 865 | 528 | 2767 | 957 | 316 | 476 | 551 | 713 | 722 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.11 | 0.46 | 0.05 | 0.48 | 0.52 | 0.30 | 0.13 | 0.10 | 0.08 | 0.73 | 0.18 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

# 3: Hillcrest Ave & Prewitt Ranch Dr/Prewett Ranch Dr

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 231 | 50 | 94 | 439 | 43 | 343 | 29 | 319 |
| v/c Ratio | 0.65 | 0.14 | 0.15 | 0.70 | 0.26 | 0.51 | 0.19 | 0.42 |
| Control Delay | 47.5 | 31.0 | 28.7 | 34.7 | 51.1 | 39.2 | 51.2 | 14.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.5 | 31.0 | 28.7 | 34.7 | 51.1 | 39.2 | 51.2 | 14.4 |
| Queue Length 50th (ft) | 144 | 23 | 44 | 226 | 27 | 105 | 18 | 29 |
| Queue Length 95th (ft) | 228 | 55 | 70 | 247 | 70 | 170 | 50 | 67 |
| Internal Link Dist (ft) |  | 1118 |  | 1835 |  | 753 |  | 2575 |
| Turn Bay Length (ft) | 95 |  | 115 |  | 130 |  | 230 |  |
| Base Capacity (vph) | 619 | 633 | 619 | 624 | 434 | 1658 | 434 | 1628 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.37 | 0.08 | 0.15 | 0.70 | 0.10 | 0.21 | 0.07 | 0.20 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 7 | 145 | 336 | 8 | 23 | 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 | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 8 | 161 | 373 | 9 | 26 | 18 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 382 | 0 | - | 0 | 555 | 378 |
| Stage 1 | - | - | - | - | 378 | - |
| Stage 2 | - | - | - | - | 177 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1176 | - | - | - | 493 | 669 |
| Stage 1 | - | - | - | - | 693 | - |
| Stage 2 | - | - | - | - | 854 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1176 | - | - | - | 490 | 669 |
| Mov Capacity-2 Maneuver | - | - | - | - | 490 | - |
| Stage 1 | - | - | - | - | 693 | - |
| Stage 2 | - | - | - | - | 848 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.4 | 0 | 11.9 |
| HCM LOS | | | B |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1176 | - | - | - | 490 | 669 |
| HCM Lane V/C Ratio | 0.007 | - | - | - | 0.052 | 0.027 |
| HCM Control Delay (s) | 8.082 | - | - | - | 12.8 | 10.5 |
| HCM Lane LOS | A | | | | B | B |
| HCM 95th %tile Q(veh) | 0.02 | - | - | - | 0.165 | 0.082 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

| | ↗ | ↘ | ↖ | ↑ | ↰ | ↓ |
|---|---|---|---|---|---|---|
| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT |
| Lane Group Flow (vph) | 51 | 121 | 338 | 32 | 22 | 63 |
| v/c Ratio | 0.16 | 0.31 | 0.57 | 0.01 | 0.07 | 0.09 |
| Control Delay | 15.3 | 6.5 | 14.7 | 6.0 | 15.6 | 10.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.3 | 6.5 | 14.7 | 6.0 | 15.6 | 10.4 |
| Queue Length 50th (ft) | 9 | 0 | 53 | 1 | 4 | 3 |
| Queue Length 95th (ft) | 31 | 30 | 119 | 8 | 18 | 15 |
| Internal Link Dist (ft) | 580 | | | 1842 | | 322 |
| Turn Bay Length (ft) | 100 | | 100 | | 100 | |
| Base Capacity (vph) | 799 | 781 | 799 | 2414 | 399 | 1502 |
| 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 | 0.15 | 0.42 | 0.01 | 0.06 | 0.04 |

| Intersection Summary |
|---|

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.2 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 0 | 29 | 0 | 101 | 62 | 9 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 0 | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 32 | 0 | 112 | 69 | 10 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 130 | 39 | 79 | 0 | - | 0 |
| Stage 1 | 74 | - | - | - | - | - |
| Stage 2 | 56 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 851 | 1024 | 1517 | - | - | - |
| Stage 1 | 940 | - | - | - | - | - |
| Stage 2 | 960 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 851 | 1024 | 1517 | - | - | - |
| Mov Capacity-2 Maneuver | 851 | - | - | - | - | - |
| Stage 1 | 940 | - | - | - | - | - |
| Stage 2 | 960 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 8.6 | 0 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1517 | - | 1024 | - | - |
| HCM Lane V/C Ratio | - | - | 0.031 | - | - |
| HCM Control Delay (s) | 0 | - | 8.6 | - | - |
| HCM Lane LOS | A | | A | | |
| HCM 95th %tile Q(veh) | 0 | - | 0.097 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

