INITIAL STUDY
APPENDICES

APPENDIX A

Air Quality and GHG Analysis

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MEMORANDUM

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TO Robert Sparks, General Manager, Almaden Golf and Country Club
Almaden Golf and Country Club

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RE **Air Quality and Greenhouse Gas Emissions Technical Memorandum for the Almaden Golf and Country Club**

This Air Quality and Greenhouse Gas (GHG) Emissions Technical Memorandum has been prepared to analyze potential criteria air pollutant and GHG emissions impacts from construction and operation of the Almaden Golf and Country Club Project. The air quality and GHG emissions analysis includes an evaluation of the impacts of the Project compared to the significance criteria adopted by the Bay Area Air Quality Management District (BAAQMD).

1.1 AIR QUALITY ENVIRONMENTAL SETTING

1.1.1 REGULATORY FRAMEWORK

Ambient air quality standards (AAQS) have been adopted at State and federal levels for criteria air pollutants. In addition, both the State and federal government regulate the release of toxic air contaminants (TACs). The City of San José is in the San Francisco Bay Area Air Basin (SFBAAB) and is subject to the rules and regulations imposed by the BAAQMD, as well as the California AAQS adopted by the California Air Resources Board (CARB) and national AAQS adopted by the United States Environmental Protection Agency (USEPA). Federal, State, regional and local laws, regulations, plans, or guidelines that are potentially applicable to the proposed Project are summarized below.

1.1.1.1 Federal and State Laws

Ambient Air Quality Standards

The Clean Air Act (CAA) was passed in 1963 by the U.S. Congress and has been amended several times. The 1970 Clean Air Act amendments strengthened previous legislation and laid the foundation for the regulatory scheme of the 1970s and 1980s. In 1977, Congress again added several provisions, including nonattainment requirements for areas not meeting National AAQS and the Prevention of Significant Deterioration program. The 1990 amendments represent the latest in a series of federal efforts to regulate the protection of air quality in the United States. The CAA allows states to adopt more stringent standards or to include other pollution species. The California Clean Air Act, signed into law in 1988, requires all areas of the State to achieve and maintain the California AAQS by the earliest practical date. The California AAQS tend to be more restrictive than the National AAQS based on even greater health and welfare concerns.

The National and California AAQS are the levels of air quality considered to provide a margin of safety in the protection of the public health and welfare. They are designed to protect "sensitive receptors" most susceptible to further respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

Both California and the federal government have established health-based AAQS for seven air pollutants, which are shown in Table 1. These pollutants include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), coarse inhalable particulate matter (PM_{10}), fine inhalable particulate matter ($PM_{2.5}$), and lead (Pb). In addition, the State has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

TABLE 1 AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	California Standard	Federal Primary Standard	Major Pollutant Sources
Ozone (O3)	1 Hour	0.09 ppm	*	Motor vehicles, paints, coatings, and solvents.
	8 Hours	0.070 ppm	0.075 ppm	
Carbon Monoxide (CO)	1 Hour	20 ppm	35 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 Hours	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO2)	Annual Average	0.030 ppm	0.053 ppm	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	1 Hour	0.18 ppm	0.100 ppm	
Sulfur Dioxide (SO2)	Annual Arithmetic Mean	*	*a	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	1 Hour	0.25 ppm	0.075 ppm	
	24 Hours	0.04 ppm	*a	
Respirable Particulate Matter(PM_{10})	Annual Arithmetic Mean	20 µg/m^3	*	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g.,

TABLE 1 AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	California Standard	Federal Primary Standard	Major Pollutant Sources
	24 Hours	50 µg/m^3	150 µg/m^3	wind-raised dust and ocean sprays).
Respirable Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	12 µg/m^3	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 Hours	*	35 µg/m^3	
Lead (Pb)	30-Day Average	1.5 µg/m^3	*	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarterly	*	1.5 µg/m^3	
	Rolling 3-Month Average	*	0.15 µg/m^3	
Sulfates (SO_4)	24 Hours	25 µg/m^3	*	Industrial processes.
Visibility Reducing Particles	8 Hours	ExCo = 0.23/km visibility of 10≥ miles	*	Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.
Hydrogen Sulfide	1 Hour	0.03 ppm	*	Hydrogen sulfide (H_2S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.
Vinyl Chloride	24 Hours	0.01 ppm	*	Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Notes: ppm: parts per million; µg/m^3: micrograms per cubic meter
* Standard has not been established for this pollutant/duration by this entity.
a. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked.
Source: California Air Resources Board (CARB), 2013. Ambient Air Quality Standards, http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

Air Pollutants of Concern

Criteria Air Pollutants

The pollutants emitted into the ambient air by stationary and mobile sources are regulated by federal and State law. Air pollutants are categorized as primary and/or secondary pollutants. Primary air pollutants are emitted directly from sources. CO, reactive organic gases (ROG), nitrogen oxides (NO_x), SO_2, PM_{10}, $PM_{2.5}$, and lead are primary air pollutants. Of these, CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ are "criteria air pollutants," which means that AAQS have been established for them. ROG and NO_2 are criteria pollutant precursors that form secondary criteria air pollutants through chemical and photochemical reactions in the atmosphere. O_3 and NO_2 are the principal secondary pollutants.

A description of each of the primary and secondary criteria air pollutants and their known health effects is presented below.

- **Carbon Monoxide** (CO) is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. CO is a primary criteria air pollutant. CO concentrations tend to be the highest during winter mornings with little or no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, motor vehicles operating at slow speeds are the primary source of CO in the SFBAAB. Emissions are highest during cold starts, hard acceleration, stop-and-go driving, and when a vehicle is moving at low speeds. New findings indicate that CO emissions per mile are lowest at about 45 miles per hour (mph) for the average light-duty motor vehicle and begin to increase again at higher speeds. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces its oxygen-carrying capacity. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses. Even healthy people exposed to high CO concentrations can experience headaches, dizziness, fatigue, unconsciousness, and even death.[1] The SFBAAB is designated under the California and National AAQS as being in attainment of CO criteria levels.[2]

- **Reactive Organic Gases** (ROGs) are compounds composed primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of ROGs. Other sources of ROGs include evaporative emissions from paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. Adverse effects on human health are not caused directly by ROGs, but rather by reactions of ROGs to form secondary pollutants such as O_3. There are no AAQS established for ROGs. However, because they

[1] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.

[2] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.

contribute to the formation of O_3, the BAAQMD has established a significance threshold for this pollutant.

- **Nitrogen Oxides** (NO_X) are a by-product of fuel combustion and contribute to the formation of O_3, PM_{10}, and $PM_{2.5}$. The two major components of NO_x are nitric oxide (NO) and NO_2. The principal component of NO_x produced by combustion is NO, but NO reacts with oxygen to form NO_2, creating the mixture of NO and NO_2 commonly called NO_x. NO_2 acts as an acute irritant and in equal concentrations is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 ppm. NO_2 absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. The SFBAAB is designated an attainment area for NO_2 under the National AAQS and California AAQS.[3]

- **Sulfur Dioxide** (SO_2) is a colorless, pungent, irritating gas formed by the combustion of sulfurous fossil fuels. It enters the atmosphere as a result of burning high-sulfur-content fuel oils and coal and from chemical processes at chemical plants and refineries. Gasoline and natural gas have very low sulfur content and do not release significant quantities of SO_2. When SO_2 forms sulfates (SO_4) in the atmosphere, together these pollutants are referred to as sulfur oxides (SO_x). Thus, SO_2 is both a primary and secondary criteria air pollutant. At sufficiently high concentrations, SO_2 may irritate the upper respiratory tract. At lower concentrations and when combined with particulates, SO_2 may do greater harm by injuring lung tissue.[4] The SFBAAB is designated an attainment area for SO_2 under the California and National AAQS.[5]

- **Suspended Particulate Matter** (PM_{10} and $PM_{2.5}$) consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized and regulated. Inhalable coarse particles, or PM_{10}, include the particulate matter with an aerodynamic diameter of 10 microns (i.e., 10 millionths of a meter or 0.0004 inch) or less. Inhalable fine particles, or $PM_{2.5}$, have an aerodynamic diameter of 2.5 microns or less (i.e., 2.5 millionths of a meter or 0.0001 inch).

  Some particulate matter, such as pollen, occurs naturally. In the SFBAAB most particulate matter is caused by combustion, factories, construction, grading, demolition, agricultural activities, and motor vehicles. Extended exposure to particulate matter can increase the risk of chronic respiratory disease. PM_{10} bypasses the body's natural filtration system more easily than larger particles and

[3] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.
[4] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.
[5] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.

can lodge deep in the lungs. EPA scientific review concluded that $PM_{2.5}$ penetrates even more deeply into the lungs, and this is more likely to contribute to health effects–at concentrations well below current PM_{10} standards. These health effects include premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, increased respiratory symptoms (e.g., irritation of the airways, coughing, or difficulty breathing). Motor vehicles are currently responsible for about half of particulates in the SFBAAB. Wood burning in fireplaces and stoves is another large source of fine particulates.[6]

Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems. These health effects include premature death and increased hospital admissions and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individual with asthma); and alterations in lung tissue and structure and in respiratory tract defense mechanisms.[7] Diesel particulate matter (DPM) is classified a carcinogen by CARB. The SFBAAB is designated nonattainment under the California AAQS for PM_{10} and a nonattainment area under both the California and National AAQS for $PM_{2.5}$.[8]

- **Ozone** (O_3) is commonly referred to as "smog" and is a gas that is formed when ROGs and NO_x, both by-products of internal combustion engine exhaust, undergo photochemical reactions in the presence of sunlight. O_3 is a secondary criteria air pollutant. O_3 concentrations are generally highest during the summer months when direct sunlight, light winds, and warm temperatures create favorable conditions to the formation of this pollutant. O_3 poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. O_3 levels usually build up during the day and peak in the afternoon hours. Short-term exposure can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, it can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Chronic exposure to high ozone levels can permanently damage lung tissue. O_3 can also damage plants and trees and materials such as rubber and fabrics.[9] The SFBAAB is designated a nonattainment area of the 1-hour California AAQS and 8-hour California and National AAQS for O_3.[10]

- **Lead** (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead

[6] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.
[7] South Coast Air Quality Management District, 2005, Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning.
[8] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.
[9] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.
[10] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.

emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the EPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.[11] The SFBAAB is designated in attainment of the California and National AAQS for lead.[12] Because emissions of lead are found only in projects that are permitted by BAAQMD, lead is not an air quality of concern for the proposed Project.

Toxic Air Contaminants

Public exposure to TACs is a significant environmental health issue in California. In 1983, the California Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health. The California Health and Safety Code define a TAC as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health." A substance that is listed as a hazardous air pollutant pursuant to Section 112(b) of the federal Clean Air Act (42 U.S. Code Section 7412[b]) is a toxic air contaminant. Under State law, the California EPA (Cal/EPA), acting through CARB, is authorized to identify a substance as a TAC if it is an air pollutant that may cause or contribute to an increase in mortality or serious illness, or may pose a present or potential hazard to human health.

California regulates TACs primarily through AB 1807 (Tanner Air Toxics Act) and AB 2588 (Air Toxics "Hot Spot" Information and Assessment Act of 1987). The Tanner Air Toxics Act sets up a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an "airborne toxics control measure" for sources that emit designated TACs. If there is a safe threshold for a substance (i.e., a point below which there is no toxic effect), the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology to minimize emissions. To date, CARB has established formal control measures for 11 TACs that are identified as having no safe threshold.

Air toxics from stationary sources are also regulated in California under the Air Toxics "Hot Spot" Information and Assessment Act of 1987. Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High

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[11] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.

[12] California Air Resources Board, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.

priority facilities are required to perform a health risk assessment (HRA) and, if specific thresholds are exceeded, are required to communicate the results to the public through notices and public meetings.

By the last update to the TAC list in December 1999, CARB had designated 244 compounds as TACs.[13] Additionally, CARB has implemented control measures for a number of compounds that pose high risks and show potential for effective control. The majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines.

In 1998, CARB identified DPM as a TAC. Previously, the individual chemical compounds in diesel exhaust were considered TACs. Almost all diesel exhaust particles are 10 microns or less in diameter. Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lungs.

The BAAQMD's Community Air Risk Evaluation program was initiated in 2004 to evaluate and reduce health risks associated with exposures to outdoor TACs in the Bay Area. Based on the annual emissions inventory of TACs for the SFBAAB, DPM was found to account for approximately 80 percent of the cancer risk from airborne toxics. The highest DPM concentrations occur in the urban core areas of eastern San Francisco, western Alameda, and northwestern Santa Clara counties. BAAQMD has identified six impacted communities in the Bay Area: Concord, eastern San Francisco, western Alameda County, Redwood City/East Palo Alto, Richmond/San Pablo, and San Jose. The major contributor to acute and chronic non-cancer health effects in the SFBAAB is acrolein (C_3H_4O). Major sources of acrolein include on-road mobile sources and aircraft near freeways and commercial and military airports.[14] Currently CARB does not have certified emission factors or an analytical test method for acrolein. Since the appropriate tools needed to implement and enforce acrolein emission limits are not available, the BAAQMD does not conduct health risk screening analysis for acrolein emissions.[15]

Bay Area Air Quality Management District

BAAQMD is the agency responsible for assuring that the National and California AAQS are attained and maintained in the SFBAAB. BAAQMD is responsible for:

- Adopting and enforcing rules and regulations concerning air pollutant sources.
- Issuing permits for stationary sources of air pollutants.
- Inspecting stationary sources of air pollutants.
- Responding to citizen complaints.

[13] California Air Resources Board, 1999, Final Staff Report: Update to the Toxic Air Contaminant List.
[14] Bay Area Air Quality Management District, 2006, Community Air Risk Evaluation Program, Phase I Findings and Policy Recommendations Related to Toxic Air Contaminants in the San Francisco Bay Area.
[15] Bay Area Air Quality Management District, 2010, Air Toxics NSR Program, Health Risk Screening Analysis Guidelines.

- Monitoring ambient air quality and meteorological conditions.
- Awarding grants to reduce motor vehicle emissions.
- Conducting public education campaigns.

Air Quality Management Planning

Air quality conditions in the SFBAAB have improved significantly since the BAAQMD was created in 1955.[16] The BAAQMD prepares air quality management plans (AQMPs) to attain ambient air quality standards in the SFBAAB. The BAAQMD prepares ozone attainment plans (OAPs) for the National O_3 standard and clean air plans for the California O_3 standard. The BAAQMD prepares these AQMPs in coordination with Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC). The most recent adopted comprehensive plan is the 2010 Bay Area Clean Air Plan, which was adopted on September 15, 2010, and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools.

BAAQMD 2010 Bay Area Clean Air Plan

The purpose of the 2010 Bay Area Clean Air Plan is to: 1) update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California CAA to implement all feasible measures to reduce $O_{3;}$ 2) consider the impacts of O_3 control measures on PM, TACs, and GHGs in a single, integrated plan; 3) review progress in improving air quality in recent years; and 4) establish emission control measures in the 2009 to 2012 timeframe. The 2010 Bay Area Clean Air Plan also provides the framework for the SFBAAB to achieve attainment of the California AAQS. Areas that meet AAQS are classified attainment areas, while areas that do not meet these standards are classified nonattainment areas. Severity classifications for O_3 range from marginal, moderate, and serious to severe and extreme. The attainment status for the SFBAAB is shown in Table 2. The SFBAAB is currently designated a nonattainment area for California and National O_3, California and National $PM_{2.5}$, and California PM_{10} AAQS.

TABLE 2 ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SAN FRANCISCO AIR BASIN

Pollutant	State	Federal
Ozone (O_3) – 1-hour	Nonattainment (serious)	Nonattainment
Ozone (O_3) – 8-hour	Nonattainment	Classification revoked (2005)

[16] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.

TABLE 2 ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SAN FRANCISCO AIR BASIN

Pollutant	State	Federal
Respirable Particulate Matter (PM_{10})	Nonattainment	Unclassified
Respirable Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Lead (Pb)	Attainment	Attainment
Sulfates (SO_4)	Attainment	Unclassified
All others	Unclassified	Unclassified

Source: California Air Resources Board, 2013, Area Designations: Activities and Maps, http://www.arb.ca.gov/desig/adm/adm.htm, accessed on January 15, 2014.

Santa Clara Valley Transportation Authority

The Santa Clara Valley Transportation Authority (SCVTA) is the designated congestion management agency for the county. The SCVTA's congestion management program (CMP) identifies strategies to respond to future transportation needs, identifies procedures to alleviate and control congestion, and promotes countywide solutions. Pursuant to the EPA's transportation conformity regulations and the Bay Area Conformity State Implementation Plan (also known as the Bay Area Air Quality Conformity Protocol), the CMP is required to be consistent with the MTC planning process, including regional goals, policies, and projects for the regional transportation improvement program (RTIP).[17] The Metropolitan Transportation Commission (MTC) cannot approve any transportation plan, program, or project unless these activities conform to the State Implementation Plan (SIP).

The federal CAA requires that federal transportation plans be prepared for regions in nonattainment of the federal AAQS. SCVTA provides county-level input to MTC during preparation of the regional transportation plan (RTP). The current RTP, Plan Bay Area, was adopted on July 18, 2013. Plan Bay Area was prepared by MTC and the Association of Bay Area Governments (ABAG). Plan Bay Area

[17] Santa Clara Valley Transportation Authority (CCTA). 2011, Santa Clara Valley County Congestion Management Program, http://www.vta.org/cmp

incorporates the region's sustainable communities strategy (SCS) pursuant to Senate Bill 375 (SB 375).[18]

1.1.2 EXISTING AMBIENT AIR QUALITY

1.1.2.1 San Francisco Air Basin

The BAAQMD is the regional air quality agency for the SFBAAB, which comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties; the southern portion of Sonoma County; and the southwestern portion of Solano County. Air quality in this area is determined by such natural factors as topography, meteorology, and climate, in addition to the presence of existing air pollution sources and ambient conditions.[19]

Meteorology

The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Coast Range splits, resulting in a western coast gap, Golden Gate, and an eastern coast gap, Carquinez Strait, which allow air to flow in and out of the SFBAAB and the Central Valley.

The climate is dominated by the strength and location of a semi-permanent, subtropical high-pressure cell. During the summer, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean, resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below the surface because of the northwesterly flow produces a band of cold water off the California coast. The cool and moisture-laden air approaching the coast from the Pacific Ocean is further cooled by the presence of the cold water band, resulting in condensation and the presence of fog and stratus clouds along the Northern California coast. In the winter, the Pacific high-pressure cell weakens and shifts southward, resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms. Weak inversions coupled with moderate winds result in a low air pollution potential.

Wind Patterns

During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more directly from the west as they stream through the Golden Gate. This channeling of wind through the Golden Gate produces a jet that sweeps

[18] Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG), 2013. Plan Bay Area, Strategy for a Sustainable Region. March (adopted July 18).

[19] Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix C: Sample Air Quality Setting.

eastward and splits off to the northwest toward Richmond and to the southwest toward San Jose when it meets the East Bay hills.

Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait, the Golden Gate, or the San Bruno gap. For example, the average wind speed at San Francisco International Airport in July is about 17 knots (from 3:00 p.m. to 4:00 p.m.), compared with only 7 knots at San Jose and less than 6 knots at the Farallon Islands.

The air flowing in from the coast to the Central Valley, called the sea breeze, begins developing at or near ground level along the coast in late morning or early afternoon. As the day progresses, the sea breeze layer deepens and increases in velocity while spreading inland. The depth of the sea breeze depends in large part upon the height and strength of the inversion. If the inversion is low and strong, and hence stable, the flow of the sea breeze will be inhibited and stagnant conditions are likely to result.

In the winter, the SFBAAB frequently experiences stormy conditions with moderate to strong winds, as well as periods of stagnation with very light winds. Winter stagnation episodes are characterized by nighttime drainage flows in coastal valleys. Drainage is a reversal of the usual daytime air-flow patterns; air moves from the Central Valley toward the coast and back down toward the Bay from the smaller valleys within the SFBAAB.

Temperature

Summertime temperatures in the SFBAAB are determined in large part by the effect of differential heating between land and water surfaces. Because land tends to heat up and cool off more quickly than water, a large-scale gradient (differential) in temperature is often created between the coast and the Central Valley, and small-scale local gradients are often produced along the shorelines of the ocean and bays. The temperature gradient near the ocean is also exaggerated, especially in summer, because of the upwelling of cold water from the ocean bottom along the coast. On summer afternoons the temperatures at the coast can be 35 degrees Fahrenheit (ºF) cooler than temperatures 15 to 20 miles inland. At night this contrast usually decreases to less than 10ºF.

In the winter, the relationship of minimum and maximum temperatures is reversed. During the daytime the temperature contrast between the coast and inland areas is small, whereas at night the variation in temperature is large.

Precipitation

The SFBAAB is characterized by moderately wet winters and dry summers. Winter rains (November through March) account for about 75 percent of the average annual rainfall. The amount of annual precipitation can vary greatly from one part of the SFBAAB to another, even within short distances. In general, total annual rainfall can reach 40 inches in the mountains, but it is often less than 16 inches in sheltered valleys.

During rainy periods, ventilation (rapid horizontal movement of air and injection of cleaner air) and vertical mixing are usually high, and thus pollution levels tend to be low. However, frequent dry periods do occur during the winter where mixing and ventilation are low and pollutant levels build up.

Wind Circulation

Low wind speed contributes to the buildup of air pollution because it allows more pollutants to be emitted into the air mass per unit of time. Light winds occur most frequently during periods of low sun (fall and winter, and early morning) and at night. These are also periods when air pollutant emissions from some sources are at their peak, namely, commuter traffic (early morning) and wood-burning appliances (nighttime). The problem can be compounded in valleys, when weak flows carry the pollutants up-valley during the day, and cold air drainage flows move the air mass down-valley at night. Such restricted movement of trapped air provides little opportunity for ventilation and leads to buildup of pollutants to potentially unhealthful levels.

Inversions

An inversion is a layer of warmer air over a layer of cooler air. Inversions affect air quality conditions significantly because they influence the mixing depth, i.e., the vertical depth in the atmosphere available for diluting air contaminants near the ground. There are two types of inversions that occur regularly in the SFBAAB. Elevation inversions are more common in the summer and fall, and radiation inversions are more common during the winter. The highest air pollutant concentrations in the SFBAAB generally occur during inversions.

1.1.2.2 Existing Ambient Air Quality

Existing levels of ambient air quality and historical trends and projections in the vicinity of the Project site are best documented by measurements made by the BAAQMD. The air quality monitoring station closest to the Project site is the Los Gatos Monitoring Station at 306 University Ave, Los Gatos. Data from this station is summarized in Table 3. This station monitors O_3 and CO. $PM_{2.5}$ and PM_{10} data has been obtained from San Jose – Jackson Street Monitoring Station at Jackson St, Santa Clara. The data show occasional violations of the State and federal O_3 standards, state PM_{10} standard, and federal $PM_{2.5}$ standard. The State and federal CO and NO_2 standards have not been exceeded in the last five years in the vicinity of this monitoring station.

TABLE 3 AMBIENT AIR QUALITY MONITORING SUMMARY

Pollutant/Standard	Number of Days Threshold Were Exceeded and Maximum Levels During Such Violations				
	2008	2009	2010	2011	2012
Ozone (O_3)[a]					
State 1-Hour ≥ 0.09 ppm	2	3	2	0	0
State 8-hour ≥ 0.07 ppm	6	8	3	1	1
Federal 8-Hour > 0.075 ppm	2	4	2	0	0
Maximum 1-Hour Conc. (ppm)	0.122	0.102	0.109	0.091	0.085
Maximum 8-Hour Conc. (ppm)	0.098	0.082	0.087	0.075	0.073
Carbon Monoxide (CO)[a]					
State 8-Hour > 9.0 ppm	0	0	0	0	0
Federal 8-Hour ≥ 9.0 ppm	0	0	0	0	0
Maximum 8-Hour Conc. (ppm)	2.48	2.50	2.19	2.18	1.86
Nitrogen Dioxide (NO_2)[a]					
State 1-Hour ≥ 0.18 (ppm	0	0	0	0	0
Maximum 1-Hour Conc. (ppb)	80.0	69.0	64.0	61.0	67.2
Coarse Particulates (PM_{10})[a]					
State 24-Hour > 50 µg/m^3	6	0	0	0	1
Federal 24-Hour > 150 µg/m^3	0	0	0	0	0
Maximum 24-Hour Conc. (µg/m^3)	57.3	43.3	46.8	44.3	59.6
Fine Particulates ($PM_{2.5}$)[a]					
Federal 24-Hour > 35 µg/m^3	5	0	3	3	2
Maximum 24-Hour Conc. (µg/m^3)	41.9	35.0	41.5	50.5	38.4

Notes: ppm: parts per million; ppb: parts per billion; µg/m^3: or micrograms per cubic meter
Data obtained from Los Gatos Monitoring Station at 306 University Ave, Los Gatos.
Data obtained from San Jose – Jackson Street Monitoring Station at Jackson St, Santa Clara.
Source: California Air Resources Board, 2013, Air Pollution Data Monitoring Cards (2008, 2009, 2010, 2011, and 2012), http://www.arb.ca.gov/adam/index.html, accessed on January 14, 2014.

1.1.2.3 Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardiorespiratory diseases.

Residential areas are also considered sensitive receptors to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Other sensitive receptors include retirement facilities, hospitals, and schools.

Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial, commercial, retail, and office areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, since the majority of the workers tend to stay indoors most of the time. In addition, the working population is generally the healthiest segment of the public.

The closest sensitive receptors proximate to the Project site include the single family residences less than 80 feet away, immediately south-west of the Project site and other single family residences across Hillcrest Drive.

1.2 GREENHOUSE GAS EMISSIONS ENVIRONMENTAL SETTING

Scientists have concluded that human activities are contributing to global climate change by adding large amounts of heat-trapping gases, known as GHG, to the atmosphere. The primary source of these GHG is fossil fuel use. The Intergovernmental Panel on Climate Change (IPCC) has identified four major GHG–water vapor, carbon dioxide (CO_2), methane (CH_4), and ozone (O_3)–that are the likely cause of an increase in global average temperatures observed within the 20th and 21st centuries. Other GHG identified by the IPCC that contribute to global warming to a lesser extent include nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons.[20,21,22] The major GHG are briefly described below. Table 4 lists the GHG applicable to the proposed Project and their relative global warming potentials (GWP) compared to CO_2.

- **Carbon dioxide** (CO_2) enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and respiration, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.
- **Methane** (CH_4) is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal landfills and water treatment facilities.

[20] Intergovernmental Panel on Climate Change (IPCC), 2001. *Third Assessment Report: Climate Change 2001.* New York: Cambridge University Press.

[21] Water vapor (H_2O) is the strongest GHG and the most variable in its phases (vapor, cloud droplets, ice crystals). However, water vapor is not considered a pollutant.

[22] Black carbon contributes to climate change both directly, by absorbing sunlight, and indirectly, by depositing on snow (making it melt faster) and by interacting with clouds and affecting cloud formation. Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels such as coal, diesel, and biomass. Reducing black carbon emissions globally can have immediate economic, climate, and public health benefits. California has been an international leader in reducing emissions of black carbon, with close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities. California Air Resources Board (CARB), 2013. Climate Change Scoping Plan First Update, http://www.arb.ca.gov/cc/scopingplan/2013_update/discussion_draft.pdf.

TABLE 4 GREENHOUSE GASES AND THEIR RELATIVE GLOBAL WARMING POTENTIAL COMPARED TO CO_2

GHGs	Atmospheric Lifetime (Years)	Global Warming Potential Relative to CO_2[a]
Carbon Dioxide (CO_2)	50 to 200	1
Methane (CH_4)[b]	12 (±3)	21
Nitrous Oxide (N_2O)	120	310
Hydrofluorocarbons:		
HFC-23	264	11,700
HFC-32	5.6	650
HFC-125	32.6	2,800
HFC-134a	14.6	1,300
HFC-143a	48.3	3,800
HFC-152a	1.5	140
HFC-227ea	36.5	2,900
HFC-236fa	209	6,300
HFC-4310mee	17.1	1,300
Perfluoromethane (CF_4)	50,000	6,500
Perfluoroethane (C_2F_6)	10,000	9,200
Perfluorobutane (C_4F_{10})	2,600	7,000
Perfluoro-2-methylpentane (C_6F_{14})	3,200	7,400
Sulfur Hexafluoride (SF_6)	3,200	23,900

a. Based on 100-year time horizon of the global warming potential (GWP) of the air pollutant relative to CO_2. Intergovernmental Panel on Climate Change (IPCC), 2001. *Third Assessment Report: Climate Change 2001.* New York: Cambridge University Press.
b. The methane GWP includes direct effects and indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.
Source: Intergovernmental Panel on Climate Change (IPCC), 2001. Third Assessment Report: Climate Change 2001. New York: Cambridge University Press.

- **Nitrous oxide** (N_2O) is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.
- **Fluorinated gases** are synthetic, strong GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High GWP gases.
- **Chlorofluorocarbons** (CFCs) are GHGs covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are also ozone-depleting gases and are therefore being replaced by other compounds that are GHGs covered under the Kyoto Protocol.
- **Perfluorocarbons** (PFCs) are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF_4] and perfluoroethane [C_2F_6]) were introduced as alternatives, along with HFCs, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high global warming potential.
- **Sulfur Hexafluoride** (SF_6) is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF_6 is a strong GHG used primarily in electrical transmission and distribution systems as an insulator.
- **Hydrochlorofluorocarbons** (HCFCs) contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent at destroying stratospheric ozone than CFCs. They have been introduced as temporary replacements for CFCs and are also GHGs.
- **Hydrofluorocarbons** (HFCs) contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances to serve many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong GHGs.[23,24,25]

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[23] United States Environmental Protection Agency (USEPA), 2012. Greenhouse Gas Emissions. http://www.epa.gov/climatechange/ghgemissions/gases.html.

[24] Intergovernmental Panel on Climate Change (IPCC), 2001. Third Assessment Report: Climate Change 2001. New York: Cambridge University Press.

[25] Intergovernmental Panel on Climate Change (IPCC), 2007. Fourth Assessment Report: Climate Change 2007. New York: Cambridge University Press.

California's Greenhouse Gas Sources and Relative Contribution

California is the second largest emitter of GHG in the United States, only surpassed by Texas, and the tenth largest GHG emitter in the world.[26] However, California also has over 12 million more people than the state of Texas. Because of more stringent air emission regulations, in 2001 California ranked fourth lowest in carbon emissions per capita and fifth lowest among states in CO_2 emissions from fossil fuel consumption per unit of Gross State Product (total economic output of goods and services).[27]

CARB's latest update to the statewide GHG emissions inventory was conducted in 2012 for year 2009 emissions.[28] In 2009, California produced 457 million metric tons (MMT) of CO_2-equivalent (CO_2e) GHG emissions. California's transportation sector is the single largest generator of GHG emissions, producing 37.9 percent of the State's total emissions. Electricity consumption is the second largest source, comprising 22.7 percent. Industrial activities are California's third largest source of GHG emissions, comprising 17.8 percent of the state's total emissions. Other major sectors of GHG emissions include commercial and residential, recycling and waste, high global warming potential GHGs, agriculture, and forestry.[29,30]

Human Influence on Climate Change

For approximately 1,000 years before the Industrial Revolution, the amount of GHG in the atmosphere remained relatively constant. During the 20th century, however, scientists observed a rapid change in the climate and climate change pollutants that are attributable to human activities. The amount of CO_2 has increased by more than 35 percent since preindustrial times and has increased at an average rate of 1.4 parts per million (ppm) per year since 1960, mainly due to combustion of fossil fuels and deforestation.[31] These recent changes in climate change pollutants far exceed the extremes of the ice ages, and the global mean temperature is warming at a rate that cannot be explained by natural causes

[26] California Energy Commission (CEC), 2005. Climate Change Emissions Estimates from Bemis, Gerry and Jennifer Allen, Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update. California Energy Commission Staff Paper CEC-600-2005-025. Sacramento, California.

[27] California Energy Commission (CEC), 2006. Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004. Report CEC-600-2006-013-SF.

[28] Methodology for determining the statewide GHG inventory is not the same as the methodology used to determine statewide GHG emissions under Assembly Bill 32 (AB 32) (2006).

[29] CO_2-equivalence is used to show the relative potential that different GHGs have to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. The global warming potential of a GHG is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere.

[30] California Air Resources Board (CARB), 2012. California Greenhouse Gas Inventory for 2000–2009. By Category as Defined by the Scoping Plan.