# HCM 2010 Signalized Intersection Summary
## 1: Heidorn Ranch Rd. & Lone Tree Way

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰↰ | ↑ | ↱ | ↰ | ↱ | |
| Volume (veh/h) | 3 | 1872 | 104 | 72 | 1559 | 20 | 154 | 7 | 53 | 10 | 5 | 5 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.98 | 1.00 | | 0.97 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 0 |
| Cap, veh/h | 37 | 3004 | 166 | 133 | 3448 | 44 | 338 | 209 | 174 | 172 | 94 | 94 |
| Arrive On Green | 0.04 | 1.00 | 1.00 | 0.15 | 1.00 | 1.00 | 0.10 | 0.11 | 0.11 | 0.10 | 0.11 | 0.11 |
| Sat Flow, veh/h | 1774 | 5246 | 290 | 1774 | 5505 | 71 | 3442 | 1863 | 1545 | 1774 | 843 | 843 |
| Grp Volume(v), veh/h | 3 | 1355 | 661 | 79 | 1159 | 576 | 181 | 8 | 62 | 23 | 0 | 24 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1863 | 1811 | 1774 | 1863 | 1850 | 1721 | 1863 | 1545 | 1774 | 0 | 1686 |
| Q Serve(g_s), s | 0.1 | 0.0 | 0.0 | 3.5 | 0.0 | 0.0 | 4.2 | 0.3 | 2.4 | 1.0 | 0.0 | 1.1 |
| Cycle Q Clear(g_c), s | 0.1 | 0.0 | 0.0 | 3.5 | 0.0 | 0.0 | 4.2 | 0.3 | 2.4 | 1.0 | 0.0 | 1.1 |
| Prop In Lane | 1.00 | | 0.16 | 1.00 | | 0.04 | 1.00 | | 1.00 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 37 | 2133 | 1037 | 133 | 2333 | 1159 | 338 | 209 | 174 | 172 | 0 | 187 |
| V/C Ratio(X) | 0.08 | 0.64 | 0.64 | 0.60 | 0.50 | 0.50 | 0.54 | 0.04 | 0.36 | 0.13 | 0.00 | 0.13 |
| Avail Cap(c_a), veh/h | 360 | 2133 | 1037 | 360 | 2333 | 1159 | 698 | 800 | 663 | 360 | 0 | 724 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.78 | 0.78 | 0.78 | 0.82 | 0.82 | 0.82 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.4 | 0.0 | 0.0 | 34.5 | 0.0 | 0.0 | 36.0 | 33.2 | 20.6 | 34.6 | 0.0 | 33.7 |
| Incr Delay (d2), s/veh | 1.0 | 1.1 | 2.3 | 4.9 | 0.6 | 1.3 | 1.9 | 0.1 | 1.8 | 0.5 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.1 | 0.3 | 0.7 | 1.6 | 0.2 | 0.4 | 1.8 | 0.2 | 1.2 | 0.5 | 0.0 | 0.5 |
| Lane Grp Delay (d), s/veh | 40.4 | 1.1 | 2.3 | 39.4 | 0.6 | 1.3 | 37.8 | 33.3 | 22.3 | 35.1 | 0.0 | 33.8 |
| Lane Grp LOS | D | A | A | D | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 2019 | | | 1814 | | | 251 | | | 47 | |
| Approach Delay, s/veh | | 1.6 | | | 2.5 | | | 33.9 | | | 34.5 | |
| Approach LOS | | A | | | A | | | C | | | C | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 4.8 | 51.0 | | 9.3 | 55.5 | | 11.2 | 12.4 | | 11.1 | 12.3 | |
| Change Period (Y+Rc), s | 4.5 | 5.5 | | 4.5 | 5.5 | | 4.5 | 5.3 | | 4.5 | 4.5 | |
| Max Green Setting (Gmax), s | 15.5 | 45.5 | | 15.5 | 45.5 | | 15.5 | 33.7 | | 15.5 | 34.5 | |
| Max Q Clear Time (g_c+I1), s | 2.1 | 2.0 | | 5.5 | 2.0 | | 6.2 | 4.4 | | 3.0 | 3.1 | |
| Green Ext Time (p_c), s | 0.0 | 43.4 | | 0.2 | 43.4 | | 0.6 | 0.3 | | 0.1 | 0.1 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 4.3 |
| HCM 2010 LOS | | | A |

Notes

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↑↑ | ↱ | ↰↰ | ↑↱ | ↱ | ↰↰ | ↑↱ | |
| Volume (veh/h) | 82 | 1857 | 35 | 431 | 1495 | 415 | 72 | 63 | 176 | 263 | 52 | 49 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| 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 | | 0.97 | 1.00 | | 0.98 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 186.3 | 190.0 |
| Lanes | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 0 |
| Cap, veh/h | 161 | 2300 | 651 | 557 | 2800 | 792 | 181 | 311 | 258 | 433 | 210 | 200 |
| Arrive On Green | 0.09 | 0.82 | 0.82 | 0.32 | 1.00 | 1.00 | 0.05 | 0.17 | 0.17 | 0.13 | 0.24 | 0.24 |
| Sat Flow, veh/h | 3442 | 5588 | 1581 | 3442 | 5588 | 1581 | 3548 | 1863 | 1543 | 3442 | 869 | 826 |
| Grp Volume(v), veh/h | 87 | 1976 | 37 | 449 | 1557 | 432 | 82 | 168 | 136 | 306 | 0 | 117 |
| Grp Sat Flow(s),veh/h/ln | 1721 | 1863 | 1581 | 1721 | 1863 | 1581 | 1774 | 1863 | 1543 | 1721 | 0 | 1695 |
| Q Serve(g_s), s | 2.2 | 19.2 | 0.4 | 10.7 | 0.0 | 0.0 | 2.0 | 7.4 | 7.2 | 7.7 | 0.0 | 5.0 |
| Cycle Q Clear(g_c), s | 2.2 | 19.2 | 0.4 | 10.7 | 0.0 | 0.0 | 2.0 | 7.4 | 7.2 | 7.7 | 0.0 | 5.0 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.49 |
| Lane Grp Cap(c), veh/h | 161 | 2300 | 651 | 557 | 2800 | 792 | 181 | 311 | 258 | 433 | 0 | 410 |
| V/C Ratio(X) | 0.54 | 0.86 | 0.06 | 0.81 | 0.56 | 0.55 | 0.45 | 0.54 | 0.53 | 0.71 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 460 | 2300 | 651 | 843 | 2800 | 792 | 553 | 768 | 636 | 920 | 0 | 887 |
| HCM Platoon Ratio | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.77 | 0.77 | 0.77 | 0.70 | 0.70 | 0.70 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.8 | 6.4 | 4.7 | 29.1 | 0.0 | 0.0 | 41.4 | 34.2 | 34.2 | 37.7 | 0.0 | 27.7 |
| Incr Delay (d2), s/veh | 0.8 | 3.5 | 0.1 | 1.3 | 0.6 | 1.9 | 0.7 | 0.5 | 0.6 | 0.8 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.9 | 3.4 | 0.2 | 3.8 | 0.1 | 0.4 | 0.9 | 3.4 | 2.8 | 3.3 | 0.0 | 2.1 |
| Lane Grp Delay (d), s/veh | 40.6 | 9.9 | 4.8 | 30.4 | 0.6 | 1.9 | 42.1 | 34.8 | 34.8 | 38.5 | 0.0 | 27.8 |
| Lane Grp LOS | D | A | A | C | A | A | D | C | C | D | | C |
| Approach Vol, veh/h | | 2100 | | | 2438 | | | 386 | | | 423 | |
| Approach Delay, s/veh | | 11.0 | | | 6.3 | | | 36.3 | | | 35.5 | |
| Approach LOS | | B | | | A | | | D | | | D | |

| Timer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 5 | 2 | | 1 | 6 | | 3 | 8 | | 7 | 4 | |
| Phs Duration (G+Y+Rc), s | 9.5 | 40.0 | | 17.5 | 48.0 | | 7.6 | 18.0 | | 14.3 | 24.7 | |
| Change Period (Y+Rc), s | 6.3 | 6.3 | | 4.0 | 6.3 | | 4.0 | 4.2 | | 4.0 | 4.2 | |
| Max Green Setting (Gmax), s | 11.0 | 31.7 | | 21.0 | 41.7 | | 13.0 | 35.8 | | 23.0 | 45.8 | |
| Max Q Clear Time (g_c+I1), s | 4.2 | 21.2 | | 12.7 | 2.0 | | 4.0 | 9.4 | | 9.7 | 7.0 | |
| Green Ext Time (p_c), s | 0.2 | 9.9 | | 0.8 | 32.5 | | 0.1 | 0.9 | | 0.6 | 0.9 | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 12.6 |
| HCM 2010 LOS | | | B |

| Notes |
|---|
| User approved volume balancing among the lanes for turning movement. |