[31] Intergovernmental Panel on Climate Change (IPCC), 2007. *Fourth Assessment Report: Climate Change 2007.* New York: Cambridge University Press.

alone. Human activities are directly altering the chemical composition of the atmosphere through the buildup of climate change pollutants.[32]

Climate-change scenarios are affected by varying degrees of uncertainty. IPCC's "2007 IPCC Fourth Assessment Report" projects that the global mean temperature increase from 1990 to 2100, under different climate-change scenarios, will range from 1.4 to 5.8°C (2.5 to 10.4°F). In the past, gradual changes in the earth's temperature changed the distribution of species, availability of water, etc. However, human activities are accelerating this process so that environmental impacts associated with climate change no longer occur in a geologic time frame but within a human lifetime.[33]

Potential Climate Change Impacts for California

Like the variability in the projections of the expected increase in global surface temperatures, the environmental consequences of gradual changes in the Earth's temperature are also hard to predict. In California and western North America, observations of the climate have shown: 1) a trend toward warmer winter and spring temperatures, 2) a smaller fraction of precipitation falling as snow, 3) a decrease in the amount of spring snow accumulation in the lower and middle elevation mountain zones, 4) an advance snowmelt of 5 to 30 days earlier in the springs, and 5) a similar shift (5 to 30 days earlier) in the timing of spring flower blooms.[34] According to the California Climate Action Team, even if actions could be taken to immediately curtail climate change emissions, the potency of emissions that have already built up, their long atmospheric lifetimes (see Table 4), and the inertia of the Earth's climate system could produce as much as 0.6°C (1.1°F) of additional warming. Consequently, some impacts from climate change are now considered unavoidable. Global climate change risks to California are shown in Table 5 and include public health impacts, water resources impacts, agricultural impacts, coastal sea level impacts, forest and biological resource impacts, and energy impacts. Specific climate change impacts that could affect the Project include health impacts from a deterioration in air quality, water resources impacts from a reduction in water supply, and increased energy demand.

TABLE 5 SUMMARY OF GREENHOUSE GAS EMISSION RISKS TO CALIFORNIA

Impact Category	Potential Risk
Public Health Impacts	Poor air quality made worse More severe heat
Water Resources Impacts	Decreasing Sierra Nevada snow pack Challenges in securing adequate water supply Potential reduction in hydropower Loss of winter recreation

[32] California Climate Action Team (CAT), 2006. Climate Action Team Report to Governor Schwarzenegger and the Legislature.
[33] Intergovernmental Panel on Climate Change (IPCC), 2007. Fourth Assessment Report: Climate Change 2007. New York: Cambridge University Press.
[34] California Climate Action Team (CAT), 2006. Climate Action Team Report to Governor Schwarzenegger and the Legislature.

TABLE 5 SUMMARY OF GREENHOUSE GAS EMISSION RISKS TO CALIFORNIA

Impact Category	Potential Risk
Agricultural Impacts	Increasing temperature Increasing threats from pests and pathogens Expanded ranges of agricultural weeds Declining productivity Irregular blooms and harvests
Coastal Sea Level Impacts	Accelerated sea level rise Increasing coastal floods Shrinking beaches Worsened impacts on infrastructure
Forest and Biological Resource Impacts	Increased risk and severity of wildfires Lengthening of the wildfire season Movement of forest areas Conversion of forest to grassland Declining forest productivity Increasing threats from pest and pathogens Shifting vegetation and species distribution Altered timing of migration and mating habits Loss of sensitive or slow-moving species
Energy Demand Impacts	Potential reduction in hydropower Increased energy demand

Sources: California Energy Commission (CEC), 2006. Our Changing Climate, Assessing the Risks to California, 2006 Biennial Report, California Climate Change Center, CEC-500-2006-077; California Energy Commission (CEC), 2008. The Future Is Now, An Update on Climate Change Science, Impacts, and Response Options for California, CEC-500-2008-0077.

1.2.1 REGULATORY FRAMEWORK

Federal Laws and Regulations

The U.S. Environmental Protection Agency (EPA) announced on December 7, 2009, that GHG emissions threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. The EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements, but allow the EPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation.[35]

The EPA's endangerment finding covers emissions of six key GHGs–CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and SF_6–that have been the subject of scrutiny and intense

[35] United States Environmental Protection Agency (EPA), 2009. *EPA: Greenhouse Gases Threaten Public Health and the Environment.* Science overwhelmingly shows greenhouse gas concentrations at unprecedented levels due to human activity. http://yosemite.epa.gov/opa/admpress.nsf/0/08D11A451131BCA585257685005BF252.

analysis for decades by scientists in the United States and around the world (the first three are applicable to the proposed Project).

In response to the endangerment finding, the EPA issued the Mandatory Reporting of GHG Rule that requires substantial emitters of GHG emissions (large stationary sources, etc.) to report GHG emissions data. Facilities that emit 25,000 metric tons (MT) or more of CO_2 per year are required to submit an annual report.

State Regulations

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Executive Order S-03-05, Assembly Bill 32, and Senate Bill 375.

Executive Order S-03-05

Executive Order S-3-05, signed June 1, 2005 set the following GHG reduction targets for the State:

- 2000 levels by 2010.
- 1990 levels by 2020.
- 80 percent below 1990 levels by 2050.

Assembly Bill 32, the Global Warming Solutions Act (2006)

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Assembly Bill 32 (AB 32), the Global Warming Solutions Act. AB 32 was passed by the California State Legislature on August 31, 2006, to place the state on a course toward reducing its contribution of GHG emissions. AB 32 follows the 2020 tier of emissions reduction targets established in Executive Order S-3-05.

AB 32 directed the California Resources Board (CARB) to adopt discrete early action measures to reduce GHG emissions and outline additional reduction measures to meet the 2020 target. Based on the GHG emissions inventory conducted for the Scoping Plan by CARB, GHG emissions in California by 2020 are anticipated to be approximately 596 $MMTCO_2e$. In December 2007, CARB approved a 2020 emissions limit of 427 $MMTCO_2e$ (471 million tons) for the State. The 2020 target requires a total emissions reduction of 169 MMTons, 28.5 percent from the projected emissions of the business-as-usual (BAU) scenario for the year 2020 (i.e., 28.5 percent of 596 $MMTCO_2e$).[36,37]

[36] California Air Resources Board (CARB), 2008. Climate Change Scoping Plan, a Framework for Change.
[37] CARB defines BAU in its Scoping Plan as emissions levels that would occur if California continued to grow and add new GHG emissions but did not adopt any measures to reduce emissions. Projections for each emission-generating sector were compiled and used to estimate emissions for 2020 based on 2002–2004

In order to effectively implement the emissions cap, AB 32 directed CARB to establish a mandatory reporting system to track and monitor GHG emissions levels for large stationary sources that generate more than 25,000 MT of CO_2 per year, prepare a plan demonstrating how the 2020 deadline can be met, and develop appropriate regulations and programs to implement the plan by 2012. The Climate Action Registry Reporting Online Tool was established through the Climate Action Registry to track GHG emissions.

CARB 2008 Scoping Plan

The final Scoping Plan was adopted by CARB on December 11, 2008. Key elements of CARB's GHG reduction plan that may be applicable to the proposed Project include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards (adopted and cycle updates in progress);
- Achieving a mix of 33 percent for energy generation from renewable sources (anticipated by 2020);
- A California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system for large stationary sources (adopted 2011);
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets (several Sustainable Communities Strategies have been adopted);
- Adopting and implementing measures pursuant to State laws and policies, including California's clean car standards (amendments to the Pavley Standards adopted 2009, Advanced Clean Car standard adopted 2012), goods movement measures, and the Low Carbon Fuel Standard (LCFS) (adopted 2009).[38]
- Creating target fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation (in progress).

emissions intensities. Under CARB's definition of BAU, new growth is assumed to have the same carbon intensities as was typical from 2002 through 2004.

[38] On December 29, 2011, the U.S. District Court for the Eastern District of California issued several rulings in the federal lawsuits challenging the LCFS. One of the court's rulings preliminarily enjoined the CARB from enforcing the regulation during the pendency of the litigation. In January 2012, CARB appealed the decision and on April 23, 2012, the Ninth Circuit Court granted CARB's motion for a stay of the injunction while it continued to consider CARB's appeal of the lower court's decision. On July 15, 2013, the State of California Court of Appeals held that the LCFS would remain in effect and that CARB can continue to implement and enforce the 2013 regulatory standards while it corrects certain aspects of the procedures by which the LCFS was adopted. Accordingly, CARB is continuing to implement and enforce the LCFS while addressing the court's concerns.

Though local government operations were not accounted for in achieving the 2020 emissions reduction, CARB estimates that land use changes implemented by local governments that integrate jobs, housing, and services result in a reduction of 5 $MMTCO_2e$, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local governments play in the successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of today's levels by 2020 to ensure that municipal and community-wide emissions match the State's reduction target.[39] Measures that local governments take to support shifts in land use patterns are anticipated to emphasize compact, low-impact growth over development in greenfields, resulting in fewer VMT.[40]

Update to the 2008 Scoping Plan

Since release of the 2008 Scoping Plan, CARB has updated the statewide GHG emissions inventory to reflect GHG emissions in light of the economic downturn and of measures not previously considered in the 2008 Scoping Plan baseline inventory. The updated forecast predicts emissions to be 507 $MMTCO_2e$ by 2020. The new inventory identifies that an estimated 80 $MMTCO_2e$ of reductions are necessary to achieve the statewide emissions reduction of AB 32 by 2020, 15.6 percent of the projected emissions compared to BAU in year 2020 (i.e., 15.6 percent of 507 $MMTCO_2e$).[41]

CARB is in the process of completing a five-year update to the 2008 Scoping Plan, as required by AB 32. A discussion draft of the 2013 Scoping Plan was released on October 1, 2013. The 2013 Scoping Plan update defines CARB's climate change priorities for the next five years and lays the groundwork to reach post-2020 goals in Executive Orders S-3-05 and B-16-2012. The update includes the latest scientific findings related to climate change and its impacts, including short-lived climate pollutants. The GHG target identified in the 2008 Scoping Plan is based on IPCC's GWPs identified in the Second and Third Assessment Reports (see Table 4). IPCC's Fourth Assessment Report identified more recent GWP values based on the latest available science. CARB recalculated the 1990 GHG emission levels with these updated GWPs, and the 427 $MMTCO_2e$ 1990 emissions level and 2020 GHG emissions limit, established in response to AB 32, is slightly higher, at 431 $MMTCO_2e$.[42]

The 2013 update highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals defined in the original 2008 Scoping Plan. As identified in the 2013 Scoping Plan update, California is on track to meeting the goals of AB 32. However, the 2013 Scoping Plan also addresses the state's longer-term GHG goals within a post-2020 element. The post-2020 element provides a high level view of a long-term strategy for meeting the 2050 GHG goals, including a

[39] The Scoping Plan references a goal for local governments to reduce community GHG emissions by 15 percent from current (interpreted as 2008) levels by 2020, but it does not rely on local GHG reduction targets established by local governments to meet the State's GHG reduction target of AB 32.

[40] California Air Resources Board (CARB), 2008. Climate Change Scoping Plan, a Framework for Change.

[41] California Air Resources Board (CARB). 2012. California Greenhouse Gas Inventory for 2000–2009. By Category as Defined by the Scoping Plan.

[42] California Air Resources Board (CARB). 2013. *Climate Change Scoping Plan First Update,* http://www.arb.ca.gov/cc/scopingplan/2013_update/discussion_draft.pdf.

recommendation for the state to adopt a midterm target. According to the 2013 Scoping Plan update, reducing emissions to 80 percent below 1990 levels will require a fundamental shift to efficient, clean energy in every sector of the economy. Progressing toward California's 2050 climate targets will require significant acceleration of GHG reduction rates. Emissions from 2020 to 2050 will have to decline several times faster than the rate needed to reach the 2020 emissions limit.[43]

Senate Bill 375

In 2008, Senate Bill 375 (SB 375), the Sustainable Communities and Climate Protection Act, was adopted to connect the GHG emissions reductions targets established in the Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excludes emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce VMT and vehicle trips. Specifically, SB 375 required CARB to establish GHG emissions reduction targets for each of the 17 regions in California managed by a metropolitan planning organization (MPO). The Metropolitan Transportation Commission (MTC) is the MPO for the nine-county San Francisco Bay Area region. MTC's targets are a 7 percent per capita reduction from 2005 by 2020, and 15 percent per capita reduction from 2005 by 2035.[44]

Plan Bay Area, Strategy for a Sustainable Region

The MTC and Association of Bay Area Government's (ABAG) *Plan Bay Area* is the Bay Area's Regional Transportation Plan (RTP)/Sustainable Community Strategy (SCS). The *Plan Bay Area* was adopted July 18, 2013.[45] The SCS sets a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce GHG emissions from transportation (excluding goods movement) beyond the per capita reduction targets identified by CARB. According to *Plan Bay Area*, the Plan meets a 16 percent per capita reduction of GHG emissions by 2035 and a 10 percent per capita reduction by 2020 from 2005 conditions. In 2008, MTC and ABAG initiated a regional effort (FOCUS) to link local planned development with regional land use and transportation planning objectives. Through this initiative, local governments identified Priority Development Areas (PDAs) and Priority Conservation Areas (PCAs). PDAs and PCAs form the implementing framework for *Plan Bay Area.* There is one PDAs identified in *Plan Bay Area* in the City of San José.[46]

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[43] California Air Resources Board (CARB). 2013. *Climate Change Scoping Plan First Update,* http://www.arb.ca.gov/cc/scopingplan/2013_update/discussion_draft.pdf.

[44] California Air Resources Board (CARB), 2010. Staff Report Proposed Regional Greenhouse Gas Emission Reduction Targets for Automobiles and Light Trucks Pursuant to Senate Bill 375.

[45] It should be noted that the Bay Area Citizens filed a lawsuit on MTC's and ABAG's adoption of Plan Bay Area.

[46] Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG), 2013. *Plan Bay Area.* http://geocommons.com/maps/141979.

Assembly Bill 1493

California vehicle GHG emission standards were enacted under AB 1493 (Pavley I). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light-duty auto to medium-duty vehicles) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by 30 percent in 2016. California implements the Pavley I standards through a waiver granted to California by the EPA. In 2012, the EPA issued a Final Rulemaking that sets even more stringent fuel economy and GHG emissions standards for model year 2017 through 2025 light-duty vehicles.

Executive Order B-16-2012

On March 23, 2012, the state identified that CARB, the CEC, the Public Utilities Commission, and other relevant agencies worked with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to accommodate zero-emissions vehicles in major metropolitan areas, including infrastructure to support them (e.g., electric vehicle charging stations). The executive order also directs the number of zero-emission vehicles in California's state vehicle fleet to increase through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles are zero-emission by 2015 and at least 25 percent by 2020. The executive order also establishes a target for the transportation sector of reducing GHG emissions from the transportation sector 80 percent below 1990 levels.

Executive Order S-01-07

On January 18, 2007, the State set a new Low Carbon Fuel Standard (LCFS) for transportation fuels sold within the State. Executive Order S-1-07 sets a declining standard for GHG emissions measured in carbon dioxide equivalent gram per unit of fuel energy sold in California. The LCFS requires a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10 percent by 2020. The Low Carbon Fuel Standard applies to refiners, blenders, producers, and importers of transportation fuels and would use market-based mechanisms to allow these providers to choose how they reduce emissions during the "fuel cycle" using the most economically feasible methods.

Senate Bills 1078 and 107 and Executive Order S-14-08

A major component of California's Renewable Energy Program is the renewable portfolio standard (RPS) established under Senate Bills 1078 (Sher) and 107 (Simitian). Under the RPS, certain retail sellers of electricity were required to increase the amount of renewable energy each year by at least 1 percent in order to reach at least 20 percent by December 30, 2010. CARB has now approved an even higher goal of 33 percent by 2020. In 2011, the State Legislature adopted this higher standard in SBX1-2. Executive Order S-14-08 was signed in November 2008, which expands the state's Renewable Energy Standard to 33 percent renewable power by 2020. Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered carbon neutral.

California Building Code

Energy conservation standards for new residential and nonresidential buildings were adopted by the California Energy Resources Conservation and Development Commission (CEC) in June 1977 and most recently revised in 2008 (Title 24, Part 6, of the California Code of Regulations [CCR]).[47] Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. On May 31, 2012, the CEC adopted the 2013 Building and Energy Efficiency Standards, which go into effect on January 1, 2014. Buildings that are constructed in accordance with the 2013 Building and Energy Efficiency Standards are 25 percent (residential) to 30 percent (nonresidential) more energy efficient than the 2008 standards as a result of better windows, insulation, lighting, ventilation systems, and other features that reduce energy consumption in homes and businesses.

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (Part 11, Title 24, known as "CALGreen") was adopted as part of the California Building Standards Code (Title 24, California Code of Regulations). CALGreen established planning and design standards for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants.[48] The mandatory provisions of the California Green Building Code Standards became effective January 1, 2011.

2006 Appliance Efficiency Regulations

The 2006 Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608) were adopted by the California Energy Commission on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally regulated appliances and non-federally regulated appliances. Though these regulations are now often viewed as "business-as-usual," they exceed the standards imposed by all other states and they reduce GHG emissions by reducing energy demand.

[47] Although new building energy efficiency standards were adopted in April 2008, these standards did not go into effect until 2009.

[48] The green building standards became mandatory in the 2010 edition of the code.

Local Regulations

GHG Reduction Strategy for the City of San José

The City of San José has prepared a Greenhouse Gas Reduction Strategy (GHGRS, or Strategy) in conjunction with the preparation of the Envision San José 2040 General Plan Update process to ensure that the implementation of the General Plan Update aligns with the implementation requirements of AB 32. The purpose of the City's GHGRS is to:

1. Capture and consolidate GHG reduction efforts already underway by the City of San José;

2. Distill policy direction on GHG reduction from the Envision San José 2040 General Plan Update;

3. Quantify GHG reductions that could result from land use changes incorporated in the Envision General Plan Land Use / Transportation diagram;

4. Create a framework for the ongoing monitoring and revision of this GHGRS;

5. Achieve General Plan-level environmental clearance for future development activities (through the year 2020) occurring within the City of San José.[49]

City of San José Green Building Ordinance

In October 2008, the City of San José enacted the Private Sector Green Building Policy (Policy No. 6-32). The policy was adopted in Ordinance No. 28622 in June, 2009. All new buildings must meet certain green building requirements in order to receive a building permit. Requirements are dependent on the size and type of the project.

The ordinance imposes mandatory green building standards for projects of 10 or more residential units, 25,000 square feet or more of nonresidential space, or high-rise developments. The new Green Building Ordinance establishes sustainability as a priority and further demonstrates the City's commitment to the environment. The ordinance establishes the U.S. Green Building Council's (USGBC), Leadership in Energy and Environmental Design (LEED) and Build it Green's (BIG) Green Point Rated rating systems as the mandatory green building standards for the City of San José.[50]

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[49] City of San Jose, 2011, Greenhouse Gas Reduction Strategy for the City of San Jose. http://www.sanjoseca.gov/documentcenter/view/9388, accessed on January 16, 2014

[50] City of San Jose, 2009, City of San Jose adopts Private Sector Green Building Ordinance http://www.piersystem.com/external/content/document/1914/552635/1/Green%20Building%20Press%20Release%20(8-4-09).pdf, accessed on January 16, 2014

Requirements are dependent on the size and type of the project:

- Tier 1 Commercial Projects include commercial industrial projects (non-residential) of less than 25,000 square feet, and less than a height of 75 feet. These projects are required to submit a completed GreenPoint Rated Checklist or LEED Checklist in order to receive a building permit.
- Tier 1 Residential Projects are single family detached residences, small residential projects consisting of 2-9 units, or multi-family buildings with 2-units. These buildings must also be less than 75 feet in height. Tier 1 Residential Projects are required to complete a GreenPoint Rated Checklist or a LEED Checklist.
- Tier 2 Commercial Projects include commercial industrial buildings (non-residential) of more than 25,000 square feet but less than 75 feet in height. These projects must LEED Silver certified.
- Tier 2 Residential Projects are multi-family buildings or multi-building residential projects consisting of 10 or more units. Buildings must be less than 75 feet in height. Tier 2 Residential projects must be LEED Certified or GreenPoint Rated.
- High-Rise Residential Projects are residential projects taller than 75 feet. These projects must be LEED Certified.
- Mixed-Use Projects must submit a GreenPoint Rated Checklist or LEED Checklist and receive the minimum LEED certification required by the relevant standard in the Ordinance.[51]

1.3 METHODOLOGY

Emissions were calculated using the California Emissions Estimator Model (CalEEMod), Version 2013.2.2. Construction emissions are based on the construction schedule, preliminary list of construction equipment, demolition volumes, and haul volumes provided by the applicant.

The BAAQMD adopted CEQA Guidelines in June 2010, which were revised in May 2011.[52] The BAAQMD CEQA Guidelines include methodology and thresholds for criteria air pollutant impacts and

[51] U.S. Department of Energy, 2009, "City of San Jose adopts Private Sector Green Building Policy" http://energy.gov/savings/city-san-jose-private-sector-green-building-policy, accessed on January 16, 2014.

[52] BAAQMD's CEQA Guidelines were reposted without the screening and significance thresholds tables in 2012 after the March 5, 2012, trial court ruling in *California Building Industry Association v. Bay Area Air Quality Management District* (Superior Court Case No. RG10548693). However, on August 13, 2013, the Court of Appeals reversed the trial court ruling and found that promulgation of thresholds of significance by a public agency is not a "project" subject to CEQA review. Furthermore, the thresholds are supported by appropriate studies and analysis (see http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx). Accordingly, pursuant to its discretion under State CEQA Guidelines section 15064 (b) ("lead agencies may exercise their discretion on what criteria to use") and the recent holding in *Citizens for Responsible Equitable Environmental Development v. City of Chula Vista* (2011) 197 Cal.App.4th 327, 335-336 ("The determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency

community health risk for plan-level and project-level analyses. The proposed Project qualifies as a project-level project under BAAQMD's criteria. The BAAQMD's Guidelines include project-level significance criteria that would be applicable to the proposed Project. For project-level analyses, BAAQMD has adopted screening criteria and significance criteria that would be applicable to the proposed Project. If a project exceeds the screening level, it would be required to conduct a full analysis using the BAAQMD's significance criteria:

1.3.1 CRITERIA AIR POLLUTANTS

Regional Significance Criteria

The BAAQMD's criteria for regional significance for projects that exceed the screening thresholds are shown in Table 6. Criteria for both the construction and operational phases of the Project are shown.

TABLE 6 BAAQMD SIGNIFICANCE THRESHOLDS

Pollutant	Construction Phase Average Daily Emissions (Pounds/Day)	Operational Phase Average Daily Emissions (Pounds/Day)	Maximum Annual Emissions (Tons/Year)
Reactive Organic Gases (ROG)	54	54	10
Nitrogen Oxides (NO_x)	54	54	10
Respirable Particulate Matter (PM_{10})	82 (Exhaust)	82	15
Respirable Particulate Matter ($PM_{2.5}$)	54 (Exhaust)	54	10
PM_{10} and $PM_{2.5}$ Fugitive Dust	Best Management Practices	None	None

Source: Bay Area Air Quality Management District, 2011, California Environmental Quality Act Air Quality Guidelines, Appendix D: Threshold of Significance Justification.

Local CO Hotspots

Congested intersections have the potential to create elevated concentrations of CO, referred to as CO hotspots. The significance criteria for CO hotspots are based on the California AAQS for CO, which is 9.0 ppm (8-hour average) and 20.0 ppm (1-hour average). However, with the turnover of older vehicles, introduction of cleaner fuels, and implementation of control technology, the SFBAAB is in attainment of the California and National AAQS, and CO concentrations in the SFBAAB have steadily declined.

involved, based to the extent possible on scientific and factual data."), the City has decided to apply the BAAQMD CEQA thresholds to the Project.

Because CO concentrations have improved, the BAAQMD does not require a CO hotspot analysis if the following criteria are met:

- The Project is consistent with an applicable congestion management program established by the County Congestion Management Agency for designated roads or highways, the RTP, and local congestion management agency plans.
- The Project would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The Project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).[53]

Odors

The BAAQMD's thresholds for odors are qualitative. The BAAQMD does not consider odors generated from use of construction equipment and activities to be objectionable. For operational phase odor impacts, a project that would result in the siting of a new source of odor or exposure of a new receptor to existing or planned odor sources should consider odor impacts. The BAAQMD considers potential odor impacts to be significant if there are five confirmed complaints per year from a facility, averaged over three years. The BAAQMD has established odor screening thresholds for land uses that have the potential to generate substantial odor complaints, including wastewater treatment plants, landfills or transfer stations, composting facilities, confined animal facilities, food manufacturing, and chemical plants.[54]

Community Risk and Hazards

The BAAQMD's significance thresholds for local community risk and hazard impacts apply to both the siting of a new source and to the siting of a new receptor. Local community risk and hazard impacts are associated with TACs and $PM_{2.5}$ because emissions of these pollutants can have significant health impacts at the local level. For assessing community risk and hazards, sources within a 1,000-foot radius are considered. Sources are defined as freeways, high volume roadways (with volumes of 10,000 vehicles or more per day or 1,000 trucks per day), and permitted sources.[55] The City of San José does not have a qualified risk reduction plan.

[53] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.
[54] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.
[55] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.

The proposed Project involves renovating an existing clubhouse facility and is therefore not a major source of operational TACs and stationary $PM_{2.5}$. However, the proposed Project would generate TACs and $PM_{2.5}$ during construction activities that could elevate concentrations of air pollutants at the surrounding residential receptors. The thresholds for construction-related local community risk and hazard impacts are the same as for Project operations. The BAAQMD has adopted screening tables for air toxics evaluation during construction.[56] Construction-related TAC and PM impacts should be addressed on a case-by-case basis, taking into consideration the specific construction-related characteristics of each project and proximity to off-site receptors, as applicable.[57] Therefore, the thresholds identified below are applied to the Project's construction emissions.

Community Risk and Hazards

Project

Project-level emissions of TACs or $PM_{2.5}$ from individual sources within 1,000 feet of the Project that exceed any of the thresholds listed below are considered a potentially significant community health risk:

- Non-compliance with a qualified Community Risk Reduction Plan.
- An excess cancer risk level of more than 10 in one million, or a non-cancer (i.e., chronic or acute) hazard index greater than 1.0 would be a significant cumulatively considerable contribution.
- An incremental increase of greater than 0.3 micrograms per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$ from a single source would be a significant cumulatively considerable contribution.[58]

Cumulative

Cumulative sources represent the combined total risk values of each of the individual sources within the 1,000-foot evaluation zone. A project would have a cumulatively considerable impact if the aggregate total of all past, present, and foreseeable future sources within a 1,000-foot radius from the fence line of a source or location of a receptor, plus the contribution from the Project, exceeds the following:

- Non-compliance with a qualified Community Risk Reduction Plan; or
- An excess cancer risk level of more than 100 in one million or a chronic non-cancer hazard index (from all local sources) greater than 10.0; or
- 0.8 $\mu g/m^3$ annual average $PM_{2.5}$.[59]

[56] Bay Area Air Quality Management District, 2010, Screening Tables for Air Toxics Evaluations during Construction.
[57] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.
[58] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.

1.3.2 GREENHOUSE GAS EMISSIONS

The BAAQMD has a tiered approach for assessing GHG emission impacts of a project. If a project is within the jurisdiction of an agency that has a "qualified" GHGRS, the project can assess consistency of its GHG emissions impacts with the reduction strategy outlined. The City of San José has prepared a CAP. However, BAAQMD has not identified San José's CAP as a "qualified" GHG reduction plan.[60] However, measures in the City's CAP represent the City's GHGRS; therefore, the project is evaluated for consistency with the GHG reduction measures in this planning document.

In the absence of an applicable qualified GHGRS, BAAQMD has adopted screening criteria and significance criteria for development projects that would be applicable for the proposed Project. If a project exceeds the Guidelines' GHG screening-level sizes, the project would be required to conduct a full GHG analysis using the following BAAQMD's significance criteria:

- 1,100 MT of CO_2e per year; or
- 4.6 MT of CO2e per service population (SP).

Land use development projects include residential, commercial, industrial, and public land use facilities. Direct sources of emissions may include on-site combustion of energy, such as natural gas used for heating and cooking, emissions from industrial processes (not applicable for most land use development projects), and fuel combustion from mobile sources. Indirect emissions are emissions produced off-site from energy production, water conveyance due to a project's energy use and water consumption, and non-biogenic emissions from waste disposal. Biogenic CO_2 emissions are not included in the quantification of a project's GHG emissions, because biogenic CO_2 is derived from living biomass (e.g., organic matter present in wood, paper, vegetable oils, animal fat, food, animal, and yard waste) as opposed to fossil fuels. Although GHG emissions from waste generation are included in the GHG inventory for the Proposed Project, the efficiency threshold of 4.6 $MTCO_2$e per service population identified above do not include the waste sector and therefore are not considered in the evaluation.

BAAQMD does not have thresholds of significance for construction-related GHG emissions, but requires quantification and disclosure of construction-related GHG emissions. However, GHG emissions from construction activities are short term and therefore not assumed to significantly contribute to cumulative GHG emissions impacts of the proposed Project.

[59] Bay Area Air Quality Management District, 2011 (Revised), California Environmental Quality Act Air Quality Guidelines.

[60] CEQA Guidelines Section 15185.5, Tiering and Streamlining the Analysis of Greenhouse Gas Emissions, states that at a minimum, a plan for the reduction of GHG emissions would need to include: "1)An inventory of GHG emissions from both existing and projected over a specified time period; 2) A target level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable; 3) To identify and analyze the GHG emissions resulting from specific actions or categories within the geographic area; 4) To specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level; and 5) Be adopted in a public process following environmental review."

1.4 AIR QUALITY IMPACT ANALYSIS

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

Large projects that exceed regional employment, population, and housing planning projections have the potential to be inconsistent with the regional inventory compiled as part of BAAQMD's 2010 Bay Area CAP. The Project is not considered a regionally significant project that would affect regional VMT and warrant Intergovernmental Review by MTC pursuant to the CEQA Guidelines (CEQA Guidelines Section 15206). In addition, the proposed Project would not have the potential to affect housing, employment, and population projections within the region, which is the basis of the CAP projections. The proposed project is below the applicable screening level size as listed in BAAQMD's CEQA Air Quality Guidelines.. These thresholds are established to identify projects that have the potential to generate a substantial amount of criteria air pollutants. Because the proposed Project would not exceed these thresholds, the proposed Project would not be considered by the BAAQMD to be a substantial emitter of criteria air pollutants. Therefore, the Project would not conflict with or obstruct implementation of the 2010 Bay Area CAP and impacts would be considered *less than significant*.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

The following describes Project-related impacts from short-term construction activities and long-term operation of the Project.

BAAQMD has identified thresholds of significance for criteria pollutant emissions and criteria air pollutant precursors, including ROG, NO_x, PM_{10}, and $PM_{2.5}$. However, development projects below the applicable screening level size are not expected to generate sufficient criteria pollutant emissions to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Construction Emissions

Construction activities produce combustion emissions from various sources, such as onsite heavy-duty construction vehicles, vehicles hauling materials to and from the site, and motor vehicles transporting the construction crew. Site preparation activities produce fugitive dust emissions (PM_{10} and $PM_{2.5}$) from demolition and soil-disturbing activities, such as grading and excavation. Air pollutant emissions from construction activities onsite would vary daily as construction activity levels change.

The proposed Project would not exceed BAAQMD's screening criteria of 277,000 square feet for a "Racquet Club;" and therefore, a quantified analysis of the Project's construction emissions is not warranted. Projects that are below the screening threshold generate a *de minimis* amount of criteria air pollutant emissions.

However, BAAQMD recommends implementing the Basic Construction Mitigation Measures to meet the best management practices threshold for fugitive dust whether or not construction-related emissions exceed applicable thresholds. Adherence to the BAAQMD's BMPs for reducing construction emissions of PM_{10} and $PM_{2.5}$ would ensure that ground-disturbing activities would not generate a significant amount of fugitive dust. Consequently, with adherence to BAAQMD's Basic Construction Mitigation Measures impacts would be *less than significant*.

AQ-1: The project contractor shall implement the following BAAQMD Basic Control Measures:

- Water all active construction areas at least twice daily, or as often as needed to control dust emissions. Watering should be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water should be used whenever possible.
- Pave, apply water twice daily or as often as necessary, to control dust, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer).
- Sweep daily (with water sweepers using reclaimed water if possible), or as often as needed, all paved access roads, parking areas and staging areas at the construction site to control dust.
- Sweep public streets daily (with water sweepers using reclaimed water if possible) in the vicinity of the Project site, or as often as needed, to keep streets free of visible soil material.
- Hydroseed or apply non-toxic soil stabilizers to inactive construction areas.
- Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit vehicle traffic speeds on unpaved roads to 15 mph.
- Replant vegetation in disturbed areas as quickly as possible.
- Install sandbags or other erosion control measures to prevent silt runoff from public roadways.