# HCM 2010 Signalized Intersection Summary
## 3: Hillcrest Ave & Prewitt Ranch Dr/Prewett Ranch Dr

Long-Term + Project
Timing Plan: PM PEAK

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | | ↰ | ↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Volume (veh/h) | 206 | 47 | 24 | 58 | 17 | 34 | 58 | 157 | 112 | 40 | 198 | 166 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 | 186.3 | 186.3 | 190.0 |
| Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Cap, veh/h | 437 | 285 | 147 | 437 | 137 | 273 | 74 | 787 | 527 | 60 | 709 | 568 |
| Arrive On Green | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.04 | 0.38 | 0.38 | 0.03 | 0.37 | 0.37 |
| Sat Flow, veh/h | 1774 | 1159 | 598 | 1774 | 555 | 1110 | 1774 | 2084 | 1395 | 1774 | 1918 | 1537 |
| Grp Volume(v), veh/h | 282 | 0 | 97 | 58 | 0 | 51 | 58 | 139 | 130 | 48 | 232 | 207 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 0 | 1756 | 1774 | 0 | 1665 | 1774 | 1863 | 1617 | 1774 | 1863 | 1592 |
| Q Serve(g_s), s | 7.2 | 0.0 | 2.2 | 1.3 | 0.0 | 1.2 | 1.6 | 2.5 | 2.7 | 1.4 | 4.5 | 4.8 |
| Cycle Q Clear(g_c), s | 7.2 | 0.0 | 2.2 | 1.3 | 0.0 | 1.2 | 1.6 | 2.5 | 2.7 | 1.4 | 4.5 | 4.8 |
| Prop In Lane | 1.00 | | 0.34 | 1.00 | | 0.67 | 1.00 | | 0.86 | 1.00 | | 0.97 |
| Lane Grp Cap(c), veh/h | 437 | 0 | 432 | 437 | 0 | 410 | 74 | 704 | 611 | 60 | 689 | 588 |
| V/C Ratio(X) | 0.65 | 0.00 | 0.22 | 0.13 | 0.00 | 0.12 | 0.78 | 0.20 | 0.21 | 0.80 | 0.34 | 0.35 |
| Avail Cap(c_a), veh/h | 1176 | 0 | 1164 | 1176 | 0 | 1104 | 825 | 1684 | 1462 | 825 | 1684 | 1439 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 17.1 | 0.0 | 15.2 | 14.8 | 0.0 | 14.8 | 24.0 | 10.6 | 10.6 | 24.2 | 11.5 | 11.5 |
| Incr Delay (d2), s/veh | 2.3 | 0.0 | 0.4 | 0.2 | 0.0 | 0.2 | 21.8 | 0.5 | 0.6 | 28.3 | 1.0 | 1.3 |
| 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 Back of Q (50%), veh/ln | 3.3 | 0.0 | 0.9 | 0.6 | 0.0 | 0.5 | 1.1 | 1.0 | 1.0 | 1.0 | 1.9 | 1.7 |
| Lane Grp Delay (d), s/veh | 19.4 | 0.0 | 15.6 | 15.0 | 0.0 | 15.0 | 45.8 | 11.1 | 11.3 | 52.6 | 12.5 | 12.8 |
| Lane Grp LOS | B | | B | B | | B | D | B | B | D | B | B |
| Approach Vol, veh/h | | 379 | | | 109 | | | 327 | | | 487 | |
| Approach Delay, s/veh | | 18.4 | | | 15.0 | | | 17.3 | | | 16.6 | |
| Approach LOS | | B | | | B | | | B | | | B | |
| Timer | | | | | | | | | | | | |
| Assigned Phs | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Phs Duration (G+Y+Rc), s | | 17.9 | | | 17.9 | | 7.6 | 25.4 | | 7.2 | 25.0 | |
| Change Period (Y+Rc), s | | 5.5 | | | 5.5 | | 5.5 | 6.3 | | 5.5 | 6.3 | |
| Max Green Setting (Gmax), s | | 33.5 | | | 33.5 | | 23.5 | 45.7 | | 23.5 | 45.7 | |
| Max Q Clear Time (g_c+I1), s | | 9.2 | | | 3.3 | | 3.6 | 4.7 | | 3.4 | 6.8 | |
| Green Ext Time (p_c), s | | 3.1 | | | 3.2 | | 0.2 | 12.1 | | 0.1 | 11.9 | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 17.2 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |
| Notes | | | | | | | | | | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.2 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 24 | 197 | 102 | 24 | 16 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 27 | 219 | 113 | 27 | 18 | 11 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 140 | 0 | - | 0 | 399 | 127 |
| Stage 1 | - | - | - | - | 127 | - |
| Stage 2 | - | - | - | - | 272 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1443 | - | - | - | 607 | 923 |
| Stage 1 | - | - | - | - | 899 | - |
| Stage 2 | - | - | - | - | 774 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1443 | - | - | - | 596 | 923 |
| Mov Capacity-2 Maneuver | - | - | - | - | 596 | - |
| Stage 1 | - | - | - | - | 899 | - |
| Stage 2 | - | - | - | - | 760 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.8 | 0 | 10.3 |
| HCM LOS | | | B |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1443 | - | - | - | 596 | 923 |
| HCM Lane V/C Ratio | 0.018 | - | - | - | 0.03 | 0.012 |
| HCM Control Delay (s) | 7.542 | - | - | - | 11.2 | 8.9 |
| HCM Lane LOS | A | | | | B | A |
| HCM 95th %tile Q(veh) | 0.056 | - | - | - | 0.092 | 0.037 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