Operation-Period

Operation of the proposed Project would generate criteria air pollutants from energy use associated with the expanded facilities. BAAQMD CEQA Guidelines identifies screening criteria for operation-related criteria air pollutant emissions for a "Racquet Club" of 291,000 square feet. Since the Project is a

37,259 square feet addition/renovations to an existing clubhouse it is below the screening criteria for criteria air pollutant emissions. Projects that are below the screening threshold generate a *de minimis* amount of criteria air pollutant emissions. Therefore, impacts are *less than significant*.

c) 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)?

The SFBAAB is currently designated as a nonattainment area for California and National O_3, California and National $PM_{2.5}$, and California PM_{10} AAQS. Any project that does not exceed or can be mitigated to less than the BAAQMD significance levels, used as the threshold for determining major projects, does not add significantly to a cumulative impact. As explained in response to criteria b) above construction and operation of the Project would not result in regional emissions in excess of these threshold values. Consequently, the Project would not result in a cumulatively considerable contribution to O_3, $PM_{2.5}$, and PM_{10} concentrations in the SFBAAB. As a result, Project emissions would have a *less-than-significant impact* on cumulative emissions.

d) Expose sensitive receptors to substantial pollutant concentrations?

The Project may expose sensitive receptors to elevated pollutant concentrations if it causes or contributes significantly to elevated pollutant concentration levels. Localized concentrations refer to the amount of pollutant in a volume of air (ppm or $\mu g/m^3$) and can be correlated to potential health effects to sensitive populations. The closest sensitive receptors to the Project site are single-family residences abutting the site to the west (within 80 feet from Project boundary).

Construction Risk and Hazards

The proposed Project would elevate concentrations of TACs and diesel-$PM_{2.5}$ in the vicinity of sensitive land uses during construction activities. The BAAQMD has developed screening thresholds for assessing potential health risks from construction activities. Receptors would have to be located more than 95 meters (312 feet) away to fall below the BAAQMD's screening thresholds. Consequently, a full Construction Health Risk Assessment (HRA) of DPM and $PM_{2.5}$ was conducted.[61]

Construction sources evaluated in the HRA include off-road construction equipment. Using air dispersion models, sensitive receptor concentrations were estimated and excess lifetime cancer risks and acute and chronic non-cancer hazard indexes were calculated. These risks were then compared to the significance thresholds identified in the BAAQMD CEQA Guidelines. The results are summarized in Table 7.

[61] The Planning Center|DC&E, 2014. Construction Health Risk Assessment for Almaden Golf and Country Club Renovations, January.

TABLE 7 CONSTRUCTION RISK SUMMARY

Receptor	Value	BAAQMD Significance Threshold	Exceeds Significance Threshold?
Adult Resident – Cancer Risk	3.7E-07	10E-06	No
Child Resident – Cancer Risk	2.0E-06	10E-06	No
Chronic Hazard (child scenario)	0.017	1.0	No
$PM_{2.5}$ Concentration ($\mu g/m^3$)	0.041	0.30	No

Source: The Planning Center|DC&E, 2014. Construction Health Risk Assessment for Almaden Golf and Country Club Renovations, January.

Results of the health risk assessment indicate that the incremental cancer risk for sensitive receptors proximate to the site during the construction period, based on the maximum receptor concentration for a 70-year, 24-hour outdoor exposure duration for the adult scenario is 3.7 x 10-7 (0.37 per million), which is less than the significance threshold of 10 per million, and for the child scenario is 2.0 x 10-6 (2.0 per million), which also is less than the significance threshold of 10 per million. For noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one. Therefore, chronic non-carcinogenic hazards are within acceptable limits. In addition, $PM_{2.5}$ annual concentrations are below the BAAQMD significance thresholds. Therefore, community risk and hazards from construction activities would be *less than significant*.

CO Hotspots

Areas of vehicle congestion have the potential to create pockets of CO called hot spots. These pockets have the potential to exceed the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm. Under existing and future vehicle emission rates, a project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour–or 24,000 vehicles per hour where vertical and/or horizontal air does not mix–in order to generate a significant CO impact (BAAQMD 2011). The project is not anticipated to result in any change to traffic levels or patterns. In addition, the potential for CO hotspots to be generated in the SFBAAB is extremely unlikely because of the improvements in vehicle emission rates and control efficiencies. Typical projects would not expose sensitive receptors to substantial pollutant concentrations and analysis of CO hotspots is not warranted. Therefore, impacts are *less than significant* and no mitigation measures are necessary.

e) Create objectionable odors affecting a substantial number of people?

The Proposed Project would involve renovating and reconstruction existing facilities and making corresponding site modifications at the Project site. Recreational uses are not considered a type of land use that has the potential to generate nuisance odors that could affect a substantial number of people.

The type of facilities that are considered to have objectionable odors include wastewater treatments plants, compost facilities, landfills, solid waste transfer stations, fiberglass manufacturing facilities, paint/coating operations (e.g., auto body shops), dairy farms, petroleum refineries, asphalt batch plants, chemical manufacturing, and food manufacturing facilities. The proposed Project would not generate objectionable odors that would lead to a public nuisance; therefore, operational impacts would be less than significant.

During construction activities, construction equipment exhaust would temporarily generate odors. Any construction-related odor emissions would be temporary, intermittent in nature, and would dissipate rapidly from the source with an increase in distance. Odors would not likely be objectionable and constitute a public nuisance. Impacts associated with construction-generated odors would be less than significant and no mitigation measures are necessary. Therefore, impacts are *less than significant*.

1.5 GREENHOUSE GAS EMISSIONS IMPACT ANALYSIS

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

A project does not generate enough GHG emissions on its own to influence global climate change; therefore, this impact analysis measures the Project's contribution to the cumulative environmental impact. GHG emissions would be generated from construction activities and operation of the proposed Project.

Construction-Period

Annual GHG emissions were calculated for construction of the proposed Project. Construction of the Project would generate a total of 213 MTons of GHG emissions over the entire construction period (approximately 14 months).[62] Because construction emissions are short term and would cease upon completion, GHG from construction activities would nominally contribute to GHG emissions impacts. For this reason, BAAQMD does not identify a significance threshold for project-related construction emissions. Consequently, GHG emissions generated by Project-related construction activities are considered *less than significant*.

Operational Phase

Operation of the proposed Project would contribute to global climate change indirectly as a result of an increase in energy use associated with the expanded clubhouse facilities. BAAQMD CEQA Guidelines identifies the screening criteria for operation-related GHG emissions for a "Racquet Club" of 46,000 square feet. Since the Project involves 37,259 square feet of addition/renovations to an existing

[62] The Planning Center|DC&E, 2014. Construction Health Risk Assessment for Almaden Golf and Country Club Renovations January.

clubhouse, it is below the screening criteria set for GHG emissions impacts. Projects that are below the screening threshold generate a *de minimis* amount of GHG emissions. GHG emissions impacts are *less-than-significant* and no mitigation measures are necessary.

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

State and Regional Greenhouse Gas Reduction Plans

CARB's Scoping Plan

In accordance with AB 32, CARB developed the Scoping Plan to outline the State's strategy to achieve 1990 level emissions by year 2020. To estimate the reductions necessary, CARB projected statewide 2020 BAU GHG emissions (i.e., GHG emissions in the absence of statewide emission reduction measures). CARB identified that the State as a whole would be required to reduce GHG emissions by 28.5 percent from year 2020 BAU to achieve the targets of AB 32.[63] The revised BAU 2020 forecast shows that the State would have to reduce GHG emissions by 21.6 percent from BAU without Pavley and the 33 percent RPS or 15.7 percent from the adjusted baseline (i.e., with Pavley and 33 percent RPS).[64]

Statewide strategies to reduce GHG emissions include the Low Carbon Fuel Standard, California Appliance Energy Efficiency regulations; California Building Standards (i.e., CALGreen and the 2008 Building and Energy Efficiency Standards); California Renewable Energy Portfolio standard (33 percent RPS); changes in the corporate average fuel economy standards (e.g., Pavley I and Pavley II); and other measures that would ensure the State is on target to achieve the GHG emissions reduction goals of AB 32. Statewide GHG emissions reduction measures that are being implemented over the next seven years would reduce the Project's GHG emissions.

New structures would meet the City's Green Building Ordinance and the 2013 Building and Energy Efficiency Standards, which become effective January 1, 2014. The 2013 Standards are 25 percent more energy efficient than the 2008 standards for residential buildings while the 2008 standards were 15 percent more energy efficient than the 2005 Standards. The new buildings would also be constructed in conformance with CALGreen, which requires high-efficiency water fixtures for indoor plumbing and water efficient irrigation systems. The proposed Project would not conflict with statewide programs adopted for the purpose of reducing GHG emissions. Impacts would be less than significant.

[63] California Air Resources Board (CARB), 2008. Climate Change Scoping Plan, a Framework for Change.
[64] California Air Resources Board (CARB), 2012. Status of Scoping Plan Recommended Measures. http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf.

MTC's Plan Bay Area

To achieve MTC's sustainable vision for the Bay Area, the Plan Bay Area land use concept plan for the region concentrates the majority of new population and employment growth within the region in PDAs. PDAs are transit-oriented, infill development opportunity areas within existing communities. Overall, well over two-thirds of all regional growth by 2040 is allocated within PDAs. PDAs are expected to accommodate 80 percent (or over 525,570 units) of new housing and 66 percent (or 744,230) of new jobs.[65] Consequently, an overarching goal of the regional plan is to concentrate development in areas where there are existing services and infrastructure rather than allocate new growth in outlying areas where substantial transportation investments would be necessary to achieve the per capita passenger vehicle VMT and associated GHG emissions reductions.

The Proposed Project does not fall under any Bay Area PDA. The Proposed Project would involve renovating and reconstruction of existing facilities and making corresponding site modifications at the Project site. Therefore the Proposed Project does not change the existing land use and does not conflict with Plan Bay Area's mechanism to achieve GHG reductions land use planning. Therefore, the proposed Project is consistent with land use concept plan for the City of San José identified in the Plan Bay Area to reduce region-wide VMT. Therefore, impacts would be *less than significant*.

Local Greenhouse Gas Reduction Plan

The City of San José prepared a GHGRS to reduce community-wide and government GHG emissions. The measures identified in the City's GHGRS represent the City's actions to achieve the GHG reduction targets of AB 32 and the long-term goals of Executive Order S-03-05.

The proposed Project will be designed and built to comply with the current edition of the California Building Code including seismic and accessibility requirements, as well as Title 24 energy criteria and applicable sustainability regulations. The Project would also be required to comply with the City's Green Building Ordinance. Furthermore, energy efficient lighting and kitchen appliances will be installed at the proposed Project site. Therefore, the Proposed Project is consistent with the City of San José's GHGRS measures to meet the goals set in the Envision San José 2040 General Plan Update. Impacts are *less than significant*.

[65] Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG), 2013. *Plan Bay Area, Strategy for a Sustainable Region.*.

CONSTRUCTION HEALTH RISK ASSESSMENT FOR:

ALMADEN GOLF AND COUNTRY CLUB RENOVATIONS

prepared for:

ALMADEN GOLF AND COUNTRY CLUB

prepared by:

THE PLANNING CENTER|DC&E

Contact:
Steven Bush, E.I.T.
Project Scientist
Cathleen Fitzgerald, P.E.
Senior Engineer

JANUARY 2014

CONSTRUCTION HEALTH RISK ASSESSMENT FOR:

ALMADEN GOLF AND COUNTRY CLUB RENOVATIONS

prepared for:

ALMADEN GOLF AND COUNTRY CLUB

Mr. Robert Sparks, General Manager

6663 Hampton Drive
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prepared by:

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KSD-02.0

JANUARY 2014

Table of Contents

Table of Contents

List of Figures

List of Tables

List of Appendices

1. Introduction

The Project Applicant, Almaden Golf and Country Club, are proposing to renovate its existing clubhouse facilities, including demolition of the existing Pro Shop/Locker room wing, constructing a new two-story wing, and remodeling the two-story Dining wing and Pool building. Project renovations would involve construction on an approximate 1.84-acre portion of the total 89.76-acre site at 6663 Hampton Drive in the City of San Jose, Santa Clara County, California (see Figure 1).

The latest version of the Bay Area Air Quality Management District (BAAQMD) CEQA Air Quality Guidelines requires projects to evaluate the impacts of construction activities on sensitive receptors (BAAQMD, 2012). Construction of the project would take place starting in June 2014 and will include demolition, grading, trenching, building construction, paving, and architectural coating (painting). The construction phase is estimated to take place over a period of 421 calendar days (301 work days) beginning in June 2014 and ending in August 2015.

The nearest offsite sensitive receptors (single family residences) are located within 80 feet of the project, adjacent to the project site to the west along Hillcrest Drive. Additional single family residences are located approximately 100 feet west of the site across Hillcrest Drive and approximately 180 feet northeast of the site across Hampton Drive. The residents at all of these locations could be potentially impacted from the proposed construction activities.

The BAAQMD has developed *Screening Tables for Air Toxics Evaluation During Construction* (2010) that evaluate construction-related health risks associated with residential, commercial, and industrial projects. According to the screening tables, the residences are much closer than the distance of 95 meters (312 feet) that would screen out potential health risks. Therefore, a site-specific construction health risk assessment (HRA) was prepared for this project.

This construction HRA considers the health impact of planned construction operations at the project site to sensitive receptors (adults and children in the nearby residences) from diesel equipment exhaust and $PM_{2.5}$.

1. Introduction

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2. Project Description

The proposed project involves renovations to an existing golf and country club facility at 6663 Hampton Drive in the City of San Jose. Construction would occur on an approximate 1.84-acre portion of the total 89.76-acre site, encompassing the clubhouse building, pool building, and portions of the parking lot and golf cart path. Development of the proposed project would involve demolition of the existing Pro Shop/Locker room wing of the clubhouse building, hauling and disposal of demolition debris, constructing a new two-story wing, and remodeling the two-story Dining wing and Pool building. In addition, renovations are proposed for the pool building west of the clubhouse building. Site work includes resurfacing and striping of the existing parking lot, and new paving for the pedestrian sidewalk, golf path, and the new driveway loop entry road. Project construction would take place over a period of approximately 15 months, which is anticipated to commence in June 2014.

The site is bounded by Hampton Drive to the north, residences to the west, the golf course to the south and residences to the east. Surrounding land uses include single family residences and the Almaden Swim and Racquet Club to the north.

The project site and vicinity are depicted in Figure 1.

2. Project Description

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Date: January 2014

Source: The Planning Center | DC&E, 2014; Google Earth, 2014.

Residental Receptors

Maximum Exposed Receptor

Receptor

Site Boundary

FIGURE 1

PROJECT LOCATION AND ISCST3 MODEL CONFIGURATION

2. Project Description

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3. Methodology and Significance Thresholds

The purpose of the construction HRA is to evaluate the potential health impacts associated with diesel particulate matter (DPM) and particulate matter less than 2.5 microns ($PM_{2.5}$) from construction activities associated with the proposed project. Construction sources evaluated in this HRA include off-road construction equipment, such as excavators, graders, forklifts, pavers, rollers, dozers, tractors, loaders, backhoes, cement and mortar mixers, cranes, and water trucks.

The BAAQMD's 2010 adopted "Thresholds of Significance" for local community risk impacts were challenged in a lawsuit and subsequently rescinded. However, lead agencies can determine that these are appropriate air quality thresholds for projects they review. The 2010 BAAQMD thresholds that were used for this project are shown below:

- Non-compliance with a qualified risk reduction plan
- Excess cancer risk of more than 10 in a million
- Non-cancer hazard index (chronic or acute) greater than 1.0
- Incremental increase in average annual $PM_{2.5}$ concentration of greater than 0.3 $\mu g/m^3$

Since both the City of San Jose and Santa Clara County do not currently have qualified risk reduction plans (San Jose is in the process of developing one), a site-specific analysis of DPM and $PM_{2.5}$ impacts on sensitive receptors was conducted.

The methodology used in this HRA is consistent with the following BAAQMD and the Office of Environmental Health Hazard Assessment (OEHHA) guidance documents:

- BAAQMD, 2012. California Environmental Quality Act Air Quality Guidelines. May 2012.
- BAAQMD, 2010. Screening Tables for Air Toxics Evaluation During Construction. May 2010.
- BAAQMD, 2011. Recommended Methods for Screening and Modeling Local Risks and Hazards. Version 2.0. May 2011
- OEHHA, 2012. Air Toxics Hot Spots Program Risk Assessment Guidelines. June, 2012.

Potential exposures to DPM and $PM_{2.5}$ from proposed project construction activities were evaluated for off-site sensitive receptors in close proximity to the site, including the residences to the west and north. Using air dispersion models, receptor concentrations were estimated and excess lifetime cancer risks and chronic non-cancer hazard indexes were calculated. These risks were then compared to the significance thresholds identified in the BAAQMD CEQA guidelines.

3. Methodology and Significance Thresholds

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4. Construction Emissions

Construction emissions were calculated, using the proposed construction schedule and the latest version of California Emissions Estimation Model, known as CalEEMod (SCAQMD, 2013). The CalEEMod construction emissions output and emission rate calculations are provided in Appendix A.

The project was assumed to take place over 421 calendar days (301 work days) beginning in June 2014 and ending in August 2015. The modeled emission rates are summarized in Table 1.

Table 1 Construction Activity

Parameter - Year	Onsite Emissions (lbs/day)
DPM - 2014	0.42
DPM - 2015	0.37
$PM_{2.5}$ - 2014	0.41
$PM_{2.5}$ - 2015	0.35

Source: CalEEMod 2013.2.2 and Almaden Golf and Country Club Renovations, Air Quality and Greenhouse Gases Technical Report, The Planning Center|DC&E, 2014.

4. Construction Emissions

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5. Dispersion Modeling

To assess the impact of emitted compounds on sensitive receptors at the project, air quality modeling using the ISCST3 model was performed. The model is a steady state Gaussian plume model and is an approved model by BAAQMD for estimating ground level impacts from point and fugitive sources in simple and complex terrain. The on-site construction emissions for the project were modeled as poly-area sources.

The model requires additional input parameters, including chemical emission data and local meteorology. Inputs for the construction phase emission rates are those described in Section 4. Meteorological data obtained from the BAAQMD for the nearest met station (IBM) and the latest available year of record (1993) were used to represent local weather conditions and prevailing winds.

DPM emissions were based on the CalEEMod construction runs, using annual exhaust PM_{10} construction emissions presented in lbs/day. The $PM_{2.5}$ emissions were taken from the CalEEMod $PM_{2.5}$ total, which includes exhaust $PM_{2.5}$ as well as fugitive dust $PM_{2.5}$. An emission release height of 4.15 meters was used as representative of the stack exhaust height for off-road construction equipment and an initial vertical dispersion parameter of 1.93 m was used, per CARB guidance (2000).

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for each source location.

To determine contaminant impacts during construction hours, the model's scalar option was invoked to predict flagpole-level concentrations (1.5 m for ground-floor receptors) for emissions generated between the hours of 7:00 AM and 4:00 PM, with a one-hour break for lunch between noon and 1:00 PM. In addition, a scalar factor was applied to HROFDY (hour of day) in the ISCST3 model to account for the number of days of construction activity per year.

The configuration of the sources and the receptor locations are presented in Figure 1. The ISCST3 model output data are presented in Appendix B.

5. Dispersion Modeling

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6. Risk Characterizations

6.1 CARCINOGENIC CHEMICAL RISK

The BAAQMD has established a threshold of ten in a million (10E–06) as a level posing no significant risk for exposures to carcinogens.

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter (μg/m^3) over a lifetime of 70 years.

Cancer risks were calculated using BAAQMD recommended methods for a residential receptor. For the inhalation pathway, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)$^{-1}$ to derive the cancer risk estimate. To calculate the contaminant dose, the following equation was used:

$$Dose_{AIR} = (C_{air} \times EF \text{ x } ED \times [BR/BW] \text{ x } A \text{ x } CF) / AT$$

Where:

$Dose_{AIR}$	=	dose by inhalation (mg/kg/day)
C_{air}	=	concentration of contaminant in air (μg/m^3)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years – construction period)
BR/BW	=	daily breathing rate normalized to body weight (L/kg-day)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor (1x10^{-6}, μg to mg, L to m^3)
AT	=	averaging time (days)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. For this assessment, the default value of 1 was used. The daily breathing rate for an adult is 302 L/kg-day and for a child is 581 L/kg-day (BAAQMD, 2011). The residential exposure frequency (EF) is set at 350 days per year to allow for a two week period away from home each year (OEHHA, 2012).

OEHHA and BAAQMD procedures require the incorporation of age sensitivity factors (ASF) into the evaluation. The AT (averaging time) for lifetime cancer risks is 70 years for all cases. The exposure duration (ED) and ASFs for the various age-groups are provided herein:

6. Risk Characterizations

ED	ASF
0.25 years – third trimester	10
2 years for 0-2 age group	10
7 years for 2-9 age group	3
14 years for 2-16 age group	3
54 years for 16-70 age group	1

To calculate the overall cancer risk, the risk for each appropriate age group is calculated using appropriate age-sensitivity factors (ASFs), and chemical-specific cancer potency factor (CPF) for each chemical of concern as per the following equation:

$$Cancer\ Risk_{AIR} = Dose_{AIR} \times CPF \times ASF$$

The CPFs used in the assessment were obtained from OEHHA guidance. For DPM, a CPF of 1.1 mg/kg-day^{-1} was used.

The excess lifetime cancer risk to the maximally exposed individual (MEI) during the construction period was calculated, based on the factors provided above. For the adult exposure scenario, a construction period of 1.2 years was assumed and an ASF of 1.7 was applied to the calculated cancer risk number to give the estimated excess cancer risk over a 70-year lifetime. For the child exposure scenario, the same construction period was assumed and a 9-year exposure period was used, as per BAAQMD and OEHHA guidance (BAAQMD, 2010). In addition, an ASF of 4.7 was applied to the excess cancer risk number to account for the increased sensitivity of children to air pollutants during the 9-year exposure period. The calculated results are provided in Appendix C.

6.2 NONCARCINOGENIC HAZARDS

An evaluation of the potential non-cancer effects of chronic chemical exposures was also conducted. Adverse health effects are evaluated by comparing the annual receptor level (flagpole) concentration of each chemical compound with the appropriate reference exposure limit (REL). Available RELs promulgated by OEHHA were considered in the assessment.

To quantify noncarcinogenic impacts, the hazard index approach was used. The hazard index assumes that chronic sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). For each discrete chemical exposure, target organs presented in regulatory guidance were used. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity value. For compounds affecting the same toxicological endpoint, this ratio is summed. Where the total equals or exceeds one, a health hazard is presumed to exist. In a manner consistent with the assessment of carcinogenic exposures, REL/RfC (reference concentration) values were converted to units expressed in mg/kg/day to accommodate the above intake algorithm.

The chronic hazard analysis for DPM is provided in Appendix C. The calculations contain the relevant exposure concentrations and corresponding reference dose values used in the evaluation of noncarcinogenic exposures.

6.3 CRITERIA POLLUTANTS

The BAAQMD has recently incorporated $PM_{2.5}$ into the District's CEQA significance thresholds due to recent studies that show adverse health impacts from exposure to this pollutant. An incremental increase of greater than 0.3 $\mu g/m^3$ for the annual average $PM_{2.5}$ concentration is considered to be a significant impact. The modeling results for $PM_{2.5}$ are summarized in Table 2 and Table 3; the model runs are provided in Appendix B.

For $PM_{2.5}$, the maximum annual concentration was calculated to be 0.041 $\mu g/m^3$ for adult and child residents north of the project site for the years 2014 and 2015, which is less than the significance threshold of 0.3 $\mu g/m^3$. The results of the modeling indicate that sensitive receptors in the vicinity of the project would not be adversely impacted by $PM_{2.5}$ emissions during the 1.2 year construction period.

6. Risk Characterizations

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7. Conclusions

Results of the health risk assessment indicate that the maximum incremental cancer risk during the construction phase of the project for a ground-floor adult resident located near the project site, based on the maximum modeled receptor concentration over a 1.2 year construction exposure period, assuming 24-hour outdoor exposure and averaged over a 70-year lifetime, is 3.7 x 10^{-7} (0.37 per million), which is much less than the significance threshold of 10 per million. Additionally, the incremental cancer risk for the child exposure scenario was estimated to be 2.0 x 10^{-6} (2.0 per million), which is also less than the significance threshold of 10 per million.

For noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one. Therefore, chronic noncarcinogenic hazards are within acceptable limits. The $PM_{2.5}$ annual concentrations are less than the BAAQMD significance threshold. The health risk results for residential receptors are summarized in Table 2.

Table 2 Residential Risk Summary

Receptor	Value	BAAQMD Significance Threshold	Exceeds Significance Threshold?
Adult Resident – Cancer Risk	3.7E-07	10E-06	No
Child Resident – Cancer Risk	2.0E-06	10E-06	No
Chronic Hazard (child scenario)	0.017	1.0	No
$PM_{2.5}$ Concentration (µg/m^3)	0.041	0.30	No

Source: Breeze 7.7.3, 2013.

The results of this construction health risk assessment indicate that the project would have a less than significant impact with respect to excess cancer risk for adult or child residents, chronic non-hazard impacts, and $PM_{2.5}$ emissions during the 1.2 year construction period.

7. Conclusions

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8. References

Bay Area Air Quality Management District (BAAQMD), 2012. *California Environmental Quality Act Air Quality Guidelines*. Dated June 2010.

Bay Area Air Quality Management District (BAAQMD), 2011. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. Version 2.0. May 2011.

Bay Area Air Quality Management District (BAAQMD), 2010a. Screening Tables for Air Toxics Evaluation During Construction. Version 1.0. Dated May 2010.

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OEHHA, 2012. *Air Toxic Hot Spots Program Risk Assessment Guidelines*. *Technical Support Document for Exposure Assessment and Stochastic Analysis*. Dated June 2012.

South Coast Air Quality Management District (SCAQMD), 2013. California Emissions Estimator Model User's Guide. Version 2013.2.2. Prepared for SCAQMD, Diamond Bar, CA by ENVIRON International Corporation, Emeryville, CA. Dated July 2013.

United States Environmental Protection Agency (USEPA). 2005. *Guideline on Air Quality Models* (Revised). EPA-450/2-78-027R.

8. References

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Appendix A. Emission Rate Calculations

Appendix

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Criteria Air Pollutant Emissions Summary - Construction (Daily - lbs/day)

Annual emissions divided by total construction duration to obtain average daily emissions. Average construction emissions accounts for the duration of each construction phase and the time each piece of construction equipment is onsite.

	avg lbs/day	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Total		2.46	8.15	10.28	0.02	0.74	0.45	1.19	0.20	0.41	0.61

	avg lbs/day	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
2014 Onsite Emissions		0.61	5.71	3.71	0.00	0.12	0.42	0.54	0.03	0.39	0.41
2015 Onsite Emissions		2.97	4.72	2.97	0.00	0.00	0.37	0.37	0.00	0.35	0.35
BAAQMD lbs/day Threshold		54	54	NA	NA	BCM	82	NA	BCM	54	NA
Exceeds		No	No	NA	NA	Mit	No	NA	Mit	No	NA

Construction Emissions - DPM and PM2.5
Input to ISCST3 Model

Onsite Construction Emissions		DPM [1]	$PM_{2.5}$ [2]
2014 Onsite Emissions	Average Daily Emissions (lbs/day)	0.42	0.41
	Average Daily Emissions (lbs/hr)	5.25E-02	5.13E-02
	Emission Rate (g/s)	6.62E-03	6.46E-03
	Modeled Area (m^2)	7,448	7,448
	Emission Rate per Area ($g/s/m^2$)	**8.88E-07**	**8.67E-07**
2015 Onsite Emissions	Average Daily Emissions (lbs/day)	0.37	0.35
	Average Daily Emissions (lbs/hr)	4.63E-02	4.38E-02
	Emission Rate (g/s)	5.83E-03	5.51E-03
	Modeled Area (m^2)	7,448	7,448
	Emission Rate per Area ($g/s/m^2$)	**7.82E-07**	**7.40E-07**

Note: Emissions assumed to be evenly distributed over entire construction phase area.

	2014	2015
Hours per work day (7:00 AM to 4:00 PM, 1-hour lunch break)	8	8
Total construction days per year	139	162
Scalar for HROFDY in ISCST3 model	0.38	0.44

[1] DPM emissions taken as PM_{10} exhaust emissions from CalEEMod average daily emissions.

[2] $PM_{2.5}$ emissions taken as total $PM_{2.5}$ (exhaust and fugitive dust) emissions from CalEEMod average daily emissions.

BAAQMD Meteorological Site

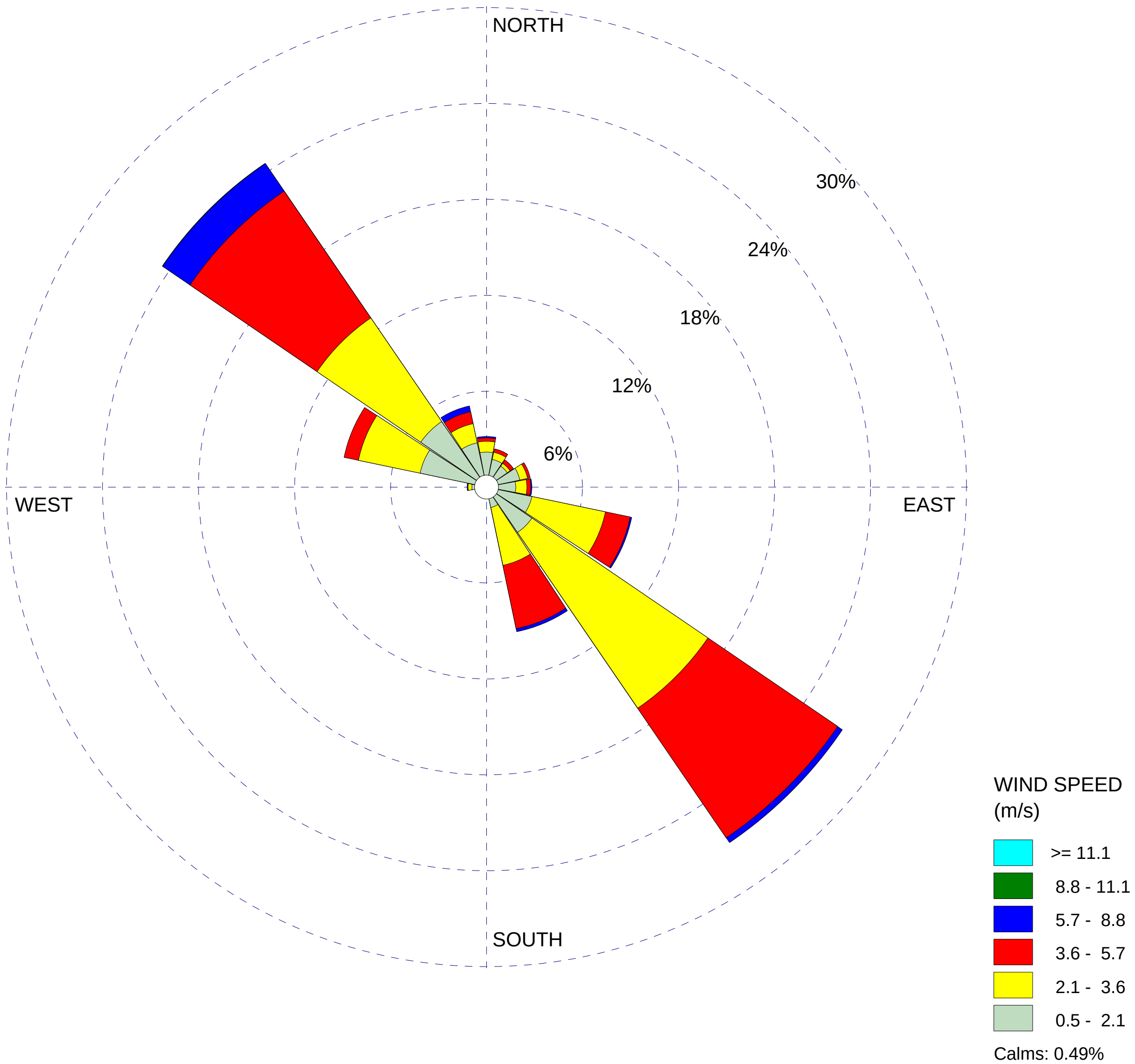
Name: IBM
Site ID: 7801
Start Date: 7/24/1992
End Date: 12/31/1993
Operator: Non-District
Latitude: 37.2478
Longitude: 121.7904
Elevation: 59.5 m
Wind Height: 10 m
UTM - East: 607.278
UTM - North: 4123.042
County: Santa Clara
Sensors: ws,wd,temp dewpt,press,solar insolation,deltaT

Files for Downloading

Year	ASCII	ISCST3 300 m mixing height	ISCST3 600 m mixing height
1993	metdata7801-93met.zip	metdata7801-93300.zip	metdata7801-93600.zip

Note: An “A” instead of a filename for any given year in the ASCII column signifies the data are missing. An “A” in the ISCST3 columns indicates the data are either missing or do not meet the EPA 90% data capture rate required for regulatory modeling applications.