## HCM 2010 Signalized Intersection Summary
## 5: Heidorn Ranch Rd. & Prewett Ranch Dr

Long-Term + Project
Timing Plan: PM PEAK

| | ↗ | ↘ | ↖ | ↑ | ↶ | ↓ | ↙ |
|---|---|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBU | SBT | SBR |
| Lane Configurations | ↰ | ↱ | ↰ | ↑↑ | ↶ | ↑↱ | |
| Volume (veh/h) | 107 | 87 | 63 | 19 | 13 | 11 | 38 |
| Number | 7 | 14 | 5 | 2 | | 6 | 16 |
| 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 |
| Adj Sat Flow veh/h/ln | 186.3 | 186.3 | 186.3 | 186.3 | | 186.3 | 190.0 |
| Lanes | 1 | 1 | 1 | 2 | | 2 | 0 |
| Cap, veh/h | 247 | 221 | 114 | 1723 | | 371 | 315 |
| Arrive On Green | 0.14 | 0.14 | 0.06 | 0.46 | | 0.20 | 0.20 |
| Sat Flow, veh/h | 1774 | 1583 | 1774 | 3725 | | 1863 | 1583 |
| Grp Volume(v), veh/h | 119 | 97 | 70 | 21 | | 12 | 42 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1583 | 1774 | 1863 | | 1863 | 1583 |
| Q Serve(g_s), s | 1.2 | 1.1 | 0.8 | 0.1 | | 0.1 | 0.4 |
| Cycle Q Clear(g_c), s | 1.2 | 1.1 | 0.8 | 0.1 | | 0.1 | 0.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Lane Grp Cap(c), veh/h | 247 | 221 | 114 | 1723 | | 371 | 315 |
| V/C Ratio(X) | 0.48 | 0.44 | 0.61 | 0.01 | | 0.03 | 0.13 |
| Avail Cap(c_a), veh/h | 1501 | 1339 | 706 | 3337 | | 1668 | 1418 |
| 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 | 8.0 | 7.9 | 9.2 | 2.9 | | 6.5 | 6.6 |
| Incr Delay (d2), s/veh | 1.4 | 1.4 | 5.2 | 0.0 | | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| %ile Back of Q (50%), veh/ln | 0.5 | 0.1 | 0.4 | 0.0 | | 0.0 | 0.1 |
| Lane Grp Delay (d), s/veh | 9.4 | 9.3 | 14.4 | 2.9 | | 6.5 | 6.8 |
| Lane Grp LOS | A | A | B | A | | A | A |
| Approach Vol, veh/h | 216 | | | 91 | | 54 | |
| Approach Delay, s/veh | 9.4 | | | 11.7 | | 6.7 | |
| Approach LOS | A | | | B | | A | |
| **Timer** | | | | | | | |
| Assigned Phs | | | 5 | 2 | | 6 | |
| Phs Duration (G+Y+Rc), s | | | 5.3 | 13.3 | | 8.0 | |
| Change Period (Y+Rc), s | | | 4.0 | 4.0 | | 4.0 | |
| Max Green Setting (Gmax), s | | | 8.0 | 18.0 | | 18.0 | |
| Max Q Clear Time (g_c+I1), s | | | 2.8 | 2.1 | | 2.4 | |
| Green Ext Time (p_c), s | | | 0.0 | 0.2 | | 0.2 | |
| **Intersection Summary** | | | | | | | |
| HCM 2010 Ctrl Delay | | | 9.6 | | | | |
| HCM 2010 LOS | | | A | | | | |
| **Notes** | | | | | | | |