WIND ROSE PLOT:	DISPLAY:
IBM Meteorological Station **1/1/1993-12/31/1993**	**Wind Speed** **Flow Vector (blowing to)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/1993 - 07:00 **End Date: 12/31/1993 - 15:00**	MODELER:	
	CALM WINDS: **0.49%**	TOTAL COUNT: **3285 hrs.**	
	AVG. WIND SPEED: **2.93 m/s**	DATE: **1/10/2014**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Appendix B. ISCST3 Model Output Files

Appendix

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```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                        ***        01/14/14
                                   ***                                                                       ***        11:02:25
**MODELOPTs:                                                                                                            PAGE   1
CONC                   URBAN FLAT  FLGPOL DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes:     1 Source(s);      1 Source Group(s); and      22 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          ISCST3.INP
**Output Print File:             ISCST3.OUT
```

**MODELOPTs:
CONC URBAN FLAT FLGPOL DFAULT

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
1	0	0.88800E-06	600528.9	4119297.2	0.0	4.15	14	1.93	HROFDY

*** ISCST3 - VERSION 02035 ***   *** Almaden Golf and Country Club   ***   01/14/14
***   ***   11:02:25
**MODELOPTs: PAGE   7
CONC   URBAN FLAT FLGPOL DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: C:\Users\sbush\DOCUME~1\!METFI~1\BAAQMD~1\IBM93300.ASC
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.:   7801   UPPER AIR STATION NO.:   7801
NAME: UNKNOWN   NAME: UNKNOWN
YEAR: 1993   YEAR: 1993

YR MN DY HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
93 01 01 01	322.0	5.72	283.6	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 02	317.0	6.04	283.8	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 03	319.0	5.81	283.5	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 04	324.0	6.88	283.8	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 05	321.0	7.20	283.5	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 06	313.0	6.30	283.5	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 07	58.0	4.16	283.3	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 08	126.0	3.98	282.6	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 09	140.0	2.24	282.1	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 10	113.0	1.56	282.2	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 11	122.0	1.97	282.3	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 12	113.0	2.24	282.5	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 13	149.0	2.55	282.5	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 14	257.0	1.00	281.9	3	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 15	107.0	1.30	282.3	2	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 16	134.0	1.39	282.3	3	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 17	71.0	1.48	282.0	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 18	138.0	1.03	281.2	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 19	145.0	1.74	280.6	4	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 20	128.0	2.10	280.2	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 21	33.0	1.07	279.1	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 22	305.0	1.07	278.6	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 23	312.0	1.00	278.4	6	300.0	300.0	0.0000	0.0	0.0000	0	0.00
93 01 01 24	298.0	1.39	277.8	5	300.0	300.0	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                       ***        01/14/14
                                   ***                                                                      ***        11:02:25
**MODELOPTs:                                                                                                           PAGE   8
CONC                    URBAN FLAT  FLGPOL DFAULT

                             *** THE ANNUAL (   1 YRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SOURCES  ***
                                 INCLUDING SOURCE(S):      1       ,

                                            *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                       ** CONC OF OTHER    IN MICROGRAMS/M**3                          **

      X-COORD (M)   Y-COORD (M)        CONC                      X-COORD (M)   Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        600502.38    4119196.75        0.00519                     600470.50    4119184.50        0.00216             50)  DC      NA
         6TH HIGHEST VALUE IS       0.01570 AT (  600441.69,  4119276.75,      0.00,      1.50)  DC      NA
         7TH HIGHEST VALUE IS       0.01177 AT (  600720.19,  4119245.50,      0.00,      1.50)  DC      NA
         8TH HIGHEST VALUE IS       0.01167 AT (  600468.38,  4119237.50,      0.00,      1.50)  DC      NA
         9TH HIGHEST VALUE IS       0.00909 AT (  600678.50,  4119330.00,      0.00,      1.50)  DC      NA
        10TH HIGHEST VALUE IS       0.00842 AT (  600748.38,  4119234.00,      0.00,      1.50)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                           ***        01/14/14
                                   ***                                                                          ***        11:02:25
**MODELOPTs:                                                                                                               PAGE  10
CONC                    URBAN FLAT  FLGPOL DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of           20 Informational Message(s)

A Total of           20 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
OU W565    66 PERPLT:Possible Conflict With Dynamically Allocated FUNIT PLOTFILE

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
* ISCST3 (02035):  Almaden Golf and Country Club
* MODELING OPTIONS USED:
*  CONC                   URBAN FLAT  FLGPOL DFAULT
*         PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SOURCES
*         FOR A TOTAL OF    22 RECEPTORS.
*         FORMAT: (3(1X,F13.5),1X,F8.2,2X,A6,2X,A8,2X,I8.8,2X,A8)
*        X             Y      AVERAGE CONC   ZELEV     AVE     GRP      NUM YRS   NET ID
*  ____________  ____________  ____________  ______  ______  ________  ________  ________
  600502.37500 4119196.75000       0.00519    0.00  ANNUAL  SOURCES   00000001     NA
  600470.50000 4119184.50000       0.00216    0.00  ANNUAL  SOURCES   00000001     NA
  600445.12500 4119178.00000       0.00145    0.00  ANNUAL  SOURCES   00000001     NA
  600422.50000 4119170.50000       0.00105    0.00  ANNUAL  SOURCES   00000001     NA
  600398.12500 4119156.25000       0.00072    0.00  ANNUAL  SOURCES   00000001     NA
  600384.00000 4119212.75000       0.00179    0.00  ANNUAL  SOURCES   00000001     NA
  600412.18750 4119217.50000       0.00264    0.00  ANNUAL  SOURCES   00000001     NA
  600435.68750 4119231.50000       0.00521    0.00  ANNUAL  SOURCES   00000001     NA
  600481.87500 4119264.75000       0.02957    0.00  ANNUAL  SOURCES   00000001     NA
  600481.37500 4119291.25000       0.04199    0.00  ANNUAL  SOURCES   00000001     NA
  600468.37500 4119237.50000       0.01167    0.00  ANNUAL  SOURCES   00000001     NA
  600485.50000 4119334.00000       0.04153    0.00  ANNUAL  SOURCES   00000001     NA
  600486.00000 4119362.25000       0.02831    0.00  ANNUAL  SOURCES   00000001     NA
  600453.81250 4119335.00000       0.03034    0.00  ANNUAL  SOURCES   00000001     NA
  600441.68750 4119276.75000       0.01570    0.00  ANNUAL  SOURCES   00000001     NA
  600698.62500 4119318.00000       0.00839    0.00  ANNUAL  SOURCES   00000001     NA
  600678.50000 4119330.00000       0.00909    0.00  ANNUAL  SOURCES   00000001     NA
  600685.00000 4119351.50000       0.00656    0.00  ANNUAL  SOURCES   00000001     NA
  600717.68750 4119306.50000       0.00750    0.00  ANNUAL  SOURCES   00000001     NA
  600709.18750 4119381.75000       0.00402    0.00  ANNUAL  SOURCES   00000001     NA
  600720.18750 4119245.50000       0.01177    0.00  ANNUAL  SOURCES   00000001     NA
  600748.37500 4119234.00000       0.00842    0.00  ANNUAL  SOURCES   00000001     NA
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                             ***        01/14/14
                                   ***                                                                            ***        11:04:03
**MODELOPTs:                                                                                                                 PAGE   1
CONC                    URBAN FLAT  FLGPOL DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes:     1 Source(s);      1 Source Group(s); and      22 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          ISCST3.INP
**Output Print File:             ISCST3.OUT
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                       ***        01/14/14
                                   ***                                                                      ***        11:04:03
**MODELOPTs:                                                                                                           PAGE   2
CONC                    URBAN FLAT  FLGPOL DFAULT


                                              *** AREAPOLY SOURCE DATA ***

             NUMBER EMISSION RATE   LOCATION OF AREA  BASE     RELEASE  NUMBER      INIT.   EMISSION RATE
   SOURCE     PART.  (GRAMS/SEC       X        Y      ELEV.    HEIGHT  OF VERTS.     SZ      SCALAR VARY
     ID       CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS)           (METERS)       BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  1             0   0.78200E-06  600528.9 4119297.2     0.0     4.15      14         1.93      HROFDY
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                           ***        01/14/14
                                   ***                                                                          ***        11:04:03
**MODELOPTs:                                                                                                               PAGE   7
CONC                    URBAN FLAT  FLGPOL DFAULT


                     *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

     FILE:   C:\Users\sbush\DOCUME~1\!METFI~1\BAAQMD~1\IBM93300.ASC
     FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
     SURFACE STATION NO.:   7801                   UPPER AIR STATION NO.:   7801
                    NAME: UNKNOWN                                    NAME: UNKNOWN
                    YEAR:   1993                                     YEAR:   1993

             FLOW   SPEED  TEMP  STAB  MIXING HEIGHT (M)  USTAR  M-O LENGTH   Z-0 IPCODE PRATE
YR MN DY HR VECTOR  (M/S)   (K)  CLASS   RURAL   URBAN    (M/S)     (M)       (M)       (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

93 01 01 01  322.0   5.72  283.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 02  317.0   6.04  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 03  319.0   5.81  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 04  324.0   6.88  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 05  321.0   7.20  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 06  313.0   6.30  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 07   58.0   4.16  283.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 08  126.0   3.98  282.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 09  140.0   2.24  282.1   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 10  113.0   1.56  282.2   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 11  122.0   1.97  282.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 12  113.0   2.24  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 13  149.0   2.55  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 14  257.0   1.00  281.9   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 15  107.0   1.30  282.3   2     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 16  134.0   1.39  282.3   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 17   71.0   1.48  282.0   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 18  138.0   1.03  281.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 19  145.0   1.74  280.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 20  128.0   2.10  280.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 21   33.0   1.07  279.1   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 22  305.0   1.07  278.6   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 23  312.0   1.00  278.4   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 24  298.0   1.39  277.8   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                      ***        01/14/14
                                   ***                                                                     ***        11:04:03
**MODELOPTs:                                                                                                          PAGE   8
CONC                    URBAN FLAT  FLGPOL DFAULT

                             *** THE ANNUAL (   1 YRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SOURCES  ***
                                 INCLUDING SOURCE(S):      1       ,

                                        *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                   ** CONC OF OTHER    IN MICROGRAMS/M**3                         **

      X-COORD (M)   Y-COORD (M)        CONC                      X-COORD (M)   Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        600502.38    4119196.75        0.00529                     600470.50    4119184.50        0.00220             50)  DC      NA
         6TH HIGHEST VALUE IS       0.01601 AT (  600441.69,  4119276.75,      0.00,      1.50)  DC      NA
         7TH HIGHEST VALUE IS       0.01200 AT (  600720.19,  4119245.50,      0.00,      1.50)  DC      NA
         8TH HIGHEST VALUE IS       0.01190 AT (  600468.38,  4119237.50,      0.00,      1.50)  DC      NA
         9TH HIGHEST VALUE IS       0.00927 AT (  600678.50,  4119330.00,      0.00,      1.50)  DC      NA
        10TH HIGHEST VALUE IS       0.00858 AT (  600748.38,  4119234.00,      0.00,      1.50)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                        ***        01/14/14
                                   ***                                                                        ***        11:04:03
**MODELOPTs:                                                                                                             PAGE  10
CONC                    URBAN FLAT  FLGPOL DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of           20 Informational Message(s)

A Total of           20 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
OU W565    66 PERPLT:Possible Conflict With Dynamically Allocated FUNIT PLOTFILE

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
* ISCST3 (02035):  Almaden Golf and Country Club
* MODELING OPTIONS USED:
*  CONC                    URBAN FLAT  FLGPOL DFAULT
*         PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SOURCES
*         FOR A TOTAL OF    22 RECEPTORS.
*         FORMAT: (3(1X,F13.5),1X,F8.2,2X,A6,2X,A8,2X,I8.8,2X,A8)
*        X             Y      AVERAGE CONC   ZELEV     AVE     GRP      NUM YRS   NET ID
* ____________ ____________ ____________ ______ ______ ________ ________ ________
  600502.37500 4119196.75000       0.00529    0.00  ANNUAL  SOURCES  00000001     NA
  600470.50000 4119184.50000       0.00220    0.00  ANNUAL  SOURCES  00000001     NA
  600445.12500 4119178.00000       0.00148    0.00  ANNUAL  SOURCES  00000001     NA
  600422.50000 4119170.50000       0.00107    0.00  ANNUAL  SOURCES  00000001     NA
  600398.12500 4119156.25000       0.00073    0.00  ANNUAL  SOURCES  00000001     NA
  600384.00000 4119212.75000       0.00182    0.00  ANNUAL  SOURCES  00000001     NA
  600412.18750 4119217.50000       0.00270    0.00  ANNUAL  SOURCES  00000001     NA
  600435.68750 4119231.50000       0.00531    0.00  ANNUAL  SOURCES  00000001     NA
  600481.87500 4119264.75000       0.03015    0.00  ANNUAL  SOURCES  00000001     NA
  600481.37500 4119291.25000       0.04282    0.00  ANNUAL  SOURCES  00000001     NA
  600468.37500 4119237.50000       0.01190    0.00  ANNUAL  SOURCES  00000001     NA
  600485.50000 4119334.00000       0.04234    0.00  ANNUAL  SOURCES  00000001     NA
  600486.00000 4119362.25000       0.02886    0.00  ANNUAL  SOURCES  00000001     NA
  600453.81250 4119335.00000       0.03094    0.00  ANNUAL  SOURCES  00000001     NA
  600441.68750 4119276.75000       0.01601    0.00  ANNUAL  SOURCES  00000001     NA
  600698.62500 4119318.00000       0.00856    0.00  ANNUAL  SOURCES  00000001     NA
  600678.50000 4119330.00000       0.00927    0.00  ANNUAL  SOURCES  00000001     NA
  600685.00000 4119351.50000       0.00669    0.00  ANNUAL  SOURCES  00000001     NA
  600717.68750 4119306.50000       0.00764    0.00  ANNUAL  SOURCES  00000001     NA
  600709.18750 4119381.75000       0.00410    0.00  ANNUAL  SOURCES  00000001     NA
  600720.18750 4119245.50000       0.01200    0.00  ANNUAL  SOURCES  00000001     NA
  600748.37500 4119234.00000       0.00858    0.00  ANNUAL  SOURCES  00000001     NA
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                         ***        01/15/14
                                   ***                                                                        ***        08:52:05
**MODELOPTs:                                                                                                             PAGE   1
CONC                    URBAN FLAT  FLGPOL DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes:     1 Source(s);      1 Source Group(s); and      22 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          ISCST3.INP
**Output Print File:             ISCST3.OUT
```

**MODELOPTs:
CONC URBAN FLAT FLGPOL DFAULT

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
1	0	0.86700E-06	600528.9	4119297.2	0.0	4.15	14	1.93	HROFDY

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                 ***        01/15/14
                                   ***                                                                ***        08:52:05
**MODELOPTs:                                                                                                     PAGE   7
CONC                    URBAN FLAT  FLGPOL DFAULT


                     *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

     FILE:   C:\Users\sbush\DOCUME~1\!METFI~1\BAAQMD~1\IBM93300.ASC
     FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
     SURFACE STATION NO.:   7801                   UPPER AIR STATION NO.:   7801
                    NAME: UNKNOWN                                    NAME: UNKNOWN
                    YEAR:   1993                                     YEAR:   1993

             FLOW   SPEED  TEMP  STAB  MIXING HEIGHT (M)  USTAR  M-O LENGTH   Z-0 IPCODE PRATE
YR MN DY HR VECTOR  (M/S)   (K)  CLASS   RURAL   URBAN    (M/S)     (M)       (M)       (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

93 01 01 01  322.0   5.72  283.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 02  317.0   6.04  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 03  319.0   5.81  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 04  324.0   6.88  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 05  321.0   7.20  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 06  313.0   6.30  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 07   58.0   4.16  283.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 08  126.0   3.98  282.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 09  140.0   2.24  282.1   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 10  113.0   1.56  282.2   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 11  122.0   1.97  282.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 12  113.0   2.24  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 13  149.0   2.55  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 14  257.0   1.00  281.9   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 15  107.0   1.30  282.3   2     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 16  134.0   1.39  282.3   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 17   71.0   1.48  282.0   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 18  138.0   1.03  281.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 19  145.0   1.74  280.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 20  128.0   2.10  280.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 21   33.0   1.07  279.1   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 22  305.0   1.07  278.6   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 23  312.0   1.00  278.4   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 24  298.0   1.39  277.8   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                    ***        01/15/14
                                   ***                                                                   ***        08:52:05
**MODELOPTs:                                                                                                        PAGE   8
CONC                     URBAN FLAT  FLGPOL DFAULT

                             *** THE ANNUAL (   1 YRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SOURCES  ***
                                 INCLUDING SOURCE(S):      1       ,

                                        *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                          ** CONC OF OTHER    IN MICROGRAMS/M**3                          **

      X-COORD (M)   Y-COORD (M)        CONC                       X-COORD (M)   Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        600502.38    4119196.75        0.00506                      600470.50    4119184.50        0.00210            50)  DC      NA
         6TH HIGHEST VALUE IS       0.01533 AT (  600441.69,  4119276.75,      0.00,      1.50)  DC      NA
         7TH HIGHEST VALUE IS       0.01149 AT (  600720.19,  4119245.50,      0.00,      1.50)  DC      NA
         8TH HIGHEST VALUE IS       0.01140 AT (  600468.38,  4119237.50,      0.00,      1.50)  DC      NA
         9TH HIGHEST VALUE IS       0.00888 AT (  600678.50,  4119330.00,      0.00,      1.50)  DC      NA
        10TH HIGHEST VALUE IS       0.00822 AT (  600748.38,  4119234.00,      0.00,      1.50)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of           20 Informational Message(s)

A Total of           20 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
OU W565    66 PERPLT:Possible Conflict With Dynamically Allocated FUNIT PLOTFILE

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
* ISCST3 (02035):  Almaden Golf and Country Club
* MODELING OPTIONS USED:
*  CONC                    URBAN FLAT  FLGPOL DFAULT
*         PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SOURCES
*         FOR A TOTAL OF    22 RECEPTORS.
*         FORMAT: (3(1X,F13.5),1X,F8.2,2X,A6,2X,A8,2X,I8.8,2X,A8)
*        X             Y      AVERAGE CONC   ZELEV     AVE     GRP      NUM YRS   NET ID
*   ___________  ___________  ___________  ______  ______  ________  ________  ________
  600502.37500 4119196.75000       0.00506    0.00  ANNUAL  SOURCES   00000001     NA
  600470.50000 4119184.50000       0.00210    0.00  ANNUAL  SOURCES   00000001     NA
  600445.12500 4119178.00000       0.00141    0.00  ANNUAL  SOURCES   00000001     NA
  600422.50000 4119170.50000       0.00103    0.00  ANNUAL  SOURCES   00000001     NA
  600398.12500 4119156.25000       0.00070    0.00  ANNUAL  SOURCES   00000001     NA
  600384.00000 4119212.75000       0.00174    0.00  ANNUAL  SOURCES   00000001     NA
  600412.18750 4119217.50000       0.00258    0.00  ANNUAL  SOURCES   00000001     NA
  600435.68750 4119231.50000       0.00508    0.00  ANNUAL  SOURCES   00000001     NA
  600481.87500 4119264.75000       0.02887    0.00  ANNUAL  SOURCES   00000001     NA
  600481.37500 4119291.25000       0.04100    0.00  ANNUAL  SOURCES   00000001     NA
  600468.37500 4119237.50000       0.01140    0.00  ANNUAL  SOURCES   00000001     NA
  600485.50000 4119334.00000       0.04054    0.00  ANNUAL  SOURCES   00000001     NA
  600486.00000 4119362.25000       0.02764    0.00  ANNUAL  SOURCES   00000001     NA
  600453.81250 4119335.00000       0.02962    0.00  ANNUAL  SOURCES   00000001     NA
  600441.68750 4119276.75000       0.01533    0.00  ANNUAL  SOURCES   00000001     NA
  600698.62500 4119318.00000       0.00819    0.00  ANNUAL  SOURCES   00000001     NA
  600678.50000 4119330.00000       0.00888    0.00  ANNUAL  SOURCES   00000001     NA
  600685.00000 4119351.50000       0.00640    0.00  ANNUAL  SOURCES   00000001     NA
  600717.68750 4119306.50000       0.00732    0.00  ANNUAL  SOURCES   00000001     NA
  600709.18750 4119381.75000       0.00392    0.00  ANNUAL  SOURCES   00000001     NA
  600720.18750 4119245.50000       0.01149    0.00  ANNUAL  SOURCES   00000001     NA
  600748.37500 4119234.00000       0.00822    0.00  ANNUAL  SOURCES   00000001     NA
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                        ***        01/15/14
                                   ***                                                                       ***        08:53:23
**MODELOPTs:                                                                                                            PAGE   1
CONC                    URBAN FLAT  FLGPOL DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Accepts FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes:     1 Source(s);      1 Source Group(s); and      22 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;    Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          ISCST3.INP
**Output Print File:             ISCST3.OUT
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                  ***        01/15/14
                                   ***                                                                 ***        08:53:23
**MODELOPTs:                                                                                                      PAGE   2
CONC                    URBAN FLAT  FLGPOL DFAULT



                                               *** AREAPOLY SOURCE DATA ***

             NUMBER EMISSION RATE   LOCATION OF AREA  BASE     RELEASE  NUMBER      INIT.   EMISSION RATE
   SOURCE     PART.  (GRAMS/SEC       X        Y      ELEV.    HEIGHT  OF VERTS.     SZ      SCALAR VARY
     ID       CATS.   /METER**2)   (METERS) (METERS) (METERS) (METERS)            (METERS)       BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  1             0   0.74000E-06  600528.9 4119297.2     0.0     4.15      14         1.93      HROFDY
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                            ***        01/15/14
                                   ***                                                                           ***        08:53:23
**MODELOPTs:                                                                                                                PAGE   7
CONC                    URBAN FLAT  FLGPOL DFAULT


                     *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

     FILE:   C:\Users\sbush\DOCUME~1\!METFI~1\BAAQMD~1\IBM93300.ASC
     FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
     SURFACE STATION NO.:   7801                   UPPER AIR STATION NO.:   7801
                    NAME: UNKNOWN                                    NAME: UNKNOWN
                    YEAR:   1993                                     YEAR:   1993

             FLOW   SPEED  TEMP  STAB  MIXING HEIGHT (M)  USTAR  M-O LENGTH   Z-0 IPCODE PRATE
YR MN DY HR VECTOR  (M/S)   (K)  CLASS   RURAL   URBAN    (M/S)     (M)       (M)       (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

93 01 01 01  322.0   5.72  283.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 02  317.0   6.04  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 03  319.0   5.81  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 04  324.0   6.88  283.8   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 05  321.0   7.20  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 06  313.0   6.30  283.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 07   58.0   4.16  283.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 08  126.0   3.98  282.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 09  140.0   2.24  282.1   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 10  113.0   1.56  282.2   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 11  122.0   1.97  282.3   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 12  113.0   2.24  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 13  149.0   2.55  282.5   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 14  257.0   1.00  281.9   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 15  107.0   1.30  282.3   2     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 16  134.0   1.39  282.3   3     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 17   71.0   1.48  282.0   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 18  138.0   1.03  281.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 19  145.0   1.74  280.6   4     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 20  128.0   2.10  280.2   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 21   33.0   1.07  279.1   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 22  305.0   1.07  278.6   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 23  312.0   1.00  278.4   6     300.0   300.0    0.0000       0.0  0.0000   0   0.00
93 01 01 24  298.0   1.39  277.8   5     300.0   300.0    0.0000       0.0  0.0000   0   0.00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                   ***        01/15/14
                                   ***                                                                  ***        08:53:23
**MODELOPTs:                                                                                                       PAGE   8
CONC                    URBAN FLAT  FLGPOL DFAULT

                             *** THE ANNUAL (   1 YRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SOURCES  ***
                                 INCLUDING SOURCE(S):      1       ,

                                            *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                       ** CONC OF OTHER    IN MICROGRAMS/M**3                          **

      X-COORD (M)   Y-COORD (M)        CONC                     X-COORD (M)   Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        600502.38    4119196.75        0.00500                    600470.50    4119184.50        0.00208            50)  DC      NA
         6TH HIGHEST VALUE IS       0.01515 AT (  600441.69,  4119276.75,      0.00,      1.50)  DC      NA
         7TH HIGHEST VALUE IS       0.01136 AT (  600720.19,  4119245.50,      0.00,      1.50)  DC      NA
         8TH HIGHEST VALUE IS       0.01126 AT (  600468.38,  4119237.50,      0.00,      1.50)  DC      NA
         9TH HIGHEST VALUE IS       0.00877 AT (  600678.50,  4119330.00,      0.00,      1.50)  DC      NA
        10TH HIGHEST VALUE IS       0.00812 AT (  600748.38,  4119234.00,      0.00,      1.50)  DC      NA


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
 *** ISCST3 - VERSION 02035 ***    ***  Almaden Golf and Country Club                                     ***        01/15/14
                                   ***                                                                    ***        08:53:23
**MODELOPTs:                                                                                                         PAGE  10
CONC                    URBAN FLAT  FLGPOL DFAULT


*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of           20 Informational Message(s)

A Total of           20 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
OU W565    66 PERPLT:Possible Conflict With Dynamically Allocated FUNIT PLOTFILE

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
* ISCST3 (02035):  Almaden Golf and Country Club
* MODELING OPTIONS USED:
*  CONC                    URBAN FLAT  FLGPOL DFAULT
*         PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SOURCES
*         FOR A TOTAL OF    22 RECEPTORS.
*         FORMAT: (3(1X,F13.5),1X,F8.2,2X,A6,2X,A8,2X,I8.8,2X,A8)
```

X	Y	AVERAGE CONC	ZELEV	AVE	GRP	NUM YRS	NET ID
600502.37500	4119196.75000	0.00500	0.00	ANNUAL	SOURCES	00000001	NA
600470.50000	4119184.50000	0.00208	0.00	ANNUAL	SOURCES	00000001	NA
600445.12500	4119178.00000	0.00140	0.00	ANNUAL	SOURCES	00000001	NA
600422.50000	4119170.50000	0.00102	0.00	ANNUAL	SOURCES	00000001	NA
600398.12500	4119156.25000	0.00069	0.00	ANNUAL	SOURCES	00000001	NA
600384.00000	4119212.75000	0.00172	0.00	ANNUAL	SOURCES	00000001	NA
600412.18750	4119217.50000	0.00255	0.00	ANNUAL	SOURCES	00000001	NA
600435.68750	4119231.50000	0.00503	0.00	ANNUAL	SOURCES	00000001	NA
600481.87500	4119264.75000	0.02853	0.00	ANNUAL	SOURCES	00000001	NA
600481.37500	4119291.25000	0.04052	0.00	ANNUAL	SOURCES	00000001	NA
600468.37500	4119237.50000	0.01126	0.00	ANNUAL	SOURCES	00000001	NA
600485.50000	4119334.00000	0.04007	0.00	ANNUAL	SOURCES	00000001	NA
600486.00000	4119362.25000	0.02731	0.00	ANNUAL	SOURCES	00000001	NA
600453.81250	4119335.00000	0.02928	0.00	ANNUAL	SOURCES	00000001	NA
600441.68750	4119276.75000	0.01515	0.00	ANNUAL	SOURCES	00000001	NA
600698.62500	4119318.00000	0.00810	0.00	ANNUAL	SOURCES	00000001	NA
600678.50000	4119330.00000	0.00877	0.00	ANNUAL	SOURCES	00000001	NA
600685.00000	4119351.50000	0.00633	0.00	ANNUAL	SOURCES	00000001	NA
600717.68750	4119306.50000	0.00723	0.00	ANNUAL	SOURCES	00000001	NA
600709.18750	4119381.75000	0.00388	0.00	ANNUAL	SOURCES	00000001	NA
600720.18750	4119245.50000	0.01136	0.00	ANNUAL	SOURCES	00000001	NA
600748.37500	4119234.00000	0.00812	0.00	ANNUAL	SOURCES	00000001	NA

Appendix C. Risk Calculations Worksheets

Appendix

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Construction Risk Assessment
Adult Resident Exposure Scenario - 70 Years

Source	Mass GLC	Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
				CPF	DOSE **	RISK	REL	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
	(µg/m^3)			(mg/kg/day)$^{-1}$	(mg/kg/day)		(µg/m^3)													
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2014 Construction	4.20E-02	1.00E+00	Diesel Particulate	1.1E+00	9.2E-08	1.0E-07	5.0E+00												8.4E-03	
2015 Construction	4.28E-02	1.00E+00	Diesel Particulate	1.1E+00	1.1E-07	1.2E-07	5.0E+00												8.6E-03	
			TOTAL			2.2E-07		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
			BAAQMD Cancer Risk Adjustment Factor - 70-year Adult Scenario			1.7														
			Adjusted Cancer Risk			3.7E-07														

* Key to Toxicological Endpoints	
ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose	
daily breathing rate (L/kg-day) - adult resident	302
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
calendar days over length of 2014 construction period	194
exposure duration (years) - 2014 construction period	0.5
calendar days over length of 2015 construction period	226
exposure duration (years) - 2015 construction period	0.6
averaging time (days) - 70 year duration	25550
fraction of time at home	1.0
2014 maximum annual PM2.5 concentration (µg/m^3)	0.041
2015 maximum annual PM2.5 concentration (µg/m^3)	0.041

Construction Risk Assessment
Child Resident Exposure Scenario - 9 Years

Source	Mass GLC	Weight	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards/ Toxicological Endpoints*													
		Fraction		CPF	DOSE **	RISK	REL	ALI	BONE	CARDIO	DEV	ENDO	EYE	HEME	IMM	KID	NERV	REPRO	RESP	SKIN
	(µg/m^3)			(mg/kg/day)$^{-1}$	(mg/kg/day)		(µg/m^3)													
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)
2014 Construction	4.20E-02	1.00E+00	Diesel Particulate	1.1E+00	1.8E-07	2.0E-07	5.0E+00												8.4E-03	
2015 Construction	4.28E-02	1.00E+00	Diesel Particulate	1.1E+00	2.1E-07	2.3E-07	5.0E+00												8.6E-03	
TOTAL						4.3E-07		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-02	0.0E+00
BAAQMD Cancer Risk Adjustment Factor - 9-year Child Scenario						4.7														
Adjusted Cancer Risk						2.0E-06														

* Key to Toxicological Endpoints

ALI	Alimentary
BONE	Bone
CARDIO	Cardiovascular
DEV	Developmental
ENDO	Endocrine
EYE	Eye
HEME	Hematologic
IMM	Immune
KID	Kidney
NERV	Nervous
REPRO	Reproductive
RESP	Respiratory
SKIN	Skin

** Exposure factors used to calculate dose

daily breathing rate (L/kg-day) - child resident	581
inhalation absorption factor	1.0
exposure frequency (days/year) - residents	350
calendar days over length of 2014 construction period	194
exposure duration (years) - 2014 construction period	0.5
calendar days over length of 2015 construction period	226
exposure duration (years) - 2015 construction period	0.6
averaging time (days) - 70 year duration	25550
fraction of time at home	1.0
2014 maximum annual PM2.5 concentration (µg/m^3)	0.041
2015 maximum annual PM2.5 concentration (µg/m^3)	0.041

APPENDIX B

Arborist Report

The Planning Center | DC&E

January 2014

THE PLANNING CENTER DC&E

MEMORANDUM

DATE January 14, 2014

TO Victor Santana

KSD Group

FROM Melissa Erikson

RE **Almaden Golf and Country Club Field Reconnaissance and Tree Inventory**

A field reconnaissance and tree inventory was completed on Tuesday, January 7, 2014 and covered the Permit Area as delineated in the EX-1 sheet revised 12/26/13 – 100% DD provided by KSD. A total of 89 trees were identified and measured. Most trees are in good health, with the exception of one *Albizia julibrissin* that is stressed, likely due to cold temperatures, and one unidentified ornamental, deciduous tree that has poor structure and is in poor health. No nests or active nesting activities were observed in the Permit Area; however, the time of year in which this survey was conducted is not typical breeding season for most birds.

For multifamily residences, commercial properties, and industrial properties, the City of San Jose requires a permit for the removal of trees of any size. For trees on these properties, a Live Tree Removal Application is required if the tree is ordinance-sized, or a Permit Adjustment is required if the tree is less than ordinance-sized. Under San Jose's tree ordinance, the threshold for special consideration for tree removal is a circumference of 56 inches as measured at a height of two feet above ground level.[1] One tree proposed for removal is ordinance-sized; one ordinance-sized palm is proposed for removal or relocation; and all the other trees proposed for removal are smaller than ordinance-sized. Building construction and associated impacts would require the removal of 20 trees, including:

- One mimosa tree which is stressed;
- Two ornamental trees, one of which has poor structure and is in poor health;
- Two cedars, one of which is ordinance sized. Pines are listed as unsuitable trees by the City but no specific genus or species are listed; it is unclear if the general term 'pine' would apply to cedars and other evergreens;
- Two lemons;
- Six crape myrtles;
- Four Japanese maples; and

[1] § 13.32.020, Chapter 13.32 Tree Removal Controls, San Jose Municipal Code.

- Three palms, *Syagras romanzoffiana*, one of which is ordinance-sized; the palms could be relocated depending on costs and the identification of an appropriate location. The City has listed palms as unsuitable trees which may factor into City requirements if the tree is removed and not relocated.

Table 1 provides a summary of the trees included in the field reconnaissance, and Figure 1 provides a location map for the trees using the EX-1 sheet noted above as a base. For each tree, Table 1 identifies: circumference as measured two feet above natural grade, general condition, and planned post-construction status. Many of the trees are multi-stemmed; a cumulative circumference for branches is listed for these trees.

TABLE 1 **Field Reconnaissance Tree Survey**

Tree Number	Species	Common Name	Circumference in Inches Measured Two Feet Above Natural Grade /Replacement Size	Condition	Status
1	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
2	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
3	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
4	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
5	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
6	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
7	*Chamaerops humilis*	Mediterranean fan palm	14	Healthy	Remain
8	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
9	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
10	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
11	*Aesculus sp.*	horse chestnut	6.5	Healthy	Remain
12	*Aesculus sp.*	horse chestnut	16	Healthy	Remain

13	*Aesculus sp.*	horse chestnut	26	Healthy	Remain
14	*Albizia julibrissin*	mimosa tree	12.5	Healthy	Remain
15	*Albizia julibrissin*	mimosa tree	20	Healthy	Remain
16	*Quercus sp.*	oak	Multistem, cumulative 21	Healthy	Remain
17	*Quercus sp.*	oak	Multistem, cumulative 36	Healthy	Remain
18	*Quercus sp.*	oak	Multi-stem, cumulative 18	Healthy	Remain
19	*Olea sp.*	olive	Multi-stem, cumulative 50	Healthy	Remain
20	*Olea asp.*	olive	Multi-stem, cumulative 48	Healthy	Remain
21	*Olea sp.*	olive	Multi-stem, cumulative 24	Healthy	Remain
22	*Dodonaea viscosa 'Purpurea'*	purple hopseed bush	Multi-stem, cumulative 50	Healthy	Remain
23	*Dodonaea viscosa 'Purpurea'*	purple hopseed bush	Multi-stem, cumulative 40	Healthy	Remain
24	*Dodonaea viscosa 'Purpurea'*	purple hopseed bush	Multi-stem, cumulative 20	Healthy	Remain
25	*Dodonaea viscosa 'Purpurea'*	purple hopseed bush	Multi-stem, cumulative 30	Healthy	Remain
26	*Washingtonia robusta*	Washington palm	54	Healthy	Remain
27	*Washingtonia robusta*	Washington palm	78	Healthy	Remain
28	*Washingtonia robusta*	Washington palm	66	Healthy	Remain
29	*Lagerstroemia indica*	crape myrtle	12	Healthy	Remain
30	*Lagerstroemia indica*	crape myrtle	11	Healthy	Remain
31	*Aesculus sp.*	horse chestnut	12	Healthy	Remain
32	*Schinus terebinthefolius*	Brazilian pepper tree	Multi-stem, cumulative 150	Healthy	Remain
33	*Syagras romanzoffiana*	queen palm	32	Stressed, recently planted	Remain
34	*Citrus sp.*	lemon	3	Healthy	Remove
35	*Citrus sp.*	lemon	3	Healthy	Remove

36	*Liquidamber stryaciflua*	sweetgum	29	Healthy	Protect in place
37	*Acer palmatum*	Japanese maple	7	Healthy	Remove
38	*Albizia julibrissin*	mimosa tree	31	Stressed	Remove
39	*Betula nigra*	river birch	34	Healthy	Protect in place
40	*Lagerstroemia indica*	crape myrtle	11	Healthy	Remove
41	Ornamental, deciduous	unidentified	13	Stressed, poor	Remove
42	*Lagerstroemia indica*	crape myrtle	Multi-stem, cumulative 50	Healthy	Remove
43	Ornamental, deciduous	unidentified	Multi-stem, cumulative 30	Healthy	Remove
44	*Lagerstroemia indica*	crape myrtle	Multi-stem, cumulative 32	Healthy	Remove
45	*Cedrus atlantica*	atlas cedar	81	Healthy	Remove
46	*Cedrus atlantica glauca*	blue atlas cedar	43	Healthy	Remove
47	*Pinus sabiniana*	gray pine	105	Healthy	Protect in place
48	*Olea sp.*	olive	Multi-stem, cumulative 59	Healthy	Remain
49	*Olea sp.*	olive	Multi-stem, cumulative 56	Healthy	Remain
50	*Pinus sabiniana*	gray pine	117	Healthy	Remain
51	*Quercus agrifolia*	coast live oak	Multi-stem, cumulative 71	Healthy	Remain
52	*Quercus agrifolia*	coast live oak	66	Healthy	Remain
53	*Quercus sp.*	oak	15	Healthy	Remain
54	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 28	Healthy	Remove
55	*Lagerstroemia indica*	crape myrtle	22	Healthy	Remove
56	*Lagerstroemia indica*	crape myrtle	21	Healthy	Remove
57	*Lagerstroemia indica*	crape myrtle	18	Healthy	Remove
58	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 48	Healthy	Remove

59	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 28	Healthy	Remove
60	*Lagerstroemia indica*	crape myrtle	12	Healthy	Protect in place
61	*Lagerstroemia indica*	crape myrtle	15	Healthy	Protect in place
62	*Sequoia sempervirens*	coast redwood	55	Healthy	Protect in place
63	*Sequoia sempervirens*	coast redwood	50	Healthy	Remain
64	*Sequoia sempervirens*	coast redwood	38	Healthy	Remain
65	*Syagras romanzoffiana*	queen palm	37	Healthy	Remove or relocate
66	*Syagras romanzoffiana*	queen palm	37	Healthy	Remove or relocate
67	*Syagras romanzoffiana*	queen palm	56	Healthy	Remove or relocate
68	*Lagerstroemia indica*	crape myrtle	Multi-stem, cumulative 43	Healthy	Protect in place
69	*Betula nigra*	river birch	Multi-stem, cumulative 64	Healthy	Protect in place
70	*Cedrus atlantica glauca*	blue atlas cedar	58	Healthy	Protect in place
71	*Pinus canariensis*	Canary Island pine	58	Healthy	Remain
72	*Pinus canariensis*	Canary Island pine	62	Healthy	Remain
73	*Pinus canariensis*	Canary Island pine	54	Healthy	Remain
74	*Toyon heteromeles*	toyon	Multi-stem, cumulative ~100	Poor structure, crossing branches	Remain
75	*Ligustrum lucidum*	glossy privet	Multi-stem, cumulative 106	Healthy	Remain
76	*Albizia julibrissum*	mimosa tree	28	Healthy	Remain
77	*Albizia julibrissum*	mimosa tree	27	Healthy	Remain
78	*Aesculus sp.*	horse chestnut	10	Healthy	Remain
79	*Aesculus sp.*	horse chestnut	7	Healthy	Remain

80	*Aesculus sp.*	horse chestnut	7	Healthy	Remain
81	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
82	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
83	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
84	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
85	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
86	*Chamaerops humilis*	Mediterranean fan palm	20	Healthy	Remain
87	*Chamaerops humilis*	Mediterranean fan palm	16	Healthy	Remain
88	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain
89	*Chamaerops humilis*	Mediterranean fan palm	18	Healthy	Remain

Table 2 lists the trees proposed for removal based on the following three size categories: greater than 18-inches, between 12-inches and 18-inches, and less than 12-inches in diameter–based on circumference measured 2-feet above natural grade. Please note:

- Tree #45 will require a Live Tree Removal Application due to its size and per Chapter 13 requirements;
- Tree #67 is ordinance-sized and may also require a Live Tree Removal Application if it is removed. If it is relocated, any additional paperwork would need to be discussed with the City;
- All other trees should be addressed through a Permit Adjustment and discussions with the City.

Figure 2 illustrates the location of the trees proposed to be removed.

TABLE 2 **Trees Proposed for Removal by Size**

Tree Number	Species	Common Name	Circumference in inches measured two feet above natural grade /replacement size	Diameter in inches based on circumference two feet above natural grade	Condition	Status
Trees Proposed for Removal Greater than 18-inches in Diameter						
45	*Cedrus atlantica*	atlas cedar	81	25.8	Healthy	Remove
Trees Proposed for Removal Between 18-inches and 12-inches in Diameter						
42	*Lagerstroemia indica*	crape myrtle	Multi-stem, cumulative 50	15.9	Healthy	Remove
46	*Cedrus atlantica glauca*	blue atlas cedar	43	13.7	Healthy	Remove
58	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 48	15.3	Healthy	Remove
67	*Syagras romanzoffiana*	queen palm	56	17.8	Healthy	Remove or relocate
Trees Proposed for Removal Less than 12-inches in Diameter						
34	*Citrus sp.*	lemon	3	0.9	Healthy	Remove
35	*Citrus sp.*	lemon	3	0.9	Healthy	Remove
37	*Acer palmatum*	Japanese maple	7	2.2	Healthy	Remove
38	*Albizia julibrissin*	mimosa tree	31	9.9	Stressed	Remove
40	*Lagerstroemia indica*	crape myrtle	11	3.5	Healthy	Remove
41	Ornamental, deciduous	unidentified	13	4.1	Stressed	Remove
43	Ornamental, deciduous	unidentified	Multi-stem, cumulative 30	9.5	Healthy	Remove
44	*Lagerstroemia indica*	crape myrtle	Multi-stem, cumulative 32	10.2	Healthy	Remove
54	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 28	8.9	Healthy	Remove
55	*Lagerstroemia indica*	crape myrtle	22	7.0	Healthy	Remove

TABLE 2 **Trees Proposed for Removal by Size (continued)**

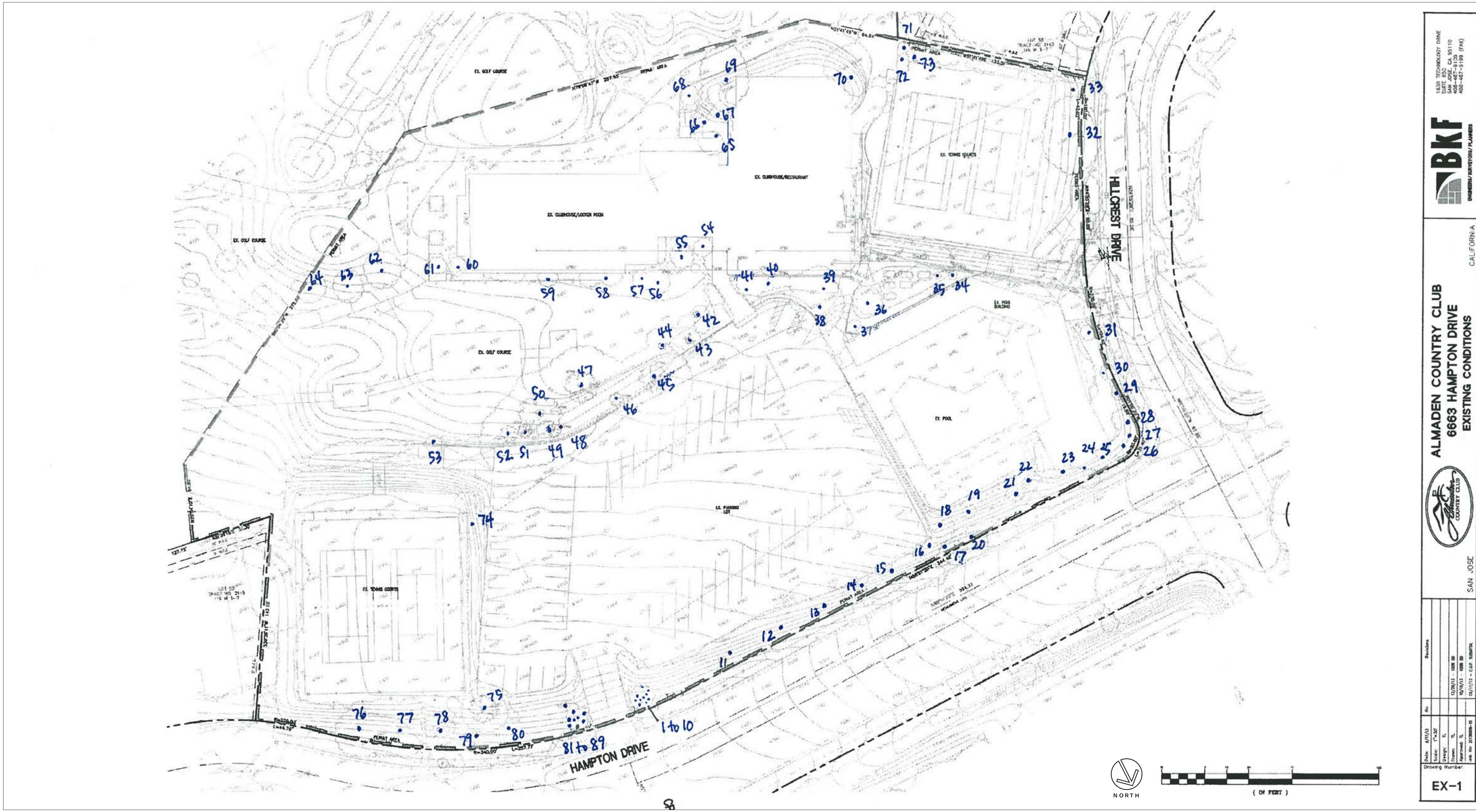
Tree Number	Species	Common Name	Circumference in inches measured two feet above natural grade /replacement size	Diameter in inches based on circumference two feet above natural grade	Condition	Status
	Trees Proposed for Removal Less than 12-inches in Diameter (continued)					
56	*Lagerstroemia indica*	crape myrtle	21	6.7	Healthy	Remove
57	*Lagerstroemia indica*	crape myrtle	18	5.7	Healthy	Remove
59	*Acer palmatum*	Japanese maple	Multi-stem, cumulative 28	8.9	Healthy	Remove
65	*Syagras romanzoffiana*	queen palm	37	11.8	Healthy	Remove or relocate
66	*Syagras romanzoffiana*	queen palm	37	11.8	Healthy	Remove or relocate

Existing trees within the Permit Area, including those proposed to be removed, provide a diversity of species, including:

19 *Chamaerops humilis*
11 *Lagerstroemia indica*
7 *Aesculus sp.*
6 *Quercus sp*.
5 *Olea sp.*
5 *Albizia julibrissin*
4 *Acer palmatum*
4 *Dodonaea viscosa 'Purpurea'*
4 *Syagras romanzoffiana*
3 *Sequoia sempervirens*
3 *Pinus canariensis*
3 *Washingtonia robusta*
2 *Citrus sp.*
2 *Betula nigra*
2 ornamentals, unidentified
2 *Pinus sabiniana*
2 *Cedrus atlantica glauca*
1 *Cedrus atlantica*
1 *Toyon heteromeles*
1 *Ligustrum lucidum*
1 *Liquidambar styraciflua*
1 *Schinus terebinthefolius*

The City's Tree Policy Manual & Recommended Best Management Practices indicates a goal to protect existing trees and increase planting of new trees within the City to add to the urban forest. The City has also listed unsuitable trees which are identified generically as eucalyptus, liquidambar, palm, pine, tree of heaven, and tulip. A one to one replacement for tree removals is suggested; replacement trees should predominately be 15- or 24-gallon trees to allow for faster root establishment and tree growth, and species diversity should be maintained. Final tree selection and location will need to be coordinated with building plan development and construction, with protection provided for existing trees to remain. Final species selection, if it deviates from the following list, should be cross-referenced with California Invasive Plants Council (Cal-IPC) and with the latest Water Use Classifications of Landscape Species (WUCOLS) to verify that selected species are not invasive and have appropriate water usage, respectively. The following is a preliminary list of trees to consider for replacement:

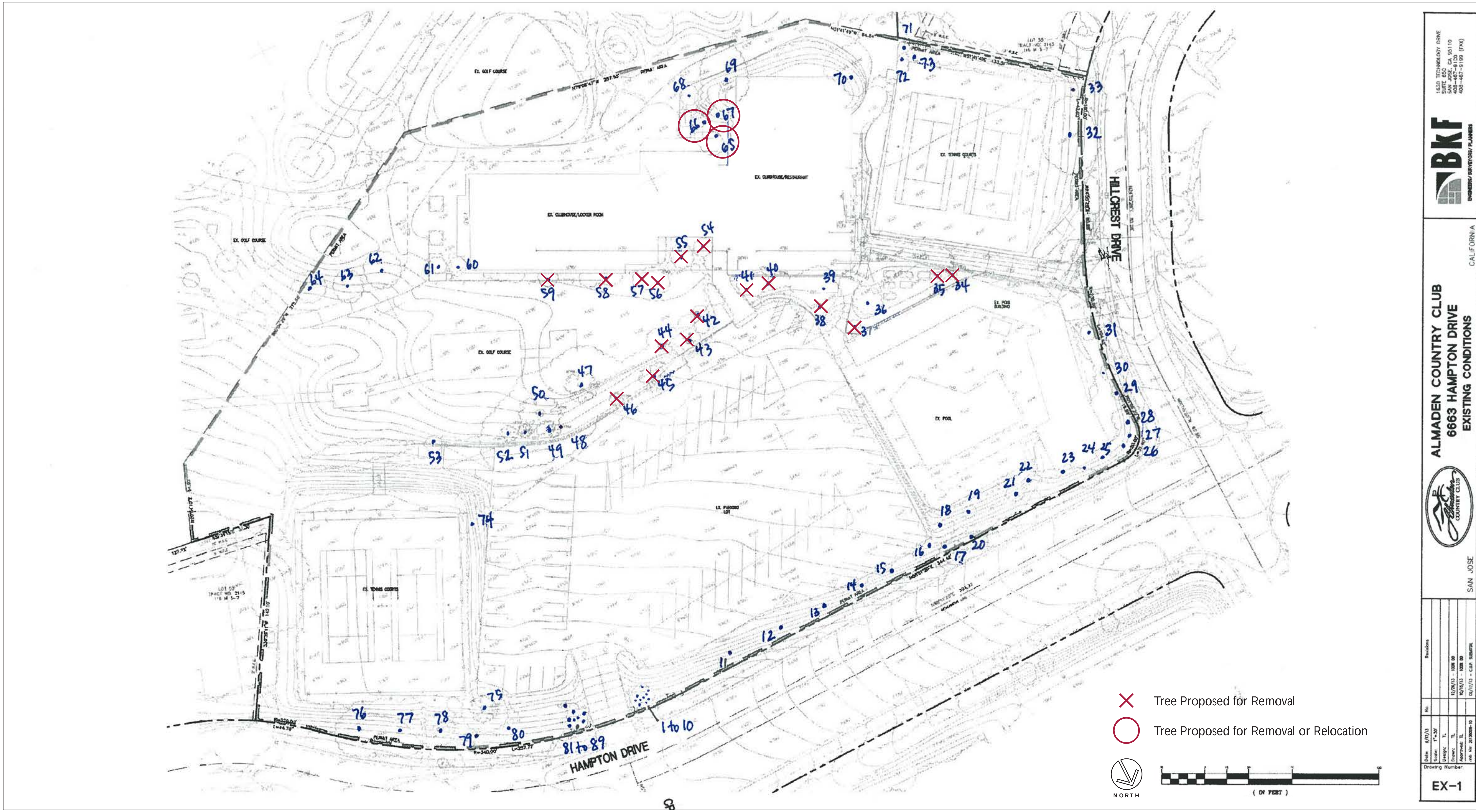
Acer rubrum 'Autumn Flame'	autumn flame maple
Aesculus californica	California buckeye
Betula nigra	river birch
Cercis canadensis	eastern redbud
Cercis occidentalis	western redbud
Geijera parviflora	Australia willow
Ginkgo biloba	maidenhair tree
Platanus racemosa	western sycamore
Populus fremontii	western cottonwood
Quercus agrifolia	coast live oak
Quercus suber	cork oak
Sequoia sempervirens	coast redwood



Source: BKF Engineers/Surveyors/Planners; The Planning Center | DC&E, 2014.

FIGURE 1

TREE LOCATION MAP - 01/07/2014 FIELD RECONNAISSANCE



Source: BKF Engineers/Surveyors/Planners; The Planning Center | DC&E, 2014.

FIGURE 2

PROPOSED TREE REMOVALS

Appendix C

Completed Screening Coverage Form for the Santa Clara Valley Habitat Conservation Plan

The Planning Center | DC&E

February 2014

SANTA CLARA VALLEY
HABITAT AGENCY

City of Gilroy

City of Morgan Hill

City of San José

County of Santa Clara

Santa Clara Valley Water District

Santa Clara Valley Transportation Authority

Santa Clara Valley Habitat Plan COVERAGE SCREENING FORM

Application File Number

CP13-072

(Assigned by jurisdiction)

To determine if a project is eligible for coverage under the Santa Clara Valley Habitat Plan ("Habitat Plan"), complete and submit this form to the planning or building office of the applicable local jurisdiction (County of Santa Clara, City of Gilroy, City of Morgan Hill, or City of San José) as soon as possible in the development process.

*This form is used to evaluate if a private development project located within the Habitat Plan Permit Area is classified as a "covered project" under the Habitat Plan. Certain projects within the Habitat Plan Permit Area may **not** be covered projects under the Habitat Plan due to their location and size. This form is used to determine one of two conclusions and courses of action regarding a proposed project:*

*(1) A project **is not** a covered project under the Habitat Plan. Submit this form to the applicable local jurisdiction. No additional action regarding the Habitat Plan is needed.*[1]

*(2) A project **is** a covered project under the Habitat Plan. Submit this form to the applicable planning or building office along with the Fees and Conditions Worksheet when submitting applications for planning approvals.*

1. **Project Type (subdivision, conditional use permit, etc.)** CUP for reconstruction/renovations
2. **Project Location (address / assessor's parcel number)** 6663 Hampton Drive, San Jose / APN 581-13-25
3. **Project Description (including proposed use)** A Conditional Use Permit to allow renovations, and partial demolition/reconstruction of the 32,954 sf Golf Course Clubhouse and Locker Room on an 89.76 acre parcel. The project would not involve changes to the types of uses on site or the number of club members. No natural areas would be disturbed.
4. **Screening Questions**

   A. Project Location

   On the Private Development Areas map[2] (Figure 2-5 of the Habitat Plan), what area is the project located within? (check the applicable box below)

i. Private Development Covered	☐	*Go to Question C, page 2*
ii. Rural Development Equal or Greater Than 2 Acres Covered	☐	*Go to Question B, page 2*
iii. Rural Development Not Covered	☐	*Go to Conclusion 1, page 3*
iv. Urban Development Equal or Greater Than 2 Acres Covered	☒	*Go to Question B, page 2*

[1] See disclaimer under Conclusion 1 below regarding Endangered Species Act requirements.

[2] The Private Development Areas map can be viewed on the Habitat Agency Geobrowser at http://www.scv-habitatplan.org or GIS maps at each of the planning or building offices (Gilroy, Morgan Hill, San José, Santa Clara County).

B. Size of the Permanently Disturbed Footprint

What is the total size of the project (see box below), in acres? 1.7 acres of soil disturbed; all areas previously disturbed No natural habitats or areas disturbed

If the size of the project is less than 2 acres, go to Conclusion 1, page 3.
If the size of the project is 2 acres or greater, go to Conclusion 2, page 3.

> ***Calculating the Size of the Permanently Disturbed Footprint****: The project size is determined by calculating the total land area that will be permanently affected by the proposed development project.*
>
> *This area includes all new buildings, new impervious surfaces (parking areas, roads, sidewalks, pools, etc.), and other areas that will be permanently affected by the project (lawns or formal landscaping areas, etc.). Refer to Exhibit A for calculating the Permanently Disturbed Footprint.*
>
> *This area shall be shown on plans submitted with this Coverage Screening Form.*
>
> *If necessary, the planning or building office reviewing this Coverage Screening Form may require this area to be calculated by a licensed professional (architect, engineer, surveyor) to verify accuracy.*

C. Additions to Existing Development[3]

i. Is the project site currently developed?

- [X] **YES** *Go to Question ii below*
- [ ] **NO** *Go to Conclusion 2, page 3*

ii. Does the project consist of a building addition and/or a new building within 50 feet of existing buildings where the total new impervious surface will be less than 5,000 square feet?[4]

- [X] **YES** *Provide area below in iii and go to Conclusion 1, page 3*
- [ ] **NO** *Go to Conclusion 2, page 3*

iii. What is the total impervious surface (see box below) that will be added (in square feet)? 4,240 square feet

> ***Calculating Impervious Surface****: New impervious surfaces include all new buildings and paved areas (asphalt and concrete), such as parking areas, driveways, roads, sidewalks and pools.*
>
> *This area shall be shown on the plans submitted with this Coverage Screening Form.*
>
> *If necessary, the planning department reviewing the Coverage Screening Form may require impervious surface area to be calculated by a licensed professional (architect, engineer, surveyor) to verify accuracy.*

[3] A developed site means a site has existing permanent improvements, such as buildings and impervious areas, that were legally established prior to the Operative Date of the Habitat Plan (October 14, 2013). Review of building permits or aerial photos may be required by the planning department for verification.

[4] Building addition and new building area is cumulative effective October 14, 2013.

☒ **CONCLUSION 1** Project **<u>is not</u>** a covered project under the Habitat Plan.

Submit this Coverage Screening Form to the planning or building office with the applicable planning application (such as use permit, subdivision, etc.) for the project. Planning staff will evaluate and confirm the project is not a Covered Project. Verification of the absence of sensitive habitats, which may include photos and aerials of the site, may be required.

Sensitive Habitats: If the proposed project affects any wildlife and/or plant species covered by the Habitat Plan, or any unmapped burrowing owl occupied nesting habitat, serpentine, riparian, stream, pond, or wetland land covers on the property, then coverage under the Habitat Plan is required. Go to Conclusion 2, below.

Projects that are not covered projects under the Habitat Plan must still comply with Federal and State Endangered Species Act requirements. If a project has the potential to take a federally or state-listed plant or wildlife species, the applicant must contact the U.S. Department of Fish and Wildlife and/or the California Department of Fish and Wildlife to determine whether an endangered species permit should be obtained.

☐ **CONCLUSION 2** Project **<u>is</u>** a covered project under the Habitat Plan.

Fill out the Fee and Conditions Worksheet and submit with verified land cover and this Coverage Screening Form to the planning or building office with the planning application (such as use permit, subdivision, etc.).

Property Owner Almaden Country Club - Membership Owned

Property Owner Signature ____________________ Date 2/19/2014

Applicant Robert Sparks, General Manager

Applicant Signature Robert Sparks Date 2/19/2014

Planning/Building Office Contact Information