# 6: Heidorn Ranch Rd. & East Project Driveway

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.1 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 17 | 6 | 10 | 142 | 67 | 28 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | 100 | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 19 | 7 | 11 | 158 | 74 | 31 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 191 | 53 | 106 | 0 | - | 0 |
| Stage 1 | 90 | - | - | - | - | - |
| Stage 2 | 101 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 780 | 1003 | 1483 | - | - | - |
| Stage 1 | 923 | - | - | - | - | - |
| Stage 2 | 912 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 774 | 1003 | 1483 | - | - | - |
| Mov Capacity-2 Maneuver | 774 | - | - | - | - | - |
| Stage 1 | 923 | - | - | - | - | - |
| Stage 2 | 905 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 9.5 | 0.5 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1483 | - | 774 | 1003 | - | - |
| HCM Lane V/C Ratio | 0.007 | - | 0.024 | 0.007 | - | - |
| HCM Control Delay (s) | 7.446 | - | 9.8 | 8.6 | - | - |
| HCM Lane LOS | A | | A | A | | |
| HCM 95th %tile Q(veh) | 0.023 | - | 0.075 | 0.02 | - | - |

| Notes |
|---|
| ~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined |

## 1: Heidorn Ranch Rd. & Lone Tree Way

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 3 | 2016 | 79 | 1735 | 181 | 8 | 62 | 23 | 24 |
| v/c Ratio | 0.03 | 0.61 | 0.43 | 0.46 | 0.48 | 0.04 | 0.23 | 0.15 | 0.15 |
| Control Delay | 78.0 | 8.8 | 86.3 | 2.5 | 58.3 | 46.0 | 4.1 | 56.6 | 33.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 78.0 | 8.8 | 86.3 | 2.5 | 58.3 | 46.0 | 4.1 | 56.6 | 33.3 |
| Queue Length 50th (ft) | 3 | 89 | 71 | 45 | 75 | 6 | 0 | 18 | 10 |
| Queue Length 95th (ft) | m5 | #686 | 122 | 65 | 104 | 17 | 9 | 22 | 11 |
| Internal Link Dist (ft) |  | 1050 |  | 900 |  | 2101 |  |  | 316 |
| Turn Bay Length (ft) | 200 |  | 410 |  | 215 |  | 200 | 50 |  |
| Base Capacity (vph) | 231 | 3298 | 233 | 3775 | 448 | 515 | 500 | 231 | 482 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.01 | 0.61 | 0.34 | 0.46 | 0.40 | 0.02 | 0.12 | 0.10 | 0.05 |

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

# Queues
## 2: Canada Valley & Lone Tree Way

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 87 | 1976 | 37 | 449 | 1557 | 432 | 82 | 142 | 130 | 306 | 117 |
| v/c Ratio | 0.28 | 0.82 | 0.05 | 0.78 | 0.55 | 0.43 | 0.37 | 0.57 | 0.37 | 0.69 | 0.32 |
| Control Delay | 46.8 | 23.7 | 1.4 | 76.9 | 12.0 | 2.3 | 62.3 | 45.3 | 4.3 | 61.9 | 27.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.8 | 23.7 | 1.4 | 76.9 | 12.0 | 2.3 | 62.3 | 45.3 | 4.3 | 61.9 | 27.9 |
| Queue Length 50th (ft) | 36 | 145 | 0 | 205 | 105 | 0 | 34 | 89 | 0 | 128 | 56 |
| Queue Length 95th (ft) | m51 | #905 | m4 | 211 | 343 | 47 | 59 | 129 | 13 | 162 | 82 |
| Internal Link Dist (ft) |  | 900 |  |  | 775 |  |  | 542 |  |  | 1064 |
| Turn Bay Length (ft) | 300 |  | 620 | 285 |  | 245 | 70 |  |  | 160 |  |
| Base Capacity (vph) | 316 | 2424 | 802 | 613 | 2810 | 1016 | 369 | 488 | 549 | 633 | 644 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.28 | 0.82 | 0.05 | 0.73 | 0.55 | 0.43 | 0.22 | 0.29 | 0.24 | 0.48 | 0.18 |

Intersection Summary

#   95th percentile volume exceeds capacity, queue may be longer.
    Queue shown is maximum after two cycles.

m   Volume for 95th percentile queue is metered by upstream signal.

# Queues
## 3: Hillcrest Ave & Prewitt Ranch Dr/Prewett Ranch Dr

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 282 | 97 | 58 | 51 | 58 | 269 | 48 | 439 |
| v/c Ratio | 0.58 | 0.19 | 0.24 | 0.20 | 0.24 | 0.26 | 0.21 | 0.49 |
| Control Delay | 32.1 | 22.7 | 39.2 | 21.0 | 39.2 | 16.8 | 39.4 | 22.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 32.1 | 22.7 | 39.2 | 21.0 | 39.2 | 16.8 | 39.4 | 22.0 |
| Queue Length 50th (ft) | 123 | 31 | 27 | 8 | 27 | 33 | 22 | 68 |
| Queue Length 95th (ft) | 182 | 62 | 75 | 45 | 75 | 79 | 59 | 124 |
| Internal Link Dist (ft) |  | 1118 |  | 1835 |  | 753 |  | 2575 |
| Turn Bay Length (ft) | 95 |  | 115 |  | 130 |  | 230 |  |
| Base Capacity (vph) | 919 | 921 | 919 | 879 | 653 | 2152 | 653 | 2147 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.11 | 0.06 | 0.06 | 0.09 | 0.13 | 0.07 | 0.20 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.2 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 24 | 197 | 102 | 24 | 16 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 27 | 219 | 113 | 27 | 18 | 11 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 140 | 0 | - | 0 | 399 | 127 |
| Stage 1 | - | - | - | - | 127 | - |
| Stage 2 | - | - | - | - | 272 | - |
| Follow-up Headway | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Capacity-1 Maneuver | 1443 | - | - | - | 607 | 923 |
| Stage 1 | - | - | - | - | 899 | - |
| Stage 2 | - | - | - | - | 774 | - |
| Time blocked-Platoon, % | | - | - | - | | |
| Mov Capacity-1 Maneuver | 1443 | - | - | - | 596 | 923 |
| Mov Capacity-2 Maneuver | - | - | - | - | 596 | - |
| Stage 1 | - | - | - | - | 899 | - |
| Stage 2 | - | - | - | - | 760 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.8 | 0 | 10.3 |
| HCM LOS | | | B |

| Minor Lane / Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1443 | - | - | - | 596 | 923 |
| HCM Lane V/C Ratio | 0.018 | - | - | - | 0.03 | 0.012 |
| HCM Control Delay (s) | 7.542 | - | - | - | 11.2 | 8.9 |
| HCM Lane LOS | A | | | | B | A |
| HCM 95th %tile Q(veh) | 0.056 | - | - | - | 0.092 | 0.037 |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# Queues
## 5: Heidorn Ranch Rd. & Prewett Ranch Dr

| Lane Group | EBL | EBR | NBL | NBT | SBU | SBT |
|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 119 | 97 | 70 | 21 | 14 | 54 |
| v/c Ratio | 0.26 | 0.20 | 0.17 | 0.01 | 0.04 | 0.04 |
| Control Delay | 10.9 | 4.3 | 11.2 | 8.2 | 11.6 | 6.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 10.9 | 4.3 | 11.2 | 8.2 | 11.6 | 6.3 |
| Queue Length 50th (ft) | 8 | 0 | 5 | 1 | 1 | 0 |
| Queue Length 95th (ft) | 43 | 20 | 31 | 6 | 11 | 10 |
| Internal Link Dist (ft) | 580 |  |  | 1842 |  | 322 |
| Turn Bay Length (ft) | 100 |  | 100 |  | 100 |  |
| Base Capacity (vph) | 1081 | 1005 | 509 | 2478 | 509 | 2201 |
| 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 | 0.11 | 0.10 | 0.14 | 0.01 | 0.03 | 0.02 |

Intersection Summary

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 1.1 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Vol, veh/h | 17 | 6 | 10 | 142 | 67 | 28 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 0 | 0 | 100 | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 19 | 7 | 11 | 158 | 74 | 31 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 191 | 53 | 106 | 0 | - | 0 |
| Stage 1 | 90 | - | - | - | - | - |
| Stage 2 | 101 | - | - | - | - | - |
| Follow-up Headway | 3.52 | 3.32 | 2.22 | - | - | - |
| Pot Capacity-1 Maneuver | 780 | 1003 | 1483 | - | - | - |
| Stage 1 | 923 | - | - | - | - | - |
| Stage 2 | 912 | - | - | - | - | - |
| Time blocked-Platoon, % | | | | - | - | - |
| Mov Capacity-1 Maneuver | 774 | 1003 | 1483 | - | - | - |
| Mov Capacity-2 Maneuver | 774 | - | - | - | - | - |
| Stage 1 | 923 | - | - | - | - | - |
| Stage 2 | 905 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 9.5 | 0.5 | 0 |
| HCM LOS | A | | |

| Minor Lane / Major Mvmt | NBL | NBT | EBLn1 | EBLn2 | SBT | SBR |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1483 | - | 774 | 1003 | - | - |
| HCM Lane V/C Ratio | 0.007 | - | 0.024 | 0.007 | - | - |
| HCM Control Delay (s) | 7.446 | - | 9.8 | 8.6 | - | - |
| HCM Lane LOS | A | | A | A | | |
| HCM 95th %tile Q(veh) | 0.023 | - | 0.075 | 0.02 | - | - |

Notes

~ : Volume Exceeds Capacity; $ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