City of Gilroy	City of Morgan Hill	City of San Jose	County of Santa Clara
7351 Rosanna St.	17575 Peak Ave.	200 E. Santa Clara St., T-3	70 West Hedding St., 7th Floor
Gilroy, CA 95020	Morgan Hill, CA 95037	San Jose, CA 95113	San Jose, CA 95110
Tel: (408) 846-0451	Tel: (408) 778-6480	Tel: (408) 535-3555	Tel: (408) 299-5770
Fax: (408) 846-0429	Fax: (408) 779-7236	Fax: (408) 292-6055	Fax: (408) 288-9798
www.ci.gilroy.ca.us/planning	www.morganhill.ca.gov	www.sanjoseca.gov/planning	www.sccplanning.org

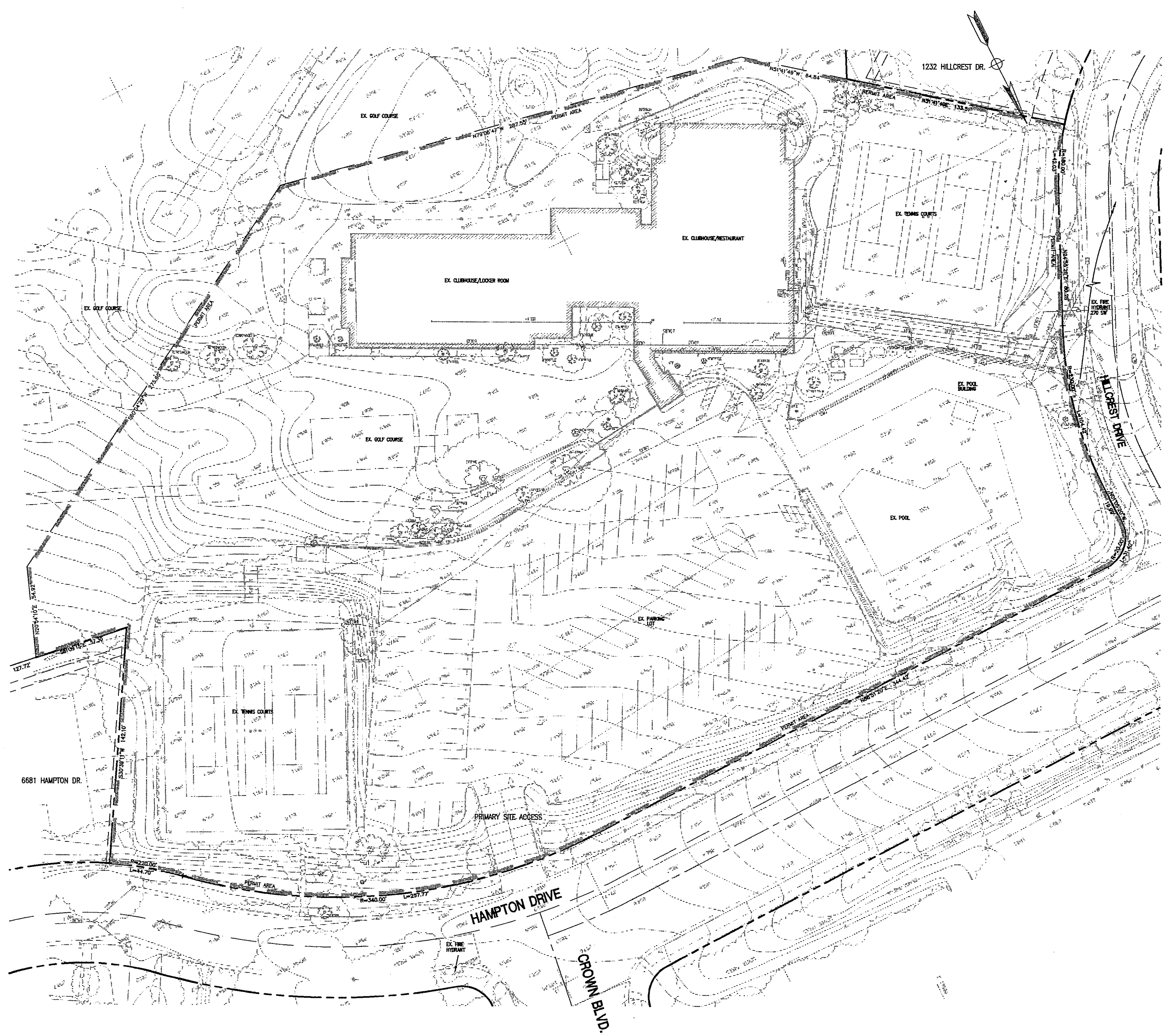
If the project is not a covered project under the Habitat Plan and "opt-in" coverage from the Habitat Plan is desired, complete the Habitat Plan Application Form and submit it to the applicable local jurisdiction's planning or building office with the planning application. Opt-in coverage is not guaranteed and will be authorized by the local jurisdiction in consultation with the Habitat Agency.

For Staff Verification Use Only

Project is Covered ☐ Project is Not Covered ☐ No Sensitive Habitats Located on Project Site ☐ Date ____________

Project Planner ____________ Phone Number ____________ Email ____________

SOURCES FOR THIS FORM: This form incorporates the policies contained within Chapter 2, *Land Use and Covered Activities*, of the Santa Clara Valley Habitat Plan, specifically subsection *Private Development Subject to the Plan*, beginning on Page 2-42.



NOTES:

1. OVERALL SITE:
   APN: 581-13-025
   AREA: 89.76 Ac.
2. PERMIT AREA:
   APN: 581-13-025 (PORTION OF)
   AREA: 5.3 Ac.
3. DISTURBED AREA:
   AREA: 1.71 Ac.
4. 1232 HILLCREST DR. AND 6681 HAMPTON DR. ARE THE ONLY STRUCTURES WITHIN 50 OF THE PERMIT AREA.

PERMIT AREA

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

BKF
ENGINEERS/SURVEYORS/PLANNERS
1650 TECHNOLOGY DRIVE
SUITE 650
SAN JOSE, CA 95110
408-467-9100
408-467-9199 (FAX)

ALMADEN COUNTRY CLUB
6663 HAMPTON DRIVE
EXISTING CONDITIONS

SAN JOSE CALIFORNIA

Date:	9/17/13
Scale:	1"=30'
Design:	TL
Drawn:	TL
Approved:	TL
Job No:	20136009-10

No.	Revisions
	02/10/14 - 65% CD
	01/17/14 - C.U.P. RESUBMITTAL
	09/17/13 - C.U.P. SUBMITTAL

Drawing Number:

EX-1

APPENDIX D

Fault Rupture Hazard Investigation

Silicon Valley Soil Engineering

January, 2014

REPORT TO
ALMADEN GOLF AND COUNTRY CLUB
SAN JOSE, CALIFORNIA

FOR

PROPOSED IMPROVEMENTS AND REMODEL

ALMADEN GOLF AND COUNTRY CLUB

6663 HAMPTON DRIVE
SAN JOSE, CALIFORNIA

GEOLOGIC EVALUATION AND GEOTECHNICAL INVESTIGATION

JULY 2013

PREPARED BY

SILICON VALLEY SOIL ENGINEERING
2391 ZANKER ROAD, SUITE 350
SAN JOSE, CALIFORNIA

SILICON VALLEY SOIL ENGINEERING
GEOTECHNICAL CONSULTANTS

File No. SV1168
July 24, 2013

Almaden Golf and Country Club
6663 Hampton Drive
San Jose, CA 95120

Attention: Mr. Robert Sparks, General Manager

Subject: Proposed Improvements and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California
GEOLOGIC EVALUATION AND GEOTECHNICAL INVESTIGATION

Dear Mr. Sparks:

We are pleased to transmit herein the results of our geologic evaluation and geotechnical investigation for the proposed improvements and remodel. The subject site is the existing Almaden Golf and Country Club located at 6663 Hampton Drive in San Jose, California.

Our findings indicate that the site is suitable for the proposed renovations provided the recommendations contained in this report are carefully followed. Field reconnaissance, drilling, sampling, and laboratory testing of the surface and subsurface material evaluated the suitability of the site. The following report details our investigation, outlines our findings, and presents our conclusions based on those findings.

If you have any questions or require additional information, please feel free to contact our office at your convenience.

Very truly yours,

SILICON VALLEY SOIL ENGINEERING

REGISTERED GEOLOGIST 3536 DAVID F. HOEXTER No. 1158 CERTIFIED ENGINEERING Exp. 11/30/13 GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER VIEN M. VO RCE 32296 Exp. 12/31/14 CIVIL STATE OF CALIFORNIA

Vien Vo, P.E.

David Hoexter
Consulting Engineering Geologist
CEG 1158 Expires 11/30/13

SV1168.GE&GI/Copies: 4 to Almaden Golf and Country Club

TABLE OF CONTENTS

GEOLOGIC EVALUATION AND GEOTECHNICAL INVESTIGATION PAGE

LIST OF TABLE, FIGURES, AND APPENDICES

GEOLOGIC EVALUATION AND GEOTECHNICAL INVESTIGATION

TABLES

FIGURES

APPENDICES

INTRODUCTION

Per your authorization, Silicon Valley Soil Engineering (SVSE) conducted a geologic evaluation and geotechnical investigation (including pavement design) for the improvements and remodel. The purpose of this investigation was to determine the nature of the surface and subsurface soil conditions at the subject site through field investigations and laboratory testing. This report presents an explanation of investigative procedures, results of the testing program, our conclusions, and our recommendations for earthwork and foundation design to adapt the proposed improvements to the existing soil conditions.

SITE LOCATION AND DESCRIPTION

The subject site is located at 6663 Hampton Drive in San Jose, California (Figure 1 - Vicinity Map), southeast of the Hampton Drive and Hillcrest Drive intersection. The project site is an existing country club, improved with a golf course, tennis courts, swimming pool, and clubhouse buildings. The subject site (proposed improved area) is bounded by the golf course, swimming pool and tennis courts, and one existing residence (1232 Hillcrest Drive), with additional residential developments at greater distance surrounding the property. Hampton Drive and residential developments are located to the north and northeast, residential developments to the southeast and southwest, and Hillcrest Drive to the northwest. Based on the available preliminary plans prepared by Marsh and Associates, the improvements will include the construction of a new eastern wing, cart barn, pro shop, snack bar, exterior and new main entry (drop-off and pick-up). The remodel of the existing western wing will include the construction of new fitness, kitchen, and offices. In addition, the remodel of the pool bath house will include pool renovations. Locations of the proposed improvements and our borings are shown on Figure 2 - Site Plan, which also includes relevant geologic observations.

FIELD INVESTIGATION

After considering the nature of the improvements and available data, a field investigation was conducted at the subject site under the direction of our geotechnical engineer. It included a surface site reconnaissance to detect any unusual surface features and the drilling of five exploratory test borings on July 17, 2013 to identify the subsurface soil characteristics. The borings were drilled to depths of 11.5 to 21.5 feet below the existing ground surface (bgs). The borings were drilled with a truck-mounted drill rig using 6-inch diameter solid stem augers and a portable drill rig using a 4-inch diameter solid stem augers. The approximate locations of these borings are shown on Figure 2. In addition, our certified engineering geologist conducted a surface site reconnaissance on July 17, 2013. Our geologist also reviewed geologic and geotechnical engineering reports for an adjacent residence (1232 Hillcrest Drive) identified and made available by the San Jose City Geologist, Michael Shimamoto, as relevant for evaluation of ground surface fault rupture potential.

The soils encountered were logged continuously in the field during the drilling operations. Relatively undisturbed soil samples were obtained by hammering a 2.5-inch outside diameter (O.D.) split-tube sampler into the ground at various depths. A 140-pound hammer for the truck-mounted drill rig and a 70-pound hammer for portable drill rig with a free fall of 30 inches were used to drive the sampler 18 inches into the ground. Blow counts were recorded on each 6-inch increment of the sampled interval. The blows required for advancing the sampler the last 12 inches of the 18 inch sampled interval were recorded on the boring logs as penetration resistance. After the completion of the drilling operation, the exploratory borings were backfilled from the bottom of the borehole to the surface with neat cement.

In addition, disturbed bulk samples of the near-surface soil were collected for laboratory analyses. The Exploratory Boring Log is a graphic representation of the encountered soil profile, and also shows the depths at which the relatively undisturbed soil samples were obtained.

LABORATORY INVESTIGATION

A laboratory-testing program was performed to determine the physical and engineering properties of the soils underlying the site. Moisture content and dry density tests were performed on the relatively undisturbed soil samples in order to determine soil consistency and the moisture variation throughout the explored soil profile (Table I). The strength parameters of the foundation soils were determined from direct shear tests that were performed on selected relatively undisturbed soil samples. Laboratory compaction tests of the native soil material were performed to determine the maximum dry density per the ASTM D1557-91 test procedure. Atterberg Limits tests were also performed on the near-surface soil to assist in the classification of these soils and to obtain an evaluation of their expansion and shrinkage potential. One R-Value test was performed on a near surface soil sample for pavement section design recommendations. The results of the laboratory-testing program are presented in the Table and Figures at the end of this report.

SOIL CONDITIONS

Each of the five borings encountered 4 to 6 inches of either asphalt concrete or organic landscaping soil from the ground surface. Underlying the surface materials was soil consisting primarily of gravelly sandy clay (CL and SC/CL), commonly hard to stiff, and variously present to depths from 3.5 to 8 feet. This soil is likely the alluvium mapped by McLaughlin et al- (1981), identified as Holocene Alluvial Fan Deposits. Bedrock, consisting of highly weathered and granular serpentine, was present in each of the five borings, underlying the clay.

The bedrock corresponds to the nearby bedrock outcrop identified by McLaughlin et al as Jurassic Serpentinized Ultramafic Rocks.

Groundwater was not encountered in all borings to the depths explored. It should be noted that the groundwater level would fluctuate as a result of seasonal changes and hydrogeological variations such as groundwater pumping and/or recharging. A graphic description of the soil profiles encountered is presented in the Exploratory Boring Logs contained in the Appendix.

GEOLOGIC SETTING

The site is located within the central region of the Coast Ranges Geomorphic Province, which extends from the Oregon border south to the Transverse Ranges. The general topography is characterized by sub-parallel, northwest trending mountain ranges and intervening valleys. The region has undergone a complex geologic history of sedimentation, volcanic activity, folding, faulting, uplift and erosion. The site is located in an area of low hills adjacent to the northeastern margin of the Central Santa Cruz Mountains.

Based on Wentworth, Blake, McLaughlin, and Graymer (1999) and McLaughlin, Clark, Brabb, Heley, and Colon, (2001), the site is located near the southern margin of Pleistocene alluvial fan deposits, which overlie the Miocene to Oligocene Temblor Sandstone and older (Jurassic) Serpentinized Ultramafic Rocks. The geology of the site vicinity is shown on Figure 3 - Vicinity Geologic Map (McLaughlin, et al, 2001). Based on the published map, the site is located on the Pleistocene Alluvium underlying much of the vicinity, with an immediately adjacent outcrop of Serpentinized Ultramafic Rocks. In addition, the map indicates a concealed trace of the Shannon Fault immediately south of the club house.

The San Andreas, Hayward, and Calaveras Faults are major faults in the Bay Area. These faults are located approximately 7 miles southwest, and approximately 9 and 11 miles northeast of the site, respectively. Additional fault traces have been mapped in the near site vicinity. The Monte Vista, Shannon, and Berrocal Faults are part of a system of low angle imbricate thrust faulting that dips toward the southwest and is located along the west side of the Santa Clara Valley between Los Gatos and Palo Alto. Collectively the Monte Vista, Shannon, and Berrocal Faults are informally known as the Range Front Thrust Faults.

Although not included within a State of California mandated Special Studies Zone ("Earthquake Fault Zone"), the Range Front Thrust Faults are considered to be potentially active by Santa Clara County (Santa Clara County Planning Department, 2002), by several municipalities, and by various geologic consultants who have worked in the area. Northwest of the site, the Monte Vista Fault has thrust older Santa Clara Formation sediments over younger Older Alluvium. In addition, Holocene-Age (within last 11,000 years) ground surface rupture has been identified (AEG, 2004) on a fault within the Shannon Fault Zone, approximately 4 miles to the northwest.

FAULT RUPTURE POTENTIAL

Reconnaissance

Our certified engineering geologist visited the site on July 17, 2013. The site and accessible surroundings were observed in an attempt to identify indications of faulting or other geologic hazards, if any, and to provide background for subsequent literature and air photo review. No indications of active faulting or damage related to previous seismic events were identified during this site reconnaissance, although the ground surface has been extensively modified by grading and construction of the club house and related structures, golf course, and surrounding residential subdivisions. There were no indications of landslides or other conditions of potential geologic hazards. Overall slopes are low.

Pertinent Published Maps and Investigations

The site is not located within a State of California Earthquake Fault Zone, an area where the potential for fault rupture is considered probable (CDMG, 2003). The closest definitively active fault is the San Andreas fault, which is located approximately 6.8 miles southwest of the site. The site is located within both City of San Jose and Santa Clara County zones of potential fault hazard (City) or rupture hazard (County) (Cooper-Clark Associates, 1974, City of San Hose (1983), and Santa Clara County Planning Department, 2012).

The site is located within a fault rupture hazard zone along the potentially active Berrocal/Monte Vista/Shannon fault system. The Shannon fault in the site vicinity projects east-west in a zone which encompasses the site. The County (which does not have jurisdiction at this site) "may require site specific geologic reports" within the zone; the maps do not specifically indicate identified fault traces. Cooper-Clarke (1974) classify the Shannon fault as potentially active.

Hydro-Geo Consultants (2004) excavated trenches at an adjacent property, 1232 Hillcrest Drive (immediately southwest of the tennis courts and, approximately 70 feet distant from the existing club house). The approximate trench locations are shown on Figure 2. The trenches totaled 145 feet and were sub-perpendicular to and south of the concealed fault, as located by McLaughlin et al (2001). The trenches encountered soil underlain by highly sheared, weathered and fractured serpentine on the south, and gravelly clay interpreted as alluvium overlying the soil, serpentine, and a sliver of sandstone on the north (our soil borings encountered similar materials). There was no gouge, offsets, high groundwater or other indications of faulting.

Air Photo and Topographic Map Interpretation

Six sets of stereo pair aerial photographs, taken from 1948 through 1989, were interpreted to supplement our engineering geologic observations on and near the site. These photographs, printed at scales from 1:12,000 through 1:31,360, are listed in the References section at the back of this report.

Imagery pre-dating ground surface modification in the vicinity of the site was not available. The earliest available imagery (1948) pre-dates development of the site as a country club with nearby residential development, but post-dates widespread agricultural development (primarily grazing) at the site and surrounding area. Thus, tonal and topographic features may have been modified, although not destroyed, by 1948. Imagery following 1948 demonstrates the increasing urbanization of the site vicinity, ultimately with total loss of utility of aerial photographs for geologic interpretation.

Various tonal lineations are evident on the 1948 imagery within the areas identified as having a potential for ground surface rupture within the Shannon Fault Zone. These lineations are parallel and subparallel to the fault zone. None projects through or towards the subject site, which is located on a topographic high. Drainages cross the general area, but do not appear in the immediate site vicinity to follow or be influenced by the tonal lineations, and thus appear not to be influenced by faulting. There are no prominent topographic features suggestive of faulting in the immediate site vicinity.

Discussion

The Berrocal/Monte Vista/Shannon fault system includes low angle imbricate structural thrust faults, which generally dip toward the south and southwest and follow the northeastern margin of the Santa Cruz Mountains along the southwestern edge of the Santa Clara Valley. The closest mapped fault trace within this fault system is located immediately south of the clubhouse buildings, as shown on Figure 3 (which is derived from McLaughlin et al, 2001).

The basis for the fault's location as shown by McLaughlin et al is unclear, and the location is clearly approximate. Some fault traces within the Berrocal/Monte Vista/Shannon fault system are believed by some geologists and seismologists to have experienced sympathetic movement during the 1989 Loma Prieta Earthquake. Schmidt et al (1995) documents numerous locations of pavement and pipeline breaks associated with the 1989 Loma Prieta Earthquake. The breaks are concentrated in the general vicinity of the Berrocal/Monte Vista/Shannon fault system northwest of the site, and consist of three compressional breaks in concrete, one break of unspecified deformation, and one additional coseismic underground water line break in the near site vicinity, although none of the breaks are within or adjacent to the site. There is no trend to the breaks in the site vicinity.

The nearby trenching by Hydro-Geo Consultants (2004) located at 1232 Hillcrest Drive shadows the subject site, although it does not provide full coverage. The trenching exposed the same apparent bedrock formation ("Jos", serpentinized ultramafic rocks) and overlying alluvium as was observed in all 5 of the on-site exploratory borings. If a trace of the Shannon Fault were located as shown on McLaughlin et al, it would juxtapose the "Jos" unit against itself. This relationship does not appear to be present elsewhere in the vicinity, where "Jos" is either in depositional or fault contact with other formations, but not with itself.

As discussed in the Aerial Photographic Interpretation, there are various tonal lineations suggestive of faulting in the vicinity. However, there are no lineations (or other indications of faulting) within or projecting towards the subject site.

The site is not located in a State of California Earthquake Fault Zone, although it is within fault rupture hazard zones established by both the City of San Jose and Santa Clara County. Available information, particularly regional geologic mapping, air photo interpretation, and plotting of ground surface damage apparently coincident with the 1989 Loma Prieta Earthquake, suggest that the Shannon Fault is located in the general vicinity of the site. The nearby trenching at 1232 Hillcrest Drive, although not providing complete coverage of the proposed site improvements, does reduce the likelihood of faulting underlying the site. Additional subsurface investigation, particularly trenching, has the potential to identify or to disprove the presence of fault traces across the site. It is not possible with the available information to definitively prove or disprove the presence of a potentially active fault capable of producing ground surface rupture or disturbance at the subject site. However, based on the findings from our study, it is our opinion that there is no conclusive evidence of faulting at the site. Therefore, in our opinion, the risk of ground surface rupture on or near the subject site is remote although it cannot be eliminated entirely. Additional geologic hazards, such as landslides, were not observed.

LIQUEFACTION ANALYSIS

Liquefaction is the transformation of loose saturated silts and sands with less than 15% clay-sized particles from a solid state to semi-liquid state. This occurs under vibratory conditions such as those induced by a seismic event. To help evaluate liquefaction potential, samples of potentially liquefiable soil were obtained by hammering the split tube sampler into the ground. The number of blows required for driving the sampler the last 12 inches of the 18 inch sampled interval were recorded on the log of test boring.

The results from our exploratory borings show that in Boring B-4, from the surface soil layer to the depth of 21.5 feet consist of hard gravelly sandy clay to hard serpentine bedrock. Due to drilling refusal, we were unable to penetrate to greater depth, but based on the elevated blow counts, it is unlikely that relatively loose sediments, which would be susceptible to liquefaction, are present at greater depth. Therefore, in our opinion there is a low potential for liquefaction to occur at the site.

INUNDATION POTENTIAL

The subject site is located at 6663 Hampton Drive in San Jose, California. According to the Limerinos and others, 1973 report, the site is not located in an area that has potential for inundation as the result of a 100-year flood.

CONCLUSIONS

1. The site covered by this investigation is suitable for the proposed improvements and remodel provided the recommendations set forth in this report are carefully followed.

2. Based on the laboratory testing results, the native surface soil at the project site has been found to have a low expansion potential when subjected to fluctuations in moisture.

3. We recommend the ground surface adjacent to the building be graded to promote proper drainage and diversion of water away from the building structure.

4. We recommended a reference to our report should be stated in the grading and foundation plans (this includes the Geotechnical Investigation File No. and dates).

5. On the basis of the engineering reconnaissance and exploratory borings, it is our opinion that trenches excavated to depths less than 5 feet below the existing ground surface will not need shoring. However, for trenches greater than 5 feet in depth, shoring will be required.

6. Specific recommendations are presented in the remainder of this report.

7. All earthwork and grading shall be observed and inspected by a representative from Silicon Valley Soil Engineering (SVSE). These operations are not limited to testing and inspection during grading.

RECOMMENDATIONS

GRADING

1. The placement of fill and control of any grading operations at the site should be performed in accordance with the recommendations of this report. These recommendations set forth the minimum standards to satisfy other requirements of this report.

2. All existing surface and subsurface structures, if any that will not be incorporated in the final improvements shall be removed from the project site prior to any grading operations. These objects should be accurately located on the grading plans to assist the field engineer in establishing proper control over their removal.

3. The depressions left by the removal of subsurface structures should be cleaned of all debris, backfilled and compacted with clean, native soil. This backfill must be engineered fill and should be conducted under the supervision of our geotechnical engineer.

4. All organic surface material and debris, including grass, shall be stripped prior to any other grading operations, and transported away from all areas that are to receive structures or structural fills. These organically contaminated soils may be stockpiled for later use in the landscaping area only.

5. After removing all the subsurface structures, if any, and after stripping the organically contaminated surface soil, the building pad area addition should be scarified by machine to a depth of 12 inches and thoroughly cleaned of vegetation and other deleterious matter.

6. After removing, stripping, scarifying and cleaning operations, native soil should be re-compacted to not less than 90% relative maximum density

using the ASTM D1557-12 test procedure over the entire building pad and 5 feet beyond.

7. All engineered fill or imported soil should be placed in uniform horizontal lifts of not more than 6 to 8 inches in un-compacted thickness, and compacted to not less than 90% relative maximum density using the ASTM D1557-12 test procedure. The top 12 inches of the pavement subgrade should compacted to not less than 95% relative maximum density. The baserock material should be compacted to not less than 95% as well. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either; 1) aerating the material if it is too wet, or 2) spraying the material with water if it is too dry. Each lift shall be thoroughly mixed before compaction to assure a uniform distribution of water content.

8. When fill material includes rocks, nesting of rocks will not be allowed and all voids must be carefully filled by proper compaction. Rocks larger than 4 inches in diameter should not be used for the final 2 feet of the building pad.

9. A representative from our office should be notified at least two days prior to commencement of any grading operations so that he/she may coordinate the work in the field with the contractor. All imported borrow must be approved by the geotechnical engineer before being brought to the site. Import soil must have a plasticity index no greater than 12 and an R-Value greater than 25.

10. All grading work shall be observed and approved by a geotechnical engineer from SVSE. The geotechnical engineer shall prepare a final report upon completion of the grading operations.

WATER WELLS

11. Any water wells and/or monitoring wells on the site which are to be abandoned, shall be capped according to the requirements of the Santa Valley Water District. The final elevation of the top of the well casing must be a minimum of 3 feet below the adjacent grade prior to any grading operation.

FOUNDATION DESIGN CRITERIA (ABOVE GRADE)

12. We recommend the proposed improvements and remodel be supported on continuous perimeter foundation and isolated interior spread footings. Recommendations are presented in the following paragraphs.

13. When continuous perimeter and isolated interior spread footings are used for the proposed addition, they must be founded at a minimum depth of 24 inches below rough soil pad. Under these conditions, the recommended allowable bearing capacity is 2,800 p.s.f. for both continuous perimeter and isolated and interior spread footings. The excavated footing bottoms should be compacted with jumping jack or vibratory plate prior to rebar placement. The sliding coefficient of the spread footings and site wall spread footings is 0.30. This coefficient is for service level design.

14. Due to the compression characteristic of the near-surface soil, very minor settlements are anticipated for the proposed improvements. We estimated the total settlements of soil due to building live and dead loads are less than 1/4 of an inch.

15. The above bearing values are for dead plus live loads, and may be increased by one-third for short term seismic and wind loads. The design

of the structures and the foundations shall meet local building code requirements.

16. The project structural engineer responsible for the foundation design shall determine the final design of the foundations and reinforcing required. We recommend that the foundation plans be reviewed by our office prior to submitting to the appropriate local agency and/or to construction.

FOUNDATION DESIGN CRITERIA (BELOW GRADE)

17. We recommend the proposed lower level wing structure be supported on either a) mat foundation or b) continuous perimeter foundation and isolated interior spread footings. Recommendations are presented in the following paragraphs.

18. The mat foundation should have a minimum thickness of 24 inches. For these conditions, the recommended allowable contact pressure is 5,000 p.s.f. The modulus of subgrade reaction can be taken as 200 p.c.i. in the design of the mat foundation.

19. When continuous perimeter and isolated interior spread footings are used, they must be founded at a minimum depth of 24 inches below pad subgrade elevation. Under these conditions, the recommended allowable bearing capacity is 5,000 p.s.f. for both continuous perimeter and isolated and interior spread footings. The excavated footing bottoms should be compacted with jumping jack or vibratory plate prior to rebar placement.

20. The above bearing values are for dead plus live loads, and may be increased by one-third for short term seismic and wind loads. The design of the structure and the foundations shall meet local building code requirements.

21. The project structural engineer responsible for the foundation design shall determine the final design of the foundations and reinforcing required. We

recommend that the foundation plans be reviewed by our office prior to submitting to the appropriate local agency and/or to construction.

2010 CBC SEISMIC VALUES

22. Site Latitude: 37.214028 degrees North
    Site Longitude: 121.866561 degrees West
    Site Class: C (Table 1613.5.2 CBC 2010)

    Mapped Spectra Acceleration for short periods S_S = 1.971g*
    Mapped Spectra Acceleration for 1-second period S_1 = 0.829g*
    Designed Spectra Acceleration for short periods S_{DS} = 1.314g*
    Designed Spectra Acceleration for 1-second period S_{D1} = 0.718g*

    (* USGS Seismic Hazard Curves and Uniform Hazard Response Spectra for 2010 CBC analysis)

    Site Coefficient F_a = 1.0 (Table 1613.5.3(1) CBC 2010)
    Site Coefficient F_V = 1.3 (Table 1613.5.3(2) CBC 2010)

    Maximum considered earthquake spectral response accelerations for short period S_{MS} = 1.971g ($S_{MS} = F_a S_S$ - Equation 16-37 CBC 2010)

    Maximum considered earthquake spectral response accelerations for 1-second period S_{M1} = 1.078g ($S_{M1} = F_V S_1$ - Equation 16-38 CBC 2010)

CONCRETE SLAB-ON-GRADE CONSTRUCTION

23. We recommend the concrete slab should have a minimum thickness of 6 inches and reinforced with No. 4 rebar with maximum spacing of 18 inches on-center both ways.

24. A minimum of 5 inches of Class II Baserock or ¾ inch crushed rock (crushed asphalt concrete is not acceptable) and 20 mil vapor barrier membrane shall be used between the finished grade and the concrete slab. The baserock should be compacted to not less than 95% relative maximum density and 90% for the subgrade according to ASTM D1557-

12. The moisture barrier should be taped at the seams and/or mastic sealed at the protrusions.

25. Use of a moisture barrier membrane under the concrete slab is required if a floor covering would be applied. The membrane should be placed between the rock and the concrete slab. If the slab would not receive a floor covering, the moisture barrier membrane can be eliminated.

26. Prior to placing the moisture membrane and/or pouring concrete, the slab subgrade/rock shall be moistened with water to reduce the swell potential, if deemed necessary, by the field engineer at the time of construction.

OPEN EXCAVATION

27. No difficulties due to soil conditions are anticipated in excavating the on-site material. Conventional earth moving equipment will be adequate for this project.

28. Any vertical cuts deeper than 5 feet must be properly shored. The minimum cut slope for excavation to the desired elevation is one horizontal to one vertical. The cut slope should be increased to 2:1 if the excavation is conducted during the rainy season or when the soil is highly saturated with water.

LOWER LEVEL WING EXCAVATION

29. It is our understanding that the excavation for the lower eastern wing structure will be approximately 8 to 9 feet below the existing ground elevation. No difficulties due to soil conditions are anticipated in excavating the on-site material. Conventional earth moving equipment will be adequate for this project.

30. Any vertical cuts deeper than 5 feet must be properly shored. The temporary minimum cut slope for excavation to the desired elevation is one horizontal to one vertical (1:1). The cut slope should be increased to 2:1 if the excavation is conducted during the rainy season or when the soil is highly saturated with water.

31. The bottom subgrade of the lower level structure will be approximately 8 to 9 feet below ground surface elevation. The groundwater table at the time of our investigation was not encountered during the drilling operation. Based on the State guidelines and CGS Seismic Hazard Zone Report 097 [*Seismic Hazard Evaluation of the Santa Teresa Hills 7.5-Minute Quadrangle, Santa Clara County, California*. 2003 (revised 10/10/2005). Department Of Conservation. Division of Mines and Geology], the highest expected groundwater level were not recorded and noted. Therefore, the dewatering is not required during lower level excavation. However, our office should be notified for dewatering recommendations, if groundwater is to be encountered during the lower level wing excavation.

32. If there are space constraints for open excavation, we recommend the following procedure be implemented for shoring of the lower level wing structure excavation.

SHORING SUPPORT FOR THE LOWER LEVEL WING EXCAVATION

33. The lower level wing will be excavated to the approximate depth of 8 to 9 feet below existing ground surface. Therefore, we recommended the excavation be supported with steel "H" beams and a 4 x 12 wood lagging. Prior to any excavation, the steel "H" beams should be placed in pre-drilled minimum 24-inch diameter holes to a minimum depth of 18 feet. The holes should be filled with concrete to one foot below the bottom of the excavation. At this point, excavation can begin. As the excavation

operation proceeds, the 4 x 12 wood lagging should be placed between the steel "H" beams. The "H" beams should be placed a maximum distance of 8 feet apart. There should be no voids between the soil wall excavation and wood lagging. However, if a void occurs, the void should be filled with sand slurry or pressure grouted especially at the area below each lagging bench (last lagging board). Proper attention should be considered during the construction. Introduction of any heavy equipment on the top of the vertical cut may damage the excavated slope. The lateral soil pressure acting on the shoring system is shown in Figure 8. The passive pressure of 300 pounds equivalent fluid pressure can be used for short-term shoring purposes. The shoring should be designed by the structural engineer or shoring design engineer and our office should review the shoring plan for approval.

RETAINING WALLS

34. Any facilities that will retain a soil mass above grade walls shall be designed for a lateral earth pressure (at rest) equivalent to 50 pounds equivalent fluid pressure a lateral earth pressure (active) equivalent to 45 pounds equivalent fluid pressure, plus surcharge loads. If the retaining walls are restrained from free movement at both ends, they shall be designed for the earth pressure resulting from 55 pounds equivalent fluid pressure, to which shall be added surcharge loads.

35. In designing for allowable resistive lateral earth pressure (passive), a value of 250 pounds equivalent fluid pressure may be used with the resultant acting at the third point. The top foot of native soil shall be neglected for computation of passive resistance.

36. A friction coefficient of 0.3 shall be used for retaining wall design. This value may be increased by 1/3 for short-term seismic loads.

37. The above values assume a drained condition, and a moisture content compatible with those encountered during our investigation.

38. Drainage should be provided behind the retaining wall. The drainage system should consist of perforated pipe placed at the base of the retaining wall and surrounded by ¾ inch drain rock wrapped in a filter fabric. The drain rock wrapped in fabric should be at least 12 inches wide and extend from the base of the wall to within 1.5 feet of the ground surface. The upper 1.5 feet of backfill should consist of compacted native soil. The retaining wall drainage system should be sloped to outfall to a discharge facility.

39. As an alternative to the drain rock and fabric. Miradrain 2000 or approved equivalent may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to the ground surface. A perforated pipe (subdrain system) should be placed at the base of the wall in direct contact with the Miradrain 2000. The pipe should be sloped to outfall to an appropriate discharge facility. Retaining walls associated with the building structure should be waterproofed.

40. We recommend a thorough review by our office of all designs pertaining to facilities retaining a soil mass.

LOWER LEVEL RETAINING WALLS

41. The lower level retaining wall shall be designed for active lateral earth pressure (static & seismic) as shown in Figure 7. These values assume a drained condition and a moisture content compatible with those encountered during our investigation.

42. A friction coefficient of 0.3 shall be used for retaining wall design. This value may be increased by 1/3 for short-term seismic loads.

43. The lower level walls should be waterproofed with "Paraseal LG" or equivalent.

44. If there are constraints with the installation of the subdrain system, AquaDrain 100BD or equivalent can be used in conjunction with standard drain mat and side-outlet discharge pipes at the base of the wall. The discharge pipes should be sloped to a discharge facility.

45. We recommend a thorough review by our office of all designs pertaining to facilities retaining a soil mass.

DRAINAGE

46. It is considered essential that positive drainage be provided during construction and be maintained throughout the life of the proposed improvements and existing structure.

47. The final exterior grade adjacent to the structure should be such that the surface drainage will flow away from the structures. Rainwater discharge at downspouts should be directed onto pavement sections, splash blocks, or other acceptable facilities, which will prevent water from collecting in the soil adjacent to the foundations.

48. Utility lines that cross under or through perimeter footings should be completely sealed to prevent moisture intrusion into the areas under the slab and/or footings. The utility trench backfill should be of impervious material and this material should be placed at least 4 feet on either side of the exterior footings.

49. Consideration should be given to collection and diversion of roof runoff and the elimination of planted areas or other surfaces that could retain water in areas adjoining the building. In unpaved areas, it is recommended that protective slopes be stabilized adjoining perimeter

building walls. These slopes should be extended to a minimum of 5 feet horizontally from building walls. They must have a minimum outfall of 2 percent.

50. Based on laboratory test results of the near surface soil at the subject site, we estimated that the percolation rate is approximately 2 inch per hour. This rate can be used in the design of the retention system for on-site storm drainage.

ON-SITE UTILITY TRENCHING

51. All on-site utility trenches must be backfilled with native on-site material or import fill and compacted to at least 90% relative maximum density in accordance with ASTM D1557-91. Backfill should be placed in 6 to 8 inch lifts and compacted. Jetting of trench backfill is not recommended. An engineer from our firm should be notified at least 48 hours before the start of any utility trench backfilling operations.

52. The utility trenches running parallel to the building foundation should not be located within the building foundation influence zone.

53. If utility trench excavation is to encounter groundwater, our office should be notified for dewatering recommendations.

54. Abandoned utility pipes discovered or exposed should be capped with concrete and removed from new eastern wing pad area.

CORROSIVITY ANALYSIS

55. One soil sample collected on August 17, 2013 at the depth of 5 feet below existing grade were submitted to Cooper Testing Lab. The sample was tested for Sulfate.

- The sulfate ion concentration is 14 mg/kg and is less than 100 mg/kg. Therefore, the sulfate ion concentration in the soil is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at the site.

- The type of cement for construction: Evaluation of soluble sulfate content of soil samples considered representative of the predominate material types on-site suggests that Type I cement can be used in construction.

PAVEMENT DESIGN

56. Due to the uniformity of the near-surface soil at the site, one R-Value Test was performed on a representative bulk sample. The result of the R-Value test is enclosed in this report. The following alternate sections are based on our laboratory resistance R-Value test of near-surface soil samples and traffic indices (T.I.) of 4.5 for parking stalls and 5.5 for driveway. Alternate pavement section designs, which satisfy the State of California Standard Design Criteria, and above traffic indices, are presented in Table II. Rigid pavement sections are presented in Table III. Permeable paver section is presented in Table IV.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations presented herein are based on the soil conditions revealed by our test borings and evaluated for the proposed construction planned at the present time. If any unusual soil conditions are encountered during the construction, or if the proposed construction will differ from that planned at the present time, Silicon Valley Soil Engineering (SVSE) should be notified for supplemental recommendations.

2. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the necessary steps are taken to see that the contractor carries out the recommendations of this report in the field.

3. The findings of this report are valid, as of the present time. However, the passing of time will change the conditions of the existing property due to natural processes, works of man, from legislation or the broadening of knowledge. Therefore, this report is subjected to review and should not be relied upon after a period of three years.

4. The conclusions and recommendations presented in this report are professional opinions derived from current standards of geotechnical practice and no warranty is intended, expressed, or implied, is made or should be inferred.

5. The area of the borings is very small compared to the site area. As a result, buried structures such as septic tanks, storage tanks, abandoned utilities, or etc. may not be revealed in the borings during our field investigation. Therefore, if buried structures are encountered during grading or construction, our office should be notified immediately for proper disposal recommendations.

6. Standard maintenance should be expected after the initial construction has been completed. Should ownership of this property change hands, the prospective owner should be informed of this report and recommendations so as not to change the grading or block drainage facilities of this subject site.

7. This report has been prepared solely for the purpose of geotechnical investigation and does not include investigations for toxic contamination studies of soil or groundwater of any type. If there are any environmental concerns, our firm can provide additional studies.

8. Any work related to grading and/or foundation operations during construction performed without direct observation from SVSE personnel will invalidate the recommendations of this report and, furthermore, if we are not retained for observation services during construction, SVSE will cease to be the Geotechnical Engineer of Record for this subject site.

REFERENCES

Aerial Photographs

United States Geologic Survey Library, Menlo Park, California (USGS); WAC Corporation, Eugene, Oregon (WAC); and Pacific Aerial Surveys, Oakland, California (PAS), California : black and white vertical stereo pairs, except as noted.

Source	Imagery	Date	Scale
USGS (?)	CDF5-3-71/72	5/14/48	1:10,000*
USGS	16G-175/176	4/1/50	1:20,000
USGS	CIV-6DD-68/69	9/28/63	1:20,000
USGS	SCL-12-216/217	5/17/65	1:12,000
USGS	GS-VEZR-3-40/41/42	2/24/81	1:24,000
WAC	89CA-36/46/47	6/16/89	1:31,680

* originally flown 1:20,000, enlarged to 1:10,000

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Wentworth, C. M, Blake, M.C. Jr, McLaughlin, R.J, and Graymer, R.W, 1999, Preliminary Geologic Map of the San Jose 30 X 60 Minute Quadrangle, California, USGS Open-File Report 98-795, Scale 1:100,000.

2010 (CBC) California Building Code, Title 24, Part 2.

TABLES

TABLE I

SUMMARY OF MOISTURE/DENSITY & DIRECT SHEAR TEST

Sample No.	Depth Ft.	In-Place Conditions: Moisture Content % Dry Wt.	In-Place Conditions: Dry Density p.c.f.	Direct Shear Testing: Unit Cohesion k.s.f.	Direct Shear Testing: Angle of Internal Friction Degrees	Plasticity Index	Liquid Limit
1-1	3	13.0	103.4				
1-2	5	8.1	127.7				
1-3	10	7.6	128.0				
3-1	3	12.4	101.5				
3-2	5	15.9	109.4				
3-3	10	8.2	127.0				
4-1	3	16.1	105.0	1.0	20		
4-2	5	9.9	128.7				
4-3	10	9.0	127.6				
4-4	15	7.3	129.2				
4-5	20	6.6	128.5				
5-1	3	14.3	124.5				
5-2	5	8.7	126.8				
5-3	10	8.9	128.4				
5-4	15	6.5	127.9				
5-5	20	5.5	128.3				

TABLE II

PROPOSED ALTERNATE PAVEMENT SECTIONS

Location: Proposed Improvements and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California

	PARKING STALLS			DRIVEWAY		
Design R-Value	24.0			24.0		
Traffic Index	4.5			5.5		
Gravel Equivalent	14.0			16.0		
Recommended Alternate Pavement Sections:	1A	1B	1C	2A	2B	2C
Asphalt Concrete	3.0"	3.5"	4.0"	3.0"	3.5"	4.0"
Class II Baserock (R=78 min.) compacted to at least 95% relative maximum density	6.0"	5.0"	4.0"	9.0"	8.0"	7.0"
Native soil compacted to at least 95% relative maximum density	12.0"	12.0"	12.0"	12.0"	12.0"	12.0"

TABLE III

PROPOSED RIGID PAVEMENT SECTIONS

Location: Proposed Improvements and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California

	DRIVEWAY*	SIDEWALK
Recommended Rigid Pavement Sections:		
P.C. Concrete*	6.0"	4.0"
Class II Baserock (R=78 min.) compacted to at least 95% relative maximum density	6.0"	4.0"
Native soil compacted to at least 95% relative maximum density	12.0"	12.0"

* Including trash enclosures, valley gutters, and curb & gutters. Reinforcement provided by Structural Engineer. Maximum control joints at 10' x 10'.

TABLE IV

PROPOSED PERMEABLE PAVER SECTION

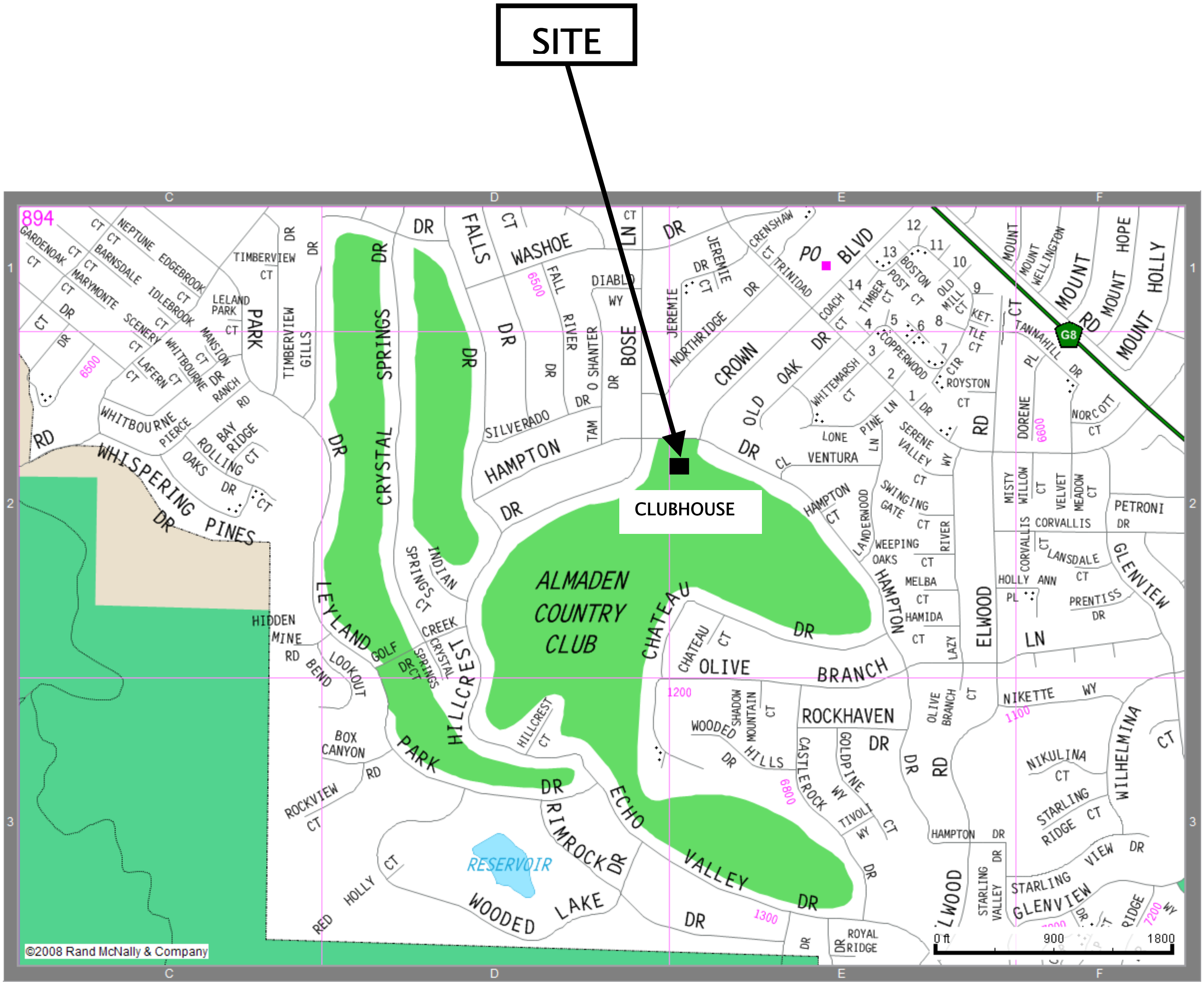
Location: Proposed Improvements and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California

Recommended Permeable Paver Sections:	DRIVEWAY*	
Permeable Paver (Vehicular Rated)	Min. 3.25" ±	
ASTM No. 8 Bedding Course & Paver Filler	2.0"	
3/4" Clean Crushed Rock or ASTM No. 57 Drain Stone compacted	8.0"	FIRE TRUCK ACCESS 12.0"
Native soil scarified & compacted to at least 95% relative maximum density	12.0"	

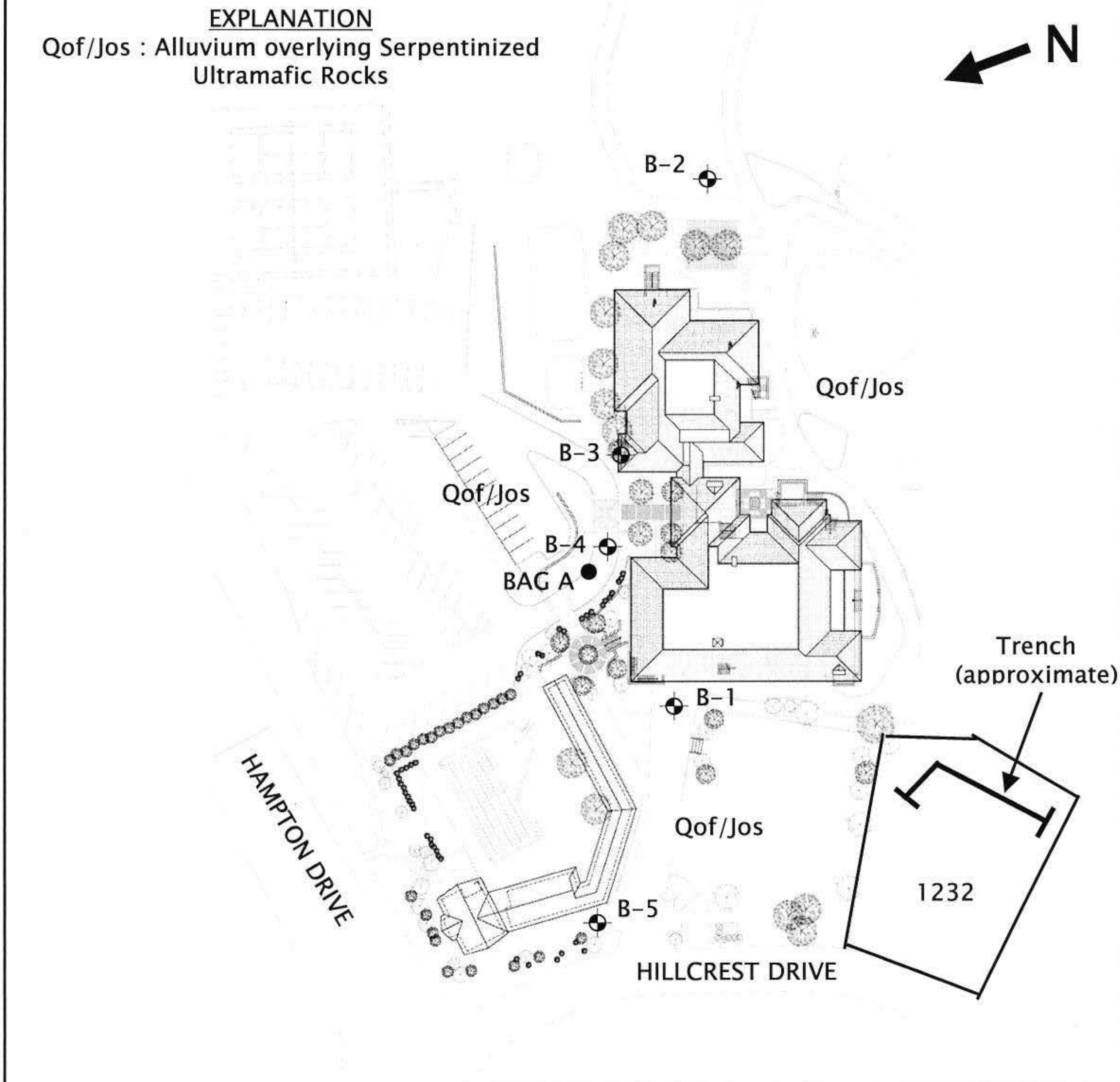
* The subgrade should be lined with a geotextile membrane Mirafi 500X or equivalent. The liner should be place and overlapped properly for drainage. The subgrade should be sloped at a minimum of 2% towards the subdrain system.

The subdrain system should consist of a 4-inch diameter perforated pipe surrounded by ¾ inch drain rock wrapped in a filter fabric. The drain rock wrapped in fabric should be at least 12 inches wide and 12 inches below the finished subgrade elevation. The drainage system should be sloped to outfall to a discharge facility.

FIGURES

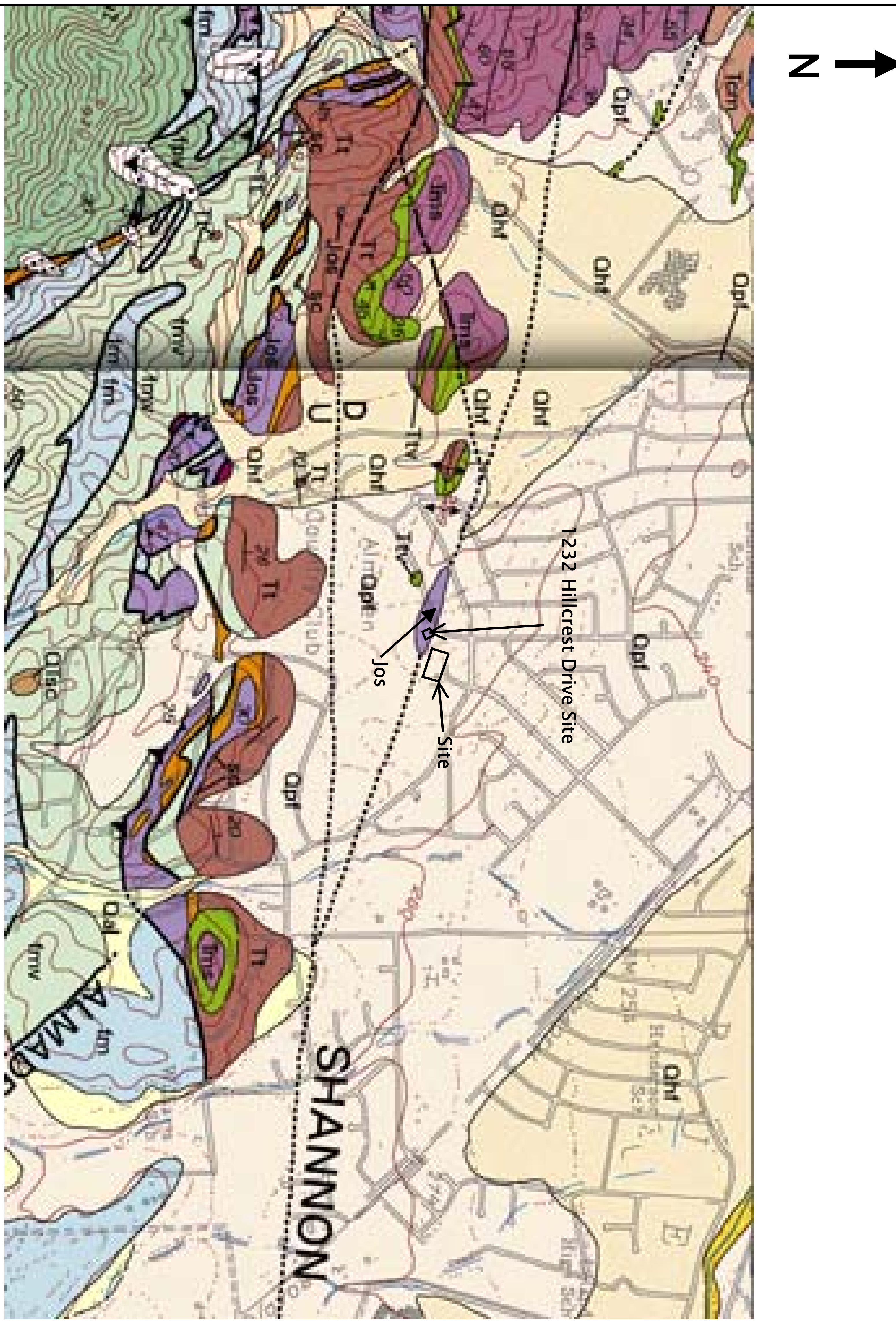


Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**VICINITY MAP** Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168	FIGURE
		Drawn by: V.V.	1
		Scale: NOT TO SCALE	July 2013



NOTE: ⊕ DENOTES APPROXIMATE EXPLORATORY BORING LOCATION
● DENOTES APPROXIMATE EXPLORATORY BAG SAMPLE LOCATION

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**SITE PLAN & GEOLOGIC MAP** Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 2 July 2013



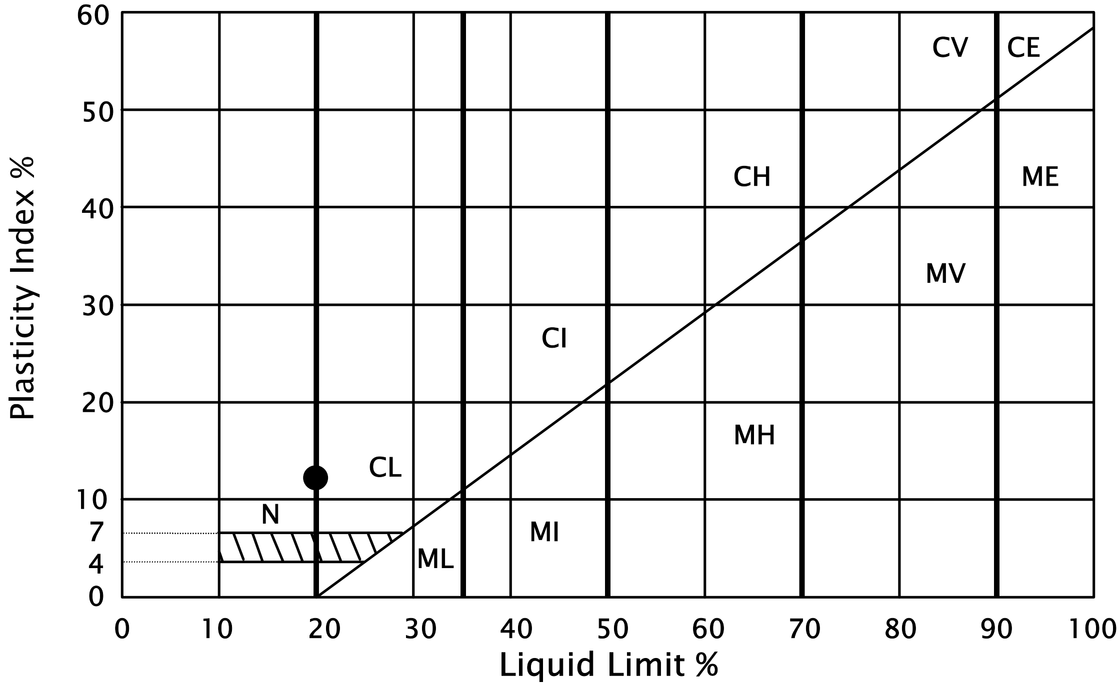
Source: McLaughlin, R. J., et al, 2001

EXPLANATION

1 Qhf: Alluvial fan deposits (Holocene)
2 Qpf: Alluvial fan deposits (Pleitocene)
3 Qof: Old floodplain deposits (Pleitocene?)
4 Tms: Monterey Shale (middle and lower Miocene)
5 Tt: Temblor Sandstone (middle Miocene to Oligocene?) --Locally includes:
6 Ttv: Volcanic and intrusive rocks (middle Miocene)
7 Jos: Serpentinized ultramafic rocks (Jurassic)

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	VICINITY GEOLOGY MAP Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 3 July 2013

PLASTICITY CHART

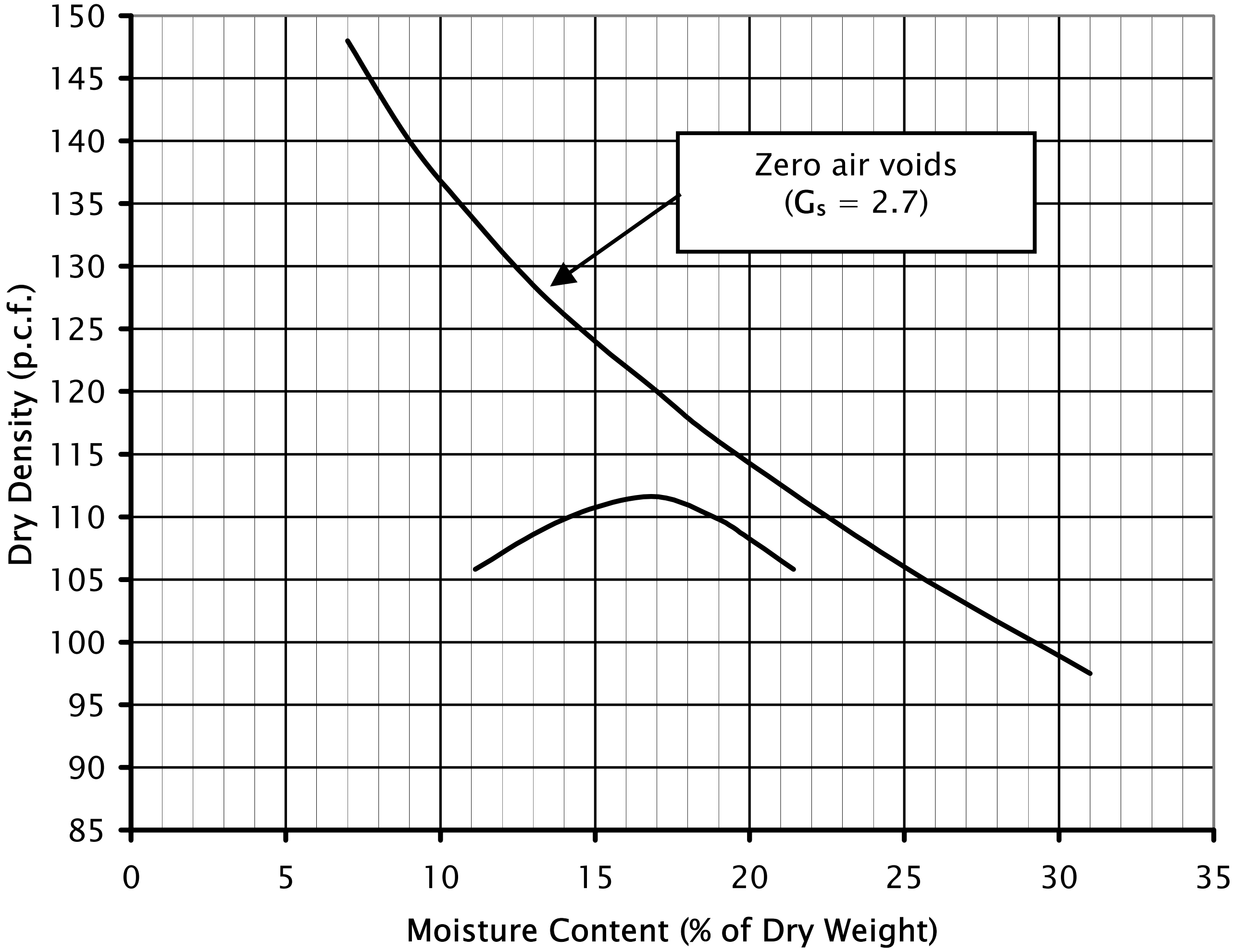


PLASTICITY DATA

Key Symbol	Hole No.	Depth ft.	Liquid Limit %	Plasticity Index %	Unified Soil Classification Symbol *
●	BAG A	0-1	20	12	CL

*Soil type classification Based on British suggested revisions to Unified Soil Classification System

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**PLASTICITY INDEX** Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 4 July 2013



SAMPLE: A

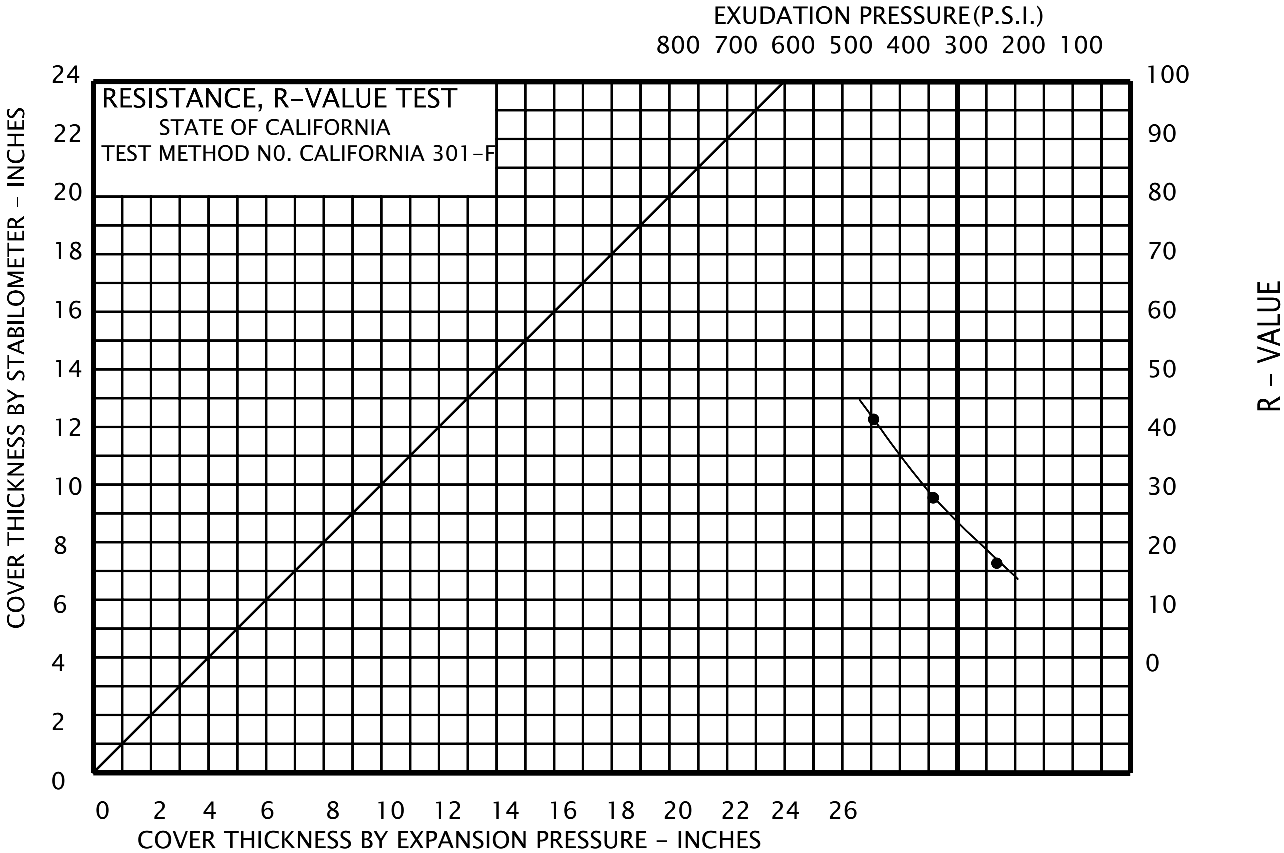
DESCRIPTION: Tan Brown Gravelly Sandy CLAY

LABORATORY TEST PROCEDURE: ASTM D1557-91

MAXIMUM DRY DENSITY: 112.0 p.c.f.

OPTIMUM MOISTURE CONTENT: 17.0 %

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	COMPACTION TEST A Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 5 July 2013

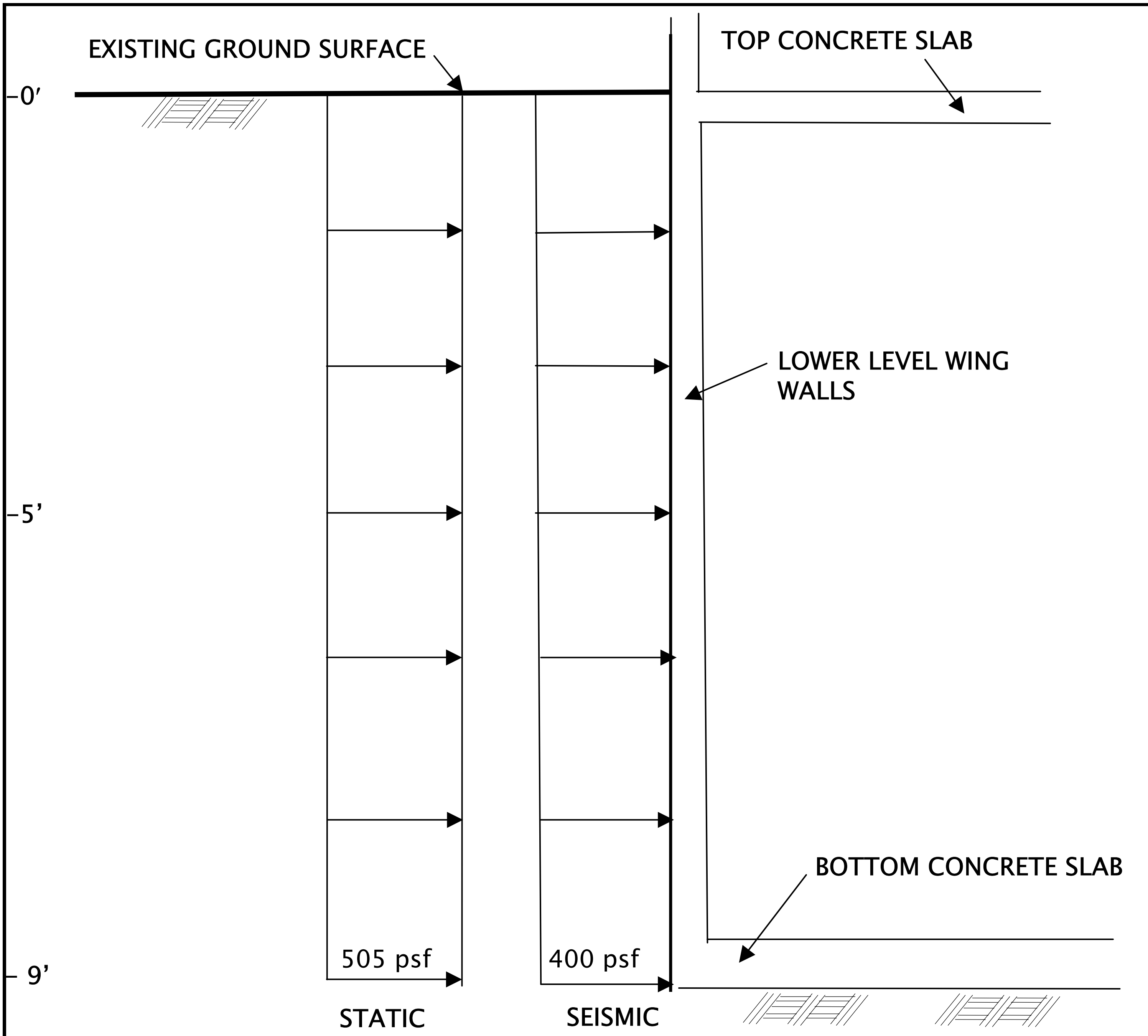


SAMPLE: A

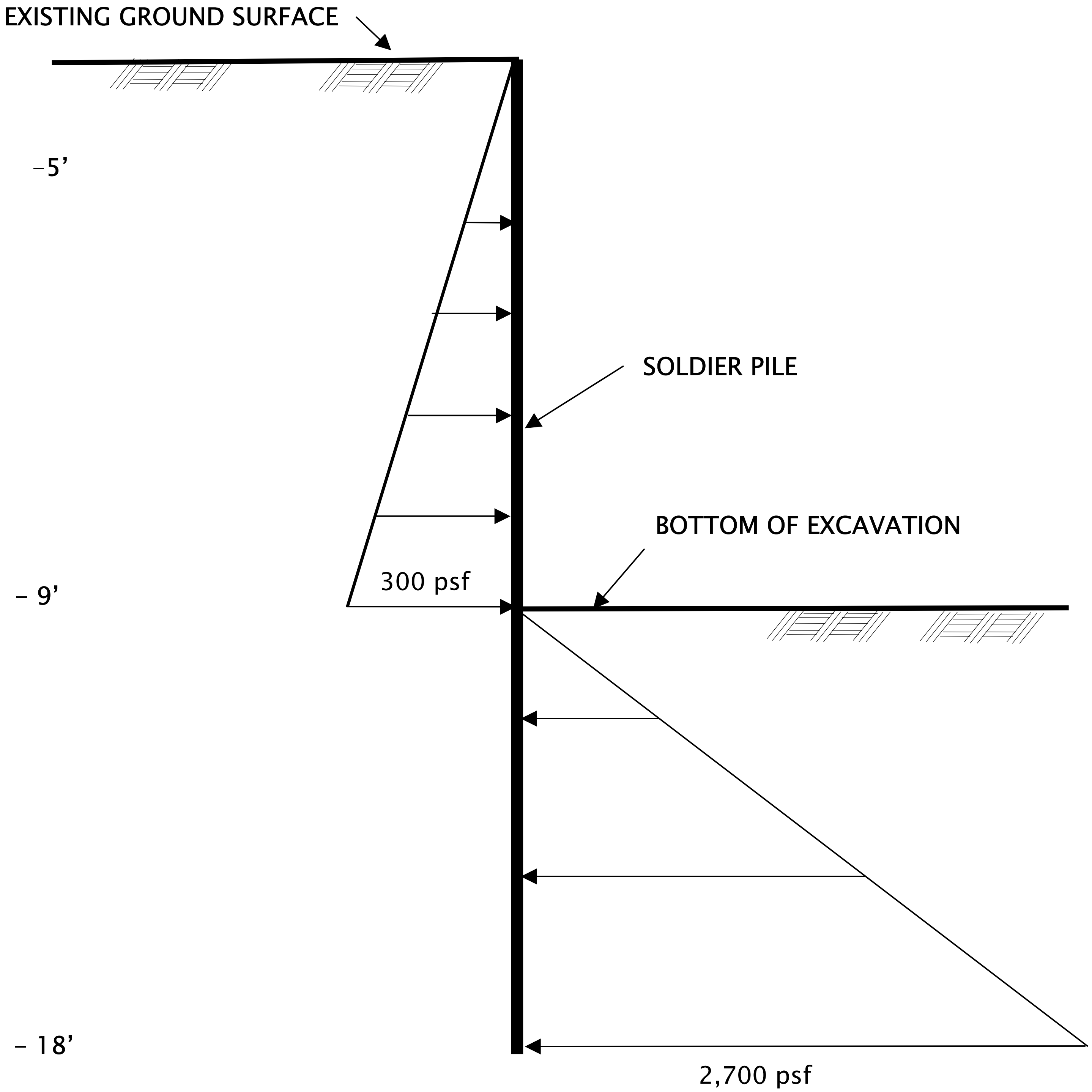
DESCRIPTION: Tan Brown Gravelly Sandy CLAY

SPECIMEN	A	B	C
EXUDATION PRESSURE (P.S.I.)	216.0	329.0	431.0
EXPANSION DIAL (.0001")	33.0	60.0	85.0
EXPANSION PRESSURE (P.S.F.)	143.0	260.0	368.0
RESISTANCE VALUE, "R"	16.0	27.0	41.0
% MOISTURE AT TEST	16.3	15.3	14.4
DRY DENSITY AT TEST (P.C.F.)	110.1	112.3	115.3
R-VALUE AT 300 P.S.I. EXUDATION PRESSURE	= (24)		

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	R-VALUE TEST Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No. SV1168	FIGURE 6
		Drawn by: B.T.	
		Scale: NOT TO SCALE	July 2013



Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	LATERAL SOIL PRESSURES LOWER LEVEL WING WALLS Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168 Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 7 July 2013



Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	**LATERAL SOIL PRESSURES** **SOLDIER PILE & WOOD LAGGING** Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168	FIGURE
		Drawn by: V.V.	8
		Scale: NOT TO SCALE	July 2013

APPENDICES

MODIFIED MERCALLI SCALE

METHOD OF SOIL CLASSIFICATION

KEY TO LOG OF BORING

EXPLORATORY BORING LOGS (B-1 THROUGH B-5)

CORROSIVITY TEST - SULFATE

GENERAL COMPARISON BETWEEN EARTHQUAKE MAGNITUDE AND THE EARTHQUAKE EFFECTS DUE TO GROUND SHAKING

Earthquake Category	Richter Magnitude	Modified Mercalli Intensity Scale* (After Housner, 1970)	Damage to Structure
		I – Detected only by sensitive instruments.	
	2.0	II – Felt by few persons at rest, especially on upper floors; delicate suspended objects may swing.	
	3.0	III – Felt noticeably indoors, but not always recognized as an earthquake; standing cars rock slightly, vibration like passing truck.	No Damage
Minor		IV – Felt indoors by many, outdoors by a few; at night some awaken; dishes, windows, doors disturbed; cars rock noticeably.	
	4.0	V – Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects.	Architec-tural Damage
		VI – Felt by all; many are frightened and run outdoors; falling plaster and chimneys; damage small.	
5.3	5.0	VII – Everybody runs outdoors. Damage to building varies, depending on quality of construction; noticed by drivers of cars.	
Moderate	6.0	VIII – Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of cars disturbed.	
6.9		IX – Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked, underground pipes broken; serious damage to reservoirs and embankments.	Structural Damage
Major	7.0	X – Most masonry and frame structures destroyed; ground cracked; rail bent slightly; landslides.	
7.7		XI – Few structures remain standing; bridges destroyed; fissures in ground; pipes broken; landslides; rails bent.	