# QUEUING SUMMARY

# Antioch Heidorn Village Queuing Summary

| Scenarios Analyzed | Turning Movement | Lone Tree Way | | | | | | Prewett Ranch Dr | | | | | | | | | Heidorn Ranch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heidorn Ranch Rd #1 | | | Canada Valley Rd #2 | | | Hillcrest Ave #3 | | | South Project Driveway #4 | | | Heidorn Ranch Rd #5 | | | East Project Driveway #6 | | |
| | | Link | AM | PM | Link | AM | PM | Link | AM | PM | Link | AM | PM | Link | AM | PM | Link | AM | PM |
| **Existing Traffic** | EBL | 200 | <25 | <25 | 300 | 52 | 80 | 95 | 33 | 38 | Future Intersections | | | | | | | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 43 | 55 | 285 | 146 | 201 | 115 | <25 | <25 | | | | | | | | | |
| | WBR | | | | 245 | 77 | <25 | | | | | | | | | | | | |
| | NBL | 215 | 31 | 88 | 70 | 30 | 49 | 130 | <25 | <25 | | | | | | | | | |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 359 | 265 | 230 | <25 | <25 | | | | | | | | | |
| | SBR | | | | | | | | | | | | | | | | | | |
| **Existing + Project Traffic** | EBL | 200 | <25 | <25 | 300 | 53 | 79 | 95 | 33 | 38 | | | | 100 | 26 | <25 | | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 65 | 122 | 285 | 146 | 201 | 115 | <25 | <25 | | | | | | | | | |
| | WBR | | | | 245 | 77 | <25 | | | | | | | | | | | | |
| | NBL | 215 | 42 | 94 | 70 | 30 | 51 | 130 | <25 | <25 | | | | 100 | <25 | <25 | 100 | <25 | <25 |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 359 | 265 | 230 | <25 | <25 | | | | 100 | <25 | <25 | | | |
| | SBR | | | | | | | | | | | | | | | | | | |
| **Near-Term Traffic** | EBL | 200 | <25 | <25 | 300 | 32 | 54 | 95 | 160 | 136 | Future Intersections | | | | | | | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 33 | 51 | 285 | 152 | 199 | 115 | <25 | <25 | | | | | | | | | |
| | WBR | | | | 245 | 91 | <25 | | | | | | | | | | | | |
| | NBL | 215 | 31 | 91 | 70 | 32 | 51 | 130 | <25 | <25 | | | | | | | | | |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 190 | 162 | 230 | 37 | 40 | | | | | | | | | |
| | SBR | | | | | | | | | | | | | | | | | | |
| **Near-Term + Project Traffic** | EBL | 200 | <25 | <25 | 300 | 31 | 52 | 95 | 163 | 138 | | | | 100 | 26 | <25 | | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 60 | 123 | 285 | 151 | 200 | 115 | <25 | <25 | | | | | | | | | |
| | WBR | | | | 245 | 92 | <25 | | | | | | | | | | | | |
| | NBL | 215 | 42 | 97 | 70 | 32 | 53 | 130 | <25 | <25 | | | | 100 | <25 | <25 | 100 | <25 | <25 |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 190 | 162 | 230 | 38 | 44 | | | | 100 | <25 | <25 | | | |
| | SBR | | | | | | | | | | | | | | | | | | |
| **Long-Term Traffic** | EBL | 200 | <25 | <25 | 300 | 32 | 53 | 95 | 223 | 182 | Future Intersection | | | 100 | <25 | 34 | Future Intersection | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 27 | 70 | 285 | 141 | 211 | 115 | 64 | 71 | | | | | | | | | |
| | WBR | | | | 245 | 78 | 45 | | | | | | | | | | | | |
| | NBL | 215 | 27 | 101 | 70 | 34 | 58 | 130 | 65 | 74 | | | | 100 | 117 | 28 | | | |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 197 | 162 | 230 | <25 | 53 | | | | 100 | <25 | <25 | | | |
| | SBR | | | | | | | | | | | | | | | | | | |
| **Long-Term + Project Traffic** | EBL | 200 | <25 | <25 | 300 | 30 | 51 | 95 | 226 | 182 | | | | 100 | 31 | 43 | | | |
| | EBR | | | | 620 | <25 | <25 | | | | | | | | | | | | |
| | WBL | 410 | 51 | 122 | 285 | 141 | 211 | 115 | 69 | 75 | | | | | | | | | |
| | WBR | | | | 245 | 79 | 47 | | | | | | | | | | | | |
| | NBL | 215 | 38 | 104 | 70 | 34 | 59 | 130 | 69 | 75 | | | | 100 | 119 | 31 | 100 | <25 | <25 |
| | NBR | 200 | <25 | <25 | | | | | | | | | | | | | | | |
| | SBL | 50 | 26 | <25 | 160 | 197 | 162 | 230 | 50 | 59 | | | | 100 | <25 | <25 | | | |
| | SBR | | | | | | | | | | | | | | | | | | |

Note: Locations where the queue length exceeds the link storage by 25 feet or more are shown in shaded cells.