Great	8.0	XII – Damage total; waves seen on ground surface; lines of sight and level distorted; objects thrown into the air; large rock masses displaced.	Near Total Destruction

*Intensity is a subject measure of the effect of the ground shaking, and is not engineering measure of the ground acceleration.

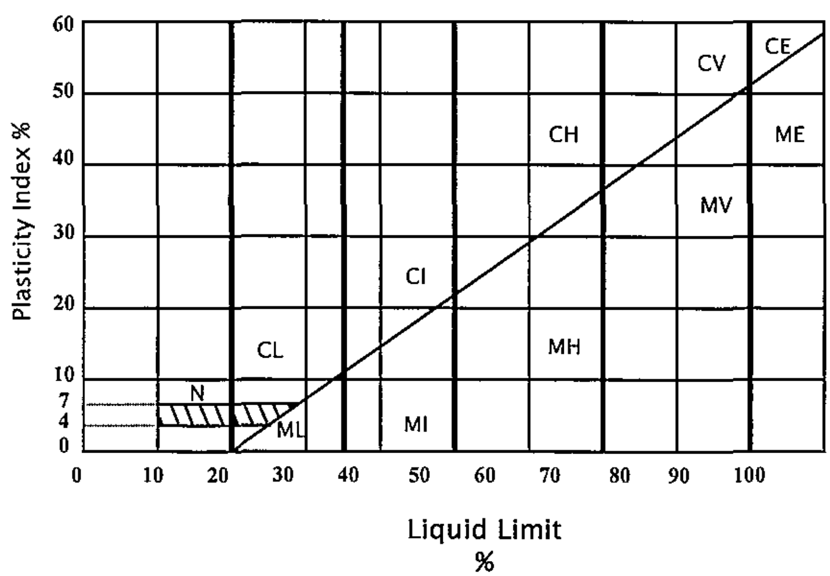
METHOD OF SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS	(More than 1/2 of soil > no. 200 sieve size)	GRAVELS	GW	Well graded gravel or gravel-sand mixtures, little or no fines
		(More than 1/2 of	GP	Poorly graded gravel or gravel-sand moistures, little or no fines
		coarse fraction >	GM	Silty gravels, gravel-sand-silt mixtures
		no. 4 sieve size)	GC	Clayey Gravels, gravel-sand-clay mixtures
		SANDS	SW	Well graded sands or gravelly sands, no fines
		(More than 1/2 of	SP	Poorly graded sands or gravelly sands, no fines
		coarse fraction <	SM	Silty sands, sand-silt mixtures
		no. 4 sieve size	SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	(More than 1/2 of soil < no. 200 sieve size)	SILTS & CLAYS	ML	Inorganic silts and very fine sand, rock, flour, silty or clayey fine sand or clayey silt/slight plasticity
		LL < 50	CL	Inorganic clay of low to medium plasticity, gravelly clayes, sandy clay, silty clay, lean clays
			OL	Organic siltys and organic silty clay of low plasticity
		SILTS & CLAYS	MH	Inorganic silts, micaceous or diatocaceous fine sandy, or silty soils, elastic silt
		LL > 50	CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOIL			PT	Peat and other highly organic soils

CLASSIFICATION CHART - UNIFIED SOIL CLASSIFICATION SYSTEM

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size In Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVELS Coarse Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No.10 to No. 40 No.40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT AND CLAY	Below No. 200	Below 0.074

PLASTICITY INDEX CHART



Project: Proposed Improvements and Remodel **Project Location:** 6663 Hampton Drive San Jose, California **Project Number:** SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	# Key to Log of Boring **Sheet 1 of 1**

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
1	2	3	4	5	6	7	8	9	10	11	12	13

COLUMN DESCRIPTIONS

1. Depth (feet): Depth in feet below the ground surface.
2. Sample Type: Type of soil sample collected at the depth interval shown.
3. Sample Number: Sample identification number.
4. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
5. Material Type: Type of material encountered.
6. Graphic Log: Graphic depiction of the subsurface material encountered.
7. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
9. Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
10. Direct Shear Test - Cohesion in ksf: Cohesion is the y-axis intercept of the failure envelope tangent to the Mohr circles.
11. Direct Shear Test - Internal Friction Angle in degrees: The internal friction angle (Phi) is the angle inclination of the failure envelope.
12. Liquid Limit - LL, %: Liquid Limit, expressed as a water content.
13. Plasticity Index - PI, %: Plasticity Index, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Asphaltic Concrete (AC)

SERPENTINE

Clayey SAND to Sandy CLAY (SC-CL)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
? Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project: Proposed Improvements and Remodel **Project Location:** 6663 Hampton Drive San Jose, California **Project Number:** SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	# Log of Boring B-1 **Sheet 1 of 1**

Date(s) Drilled **07/17/13**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **4-inch**	Total Depth of Borehole **11.5 feet**
Drill Rig Type **Truck Mounted Drill Rig**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation **309.5 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **140 lbs**
Borehole Backfill **Grout**	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0–0.5				Asphalt		6 inches Asphalt Concrete (AC)						
0.5–3.5		1-1	63	SC-CL		Tan Brown Gravelly Sandy CLAY Moist, hard	13.0	103.4				
3.5–11.5		1-2	55+	SERP.		Reddish Brown to Greenish Gray Highly Weathered and Sheared SERPENTINE (?) (BEDROCK) Damp, hard	8.1	127.7				
		1-3	55+				7.6	128.0				
11.5						Boring terminated at 11.5 feet						

Depth scale: 0, 0.5, 3.5, 5, 10, 11.5, 15, 20, 25, 30

Project: Proposed Improvements and Remodel Project Location: 6663 Hampton Drive San Jose, California Project Number: SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	# Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **07/17/13**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **2-inch**	Total Depth of Borehole **11.5 feet**
Drill Rig Type **Portable Drill**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation **310.7 feet**
Groundwater Level and Date Measured	Sampling Method(s)	Hammer Data **70 lbs**
Borehole Backfill **Grout**	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0				Grass		4 inches of organic material						
0.33				SC-CL		Tan Brown Gravelly Sandy CLAY Moist, hard						
5												
8				SERP.		Reddish Brown to Greenish Gray SERPENTINE (?) (BEDROCK) Damp, hard						
10												
11.5						Boring terminated at 11.5 feet						
15												
20												
25												
30												

Project: Proposed Improvements and Remodel **Project Location:** 6663 Hampton Drive San Jose, California **Project Number:** SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-3 **Sheet 1 of 1**

Date(s) Drilled **07/17/13**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **2-inch**	Total Depth of Borehole **11.5 feet**
Drill Rig Type **Portable Drill**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation **310.3 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **70 lbs**
Borehole Backfill **Grout**	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0 – 0.33				Grass		4 inches of organic material						
0.33 – 8				SC-CL		Tan Brown Gravelly Sandy CLAY Moist, stiff						
	■	3-1	14				12.4	101.5				
5	■	3-2	33				15.9	109.4				
8 – 11.5				SERP.		Redish Brown to Greenish Gray SERPENTINE (?) (BEDROCK) Damp, hard						
10	■	3-3	55+				8.2	127.0				
11.5						Boring terminated at 11.5 feet						

Depth scale: 0, 0.33, 5, 8, 10, 11.5, 15, 20, 25, 30

Project: Proposed Improvements and Remodel Project Location: 6663 Hampton Drive San Jose, California Project Number: SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-4 **Sheet 1 of 1**

Date(s) Drilled **07/17/13**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **4-inch**	Total Depth of Borehole **21.5 feet**
Drill Rig Type **Truck Mounted Drill Rig**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation **303.5 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **140 lbs**
Borehole Backfill **Grout**	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0				Asphalt		5 inches Asphalt Concrete (AC)						
0.42				SC-CL		Tan Brown Gravelly Sandy CLAY Moist, hard						
		4-1	65				16.1	105.0	1.0	20		
5		4-2	55+	SERP.		Reddish Brown to Greenish Gray Highly Weathered and Sheared SERPENTINE (?) (BEDROCK) Damp, hard	9.9	128.7				
10		4-3	55+				9.0	127.6				
15		4-4	55+				7.3	129.2				
20		4-5	55+				6.6	128.5				
21.5						Boring terminated at 21.5 feet						
25												
30												

Project: Proposed Improvements and Remodel **Project Location:** 6663 Hampton Drive San Jose, California **Project Number:** SV1168	**Silicon Valley Soil Engineering** **2391 Zanker Road, Suite 350** **San Jose, CA 95131** **(408) 324-1400**	Log of Boring B-5 **Sheet 1 of 1**

Date(s) Drilled **07/17/13**	Logged By **V.V.**	Checked By
Drilling Method **Solid Stem Auger**	Drill Bit Size/Type **4-inch**	Total Depth of Borehole **21.5 feet**
Drill Rig Type **Truck Mounted Drill Rig**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation **303.4 feet**
Groundwater Level and Date Measured	Sampling Method(s) **Modified California**	Hammer Data **140 lbs**
Borehole Backfill **Grout**	Location	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Direct Shear Test - Cohesion in ksf	Direct Shear Test - Internal Friction Angle in degrees	Liquid Limit - LL, %	Plasticity Index - PI, %
0				Asphalt		4 inches Asphalt Concrete (AC)						
0.33				SC-CL		Tan Brown Gravelly Sandy CLAY Moist, hard						
		5-1	60				14.3	124.5				
3.5				SERP.		Reddish Brown to Greenish Gray Highly Weathered and Sheared SERPENTINE (?)(BEDROCK) Damp, hard						
5		5-2	55+				8.7	126.8				
10		5-3	55+				8.9	128.4				
15		5-4	55+				6.5	127.9				
20		5-5	55+				5.5	128.3				
21.5						Boring terminated at 21.5 feet						
25												
30												

Corrosivity Tests Summary

CTL #: 768-011   Date: 8/2/2013   Tested By: PJ   Checked: PJ
Client: Silicon Valley Soil Engineering   Project: Almaden Golf -San Jose   Proj. No: SV1168
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%		(Redox)		Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
4-1	-	3	-	-	-	-	14	0.0014	-	-	-	-	2.5	Yellowish Red Silty SAND w/ Gravel

Appendix E

Geologic Evaluation and Geotechnical Investigation

Silicon Valley Soil Engineering

July 2013

REPORT TO

ALMADEN GOLF AND COUNTRY CLUB

SAN JOSE, CALIFORNIA

FOR

PROPOSED IMPROVEMENTS AND REMODEL

ALMADEN GOLF AND COUNTRY CLUB

6663 HAMPTON DRIVE

SAN JOSE, CALIFORNIA

FAULT RUPTURE HAZARD INVESTIGATION

JANUARY 2014

PREPARED BY

SILICON VALLEY SOIL ENGINEERING

2391 ZANKER ROAD, SUITE 350

SAN JOSE, CALIFORNIA

SILICON VALLEY SOIL ENGINEERING
GEOTECHNICAL CONSULTANTS

File No. SV1168A
January 3, 2014

Almaden Golf and Country Club
6663 Hampton Drive
San Jose, CA 95120

Attention: Mr. Robert Sparks, General Manager

Subject: Proposed Improvements and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California
FAULT RUPTURE HAZARD INVESTIGATION

Dear Mr. Sparks:

We are pleased to transmit herein the results of our fault rupture hazard investigation for the proposed improvements and remodel. The subject site is the existing Almaden Golf and Country Club located at 6663 Hampton Drive in San Jose, California.

Our findings indicate that the site is suitable for the proposed renovations provided the recommendations contained in this report are carefully followed. The following report details our investigation, outlines our findings, and presents our conclusions based on those findings.

If you have any questions or require additional information, please feel free to contact our office at your convenience.

Very truly yours,

SILICON VALLEY SOIL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER VIEN M. VO RCE 32296 Exp. 12/31/14 CIVIL STATE OF CALIFORNIA

Vien Vo, P.E.

REGISTERED GEOLOGIST 3535 DAVID F. HOEXTER No. 1158 CERTIFIED ENGINEERING GEOLOGIST Exp. 11/30/15 STATE OF CALIFORNIA

REGISTERED GEOLOGIST CRAIG S. HARWOOD exp 3/31/14 C.E.G. No. 2275 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

David F. Hoexter
Consulting Engineering Geologist
CEG 1158 Expires 11/30/15

Craig S. Harwood
Consulting Engineering Geologist
CEG 2275 Expires 3/31/14

SV1168.SGI/Copies: 4 to Almaden Golf and Country Club

TABLE OF CONTENTS

FAULT RUPTURE HAZARD INVESTIGATION PAGE

LIST OF TABLE, FIGURES, AND APPENDICES

FAULT RUPTURE HAZARD INVESTIGATION

FIGURES

APPENDIX

INTRODUCTION

Per your authorization, Silicon Valley Soil Engineering (SVSE) conducted a fault rupture hazard investigation for the improvements and remodel. The purpose of this investigation was to supplement our previous geotechnical and geologic hazard investigation with further investigation of the potential for ground surface fault rupture (consistent with State of California guidelines for the preparation of fault rupture hazard evaluation reports - CGS Special Publication 42, 2007) at the site per comments in a letter dated November 6, 2013 by Mr. Michael Shimamoto, Engineering Geologist, City of San Jose, Development Services Division. The report presents an explanation of investigative procedures, results of the field investigation, our conclusions, and our recommendations.

SCOPE OF SERVICES

Our scope of services included the following:

1. Review and evaluation of applicable geologic and geotechnical studies previously performed at and adjacent to the site, and review of available published and unpublished geologic maps and investigations of the vicinity.

2. Interpretation of available stereo pairs of aerial photographs.

3. Discussions with other professionals who have worked in the site vicinity, and with Michael Shimamoto, City of San Jose Geologist. In particular, we discussed the site and vicinity with Glenn Borchardt, PhD, Soil Scientist with Soil Tectonics.

4. Site reconnaissance; excavation during December 2013 and subsequent logging of one trench. Trench logging was conducted by Craig S. Harwood and David F. Hoexter, California Certified Engineering Geologists. Detailed soil stratigraphy logging was conducted by Glenn Borchardt, PhD.

5 Preparation of this report summarizing the available information on the site and our preliminary observations, conclusions, and recommendations.

This investigation is intended to be utilized in conjunction with the previously conducted geotechnical investigation by Silicon Valley Soil Engineering. We have evaluated the site from an engineering geologic viewpoint. The study is not intended to provide geotechnical engineering recommendations, which are included in the geotechnical investigation report.

SITE LOCATION AND DESCRIPTION

The site is located at 6663 Hampton Drive in San Jose, California (Figure 1 - Vicinity Map), southeast of the Hampton Drive and Hillcrest Drive intersection. The site is an existing country club, improved with a golf course, tennis courts, swimming pool, and clubhouse buildings. For the purpose of this report, the subject site is defined specifically as the proposed improved area, which is bounded by the golf course, swimming pool and tennis courts, and one existing residence (1232 Hillcrest Drive), with additional residential developments at greater distance surrounding the property. Hampton Drive and residential developments are located to the north and northeast, residential developments to the southeast and southwest, and Hillcrest Drive to the northwest.

Based on the available preliminary plans prepared by Marsh and Associates, the improvements will include the construction of a new eastern wing, cart barn, pro shop, snack bar, exterior and new main entry (drop-off and pick-up). The western wing renovation will include the fitness facility, kitchen, and offices. In addition, the remodel of the pool building will include in-fill of existing kid's pool. Locations of the proposed improvements and our previous borings and current fault trench are shown on Figure 2 - Site Plan and Geology Map, which also includes relevant geologic observations.

FIELD INVESTIGATION METHODS

We initially met with Vic Santana, Senior Project Manager with The KSD Group, Inc., and Robert Sparks, General Manager, Almaden Golf and Country Club, to discuss the trench location. The trench location and extent were constrained by the presence of existing structures, utilities and surface facilities.

One continuous trench (Figures 2 and 3) was excavated with a backhoe December 9 and 10, 2013. The trench was logged December 10 and 11, 2013 by Craig S. Harwood and David F. Hoexter, California Certified Engineering Geologists. We also employed the services of Consulting Soil Scientist Glenn Borchardt, PhD, whose observations as well as discussion of faulting at the site and vicinity are presented in the Appendix of this report (report by Soil Tectonics, 2013). The trench was 162 feet long and from 10 to 13 feet deep. The trench was oriented approximately perpendicular to the projected concealed trace of the Shannon Fault, based on its location on McLaughlin, Clark, Brabb, Heley, and Colon (2001), and effectively "shadowed" the proposed construction.

The trench sidewalls were shored for entry, cleaned by our staff and logged by our engineering geologists. The trench was backfilled upon completion of the logging using the soils from the excavation. The backfill was mechanically compacted with a roller/compactor.

The location of the trench was determined by measuring from existing topographic and cultural features (fences, walls, buildings, etc) using a tape measure and hand-held compass. The location in our opinion is accurate for planning purposes, but should be considered accurate only to the degree implied by the method used.

GEOLOGIC SETTING

Pertinent Published Maps and Investigations

The closest definitively active fault is the San Andreas fault, which is located approximately 6.8 miles southwest of the site. The site is not located within a State of California Earthquake Fault Zone, an area where the potential for fault rupture is considered probable (CDMG, 2003). The site is located within a City of San Jose zone of potential fault hazard (Cooper-Clark Associates, 1974; City of San Jose, 1983) and a Santa Clara County zone of rupture hazard (Santa Clara County Planning Department, 2012).

The site is located within a fault rupture hazard zone along the potentially active Berrocal/Monte Vista/Shannon fault system. The Shannon fault in the site vicinity projects east-west and therefore encompasses the site. The County (which does not have jurisdiction at this site) "may require site specific geologic reports" within the zone; the County's maps do not specifically indicate identified fault traces. Cooper-Clark (1974) classify the Shannon fault as potentially active. The site is located near the southeast termination of the Monte Vista - Shannon Fault, which is designated as a Type B fault, on the 1998 ICBO fault map.

Hydro-Geo Consultants (2004) excavated trenches at an adjacent property, 1232 Hillcrest Drive (immediately southwest of the tennis courts and, approximately 70 feet distant from the existing club house). The approximate trench locations are shown on Figure 2 and 3. The trenches totaled 145 feet and were sub-perpendicular to and south of the concealed fault as projected by McLaughlin et al (2001). The Hydro-Geo trenches encountered soil underlain by highly sheared, weathered and fractured serpentine on the southwest, and gravelly clay interpreted as alluvium overlying the soil, serpentine, and a sliver of sandstone on the northeast (the soil borings of SVSE at the subject site encountered similar alluvial materials). There were no gouge, offsets, high groundwater or other indications of faulting identified in the Hydro Geo trench.

Regional Setting

The site is located within the central region of the Coast Ranges Geomorphic Province, which extends from the Oregon border south to the Transverse Ranges. The general topography is characterized by sub-parallel, northwest trending mountain ranges and intervening valleys. The region has undergone a complex geologic history of sedimentation, volcanic activity, folding, faulting, uplift and erosion. The site is located in an area of low hills adjacent to the northeastern margin of the Central Santa Cruz Mountains.

Based on Wentworth, Blake, McLaughlin, and Graymer (1999) and McLaughlin, Clark, Brabb, Heley, and Colon, (2001), the site is located near the southern margin of Pleistocene alluvial fan deposits, which overlie the Miocene to Oligocene Temblor Sandstone and older (Jurassic) Serpentinized Ultramafic Rocks. The geology of the site vicinity is shown on Figure 4 - Vicinity Geologic Map (McLaughlin, et al, 2001). Based on this published map, the site is located on the Pleistocene Alluvium underlying much of the vicinity, with an immediately adjacent outcrop of Serpentinized Ultramafic Rocks *on the west*. In addition, the map of McLaughlin, et al, (2001) indicates a concealed trace of the Shannon Fault approximately along the south side of the clubhouse buildings. This concealed fault trace is located on this map essentially as previously mapped by Bailey and Everhart (1964). The basis for the fault trace as located by these publications is unclear; it is projected across the alluviated Almaden Valley over a distance of approximately one-half mile between bedrock outcrops.

The San Andreas, Hayward, and Calaveras Faults are major faults in the Bay Area. These faults are located approximately 7 miles southwest, and approximately 9 and 11 miles northeast of the site, respectively. Additional fault traces have been mapped in the near site vicinity. The Monte Vista, Shannon, and Berrocal Faults are part of a system of low angle imbricate thrust faulting that dips toward the southwest and are located along the west side of the Santa Clara Valley between Los Gatos and Palo Alto. Collectively the Monte Vista, Shannon, and Berrocal Faults are informally known as the Range Front Thrust Faults.

Although not included within a State of California mandated Special Studies Zone ("Earthquake Fault Zone"), the Range Front Thrust Faults are considered to be potentially active by Santa Clara County (Santa Clara County Planning Department, 2002), by several municipalities, and by various geologic consultants who have worked in the area. Northwest of the site, the Monte Vista Fault has thrust older (Plio-Pleistocene) Santa Clara Formation sediments over (relatively younger) Older Alluvium (Pleistocene). In addition, Holocene-Age (within last 11,000 years) ground surface rupture has been identified (AEG, 2004) on a fault within the Shannon Fault Zone, approximately 4 miles to the northwest of the subject site.

Site Geology

There are no bedrock exposures at the site. Bailey and Everhart (1964) identified the serpentinite outcrop in the near vicinity, although we were not able to locate any outcrops at the ground surface. The low slope between Hillcrest Drive and the adjacent tennis courts west of the existing clubhouse appears to expose alluvium (Pleistocene Alluvial Fan Deposits of McLaughlin et al, 2001), although this exposure may consist of locally derived fill placed for development of tennis courts associated with the Almaden Country Club. Our five previous geotechnical borings encountered “serpentinite” at depth, which was uncertain and queried on the boring logs. Our trench, located immediately adjacent to geotechnical Boring B-2, encountered only Older Alluvium within the same depth interval (11.5 feet) as the boring. It is apparent that greenish, mafic appearing clasts within the very dense alluvium were misidentified as serpentine bedrock in the geotechnical borings.

RECONNAISSANCE

Our certified engineering geologist initially visited the site on July 17, 2013; conditions were essentially unchanged in December 2013. The site and accessible surroundings were observed in an attempt to identify indications of faulting or other geologic hazards, if any, and to provide background for subsequent literature and air photo review. No indications of active faulting or damage related to previous seismic events were identified during the site reconnaissance, although the ground surface has been extensively modified by landscaping and construction of the club house and related structures, hardscape, golf course, and surrounding residential subdivisions. There were no indications of landslides or other conditions of potential geologic hazards. Overall slopes are low. There appears to have been minimal grading conducted at the location of our trench and the existing structures.

AERIAL PHOTO AND TOPOGRAPHIC MAP INTERPRETATION

Seven sets of stereo pair aerial photographs, taken from 1939 through 1989, were interpreted to supplement our engineering geologic observations on and near the site. These photographs, printed at scales from 1:12,000 through 1:31,360, are listed in the References section at the back of this report.

Imagery pre-dating ground surface modification in the vicinity of the site was not available. The earliest available imagery (1939 and 1948) pre-date development of the site as a country club with nearby residential development, but post-date widespread agricultural development (primarily grazing and orchards) at the site and surrounding area. Thus, tonal and topographic features may have been modified, although not destroyed, by 1939. The 1939 imagery indicate that the site is located at the southeast end of a low ridge. The ridge at this location is undeveloped apparent grazing land, with orchards to the east, south and west. There are no tonal or other lineations within or near the site, and no indications of the concealed fault trace mapped by McLaughlin et al (2001). Imagery following 1948 demonstrates the increasing urbanization of the site vicinity, ultimately with total loss of utility of aerial photographs for geologic interpretation.

Various tonal lineations are evident on the 1939 and 1948 imagery within the areas identified as having a potential for ground surface rupture within the Shannon Fault Zone. These lineations are parallel and subparallel to the fault zone. None of the lineations project through or towards the subject site, which is located on a topographic high. Drainages cross the general area, but do not appear in the immediate site vicinity to follow or be influenced by the tonal lineations, and thus do not appear to be influenced by faulting. There are no prominent topographic features suggestive of faulting in the immediate site vicinity.

SUBSURFACE CONDITIONS

Introduction

Our interpretation of the soil and rock materials encountered in the exploratory trench is shown on Figure 5. The observed materials are identified by lithology, Munsell soil colors, and origin, which are also described on Figure 5. The following discussion summarizes salient features of the primary geologic units as well as sub-units delineated in our trenche. Where applicable, we have provided the equivalent soil types (datable soil horizons) with those used by Borchardt (2013). There were no indications of archaeological deposits.

Lithology

Artificial Fill

Artificial fill is present at two locations, underlying the northeastern cart path and in proximity to the existing clock and three buried pipelines at Stations 35 - 54. The fill is not of significance, although it does replace the soil horizon in the clock vicinity.

Residual Soil (Holocene) Unit A

Unit A is a mixture of disturbed native soils, composed primarily of sandy clay with silt (CL). It is equivalent to soil horizon Ap of Borchardt. Unit A is present from the southwest Station 0 to approximately Station 66 where it pinches out at the ground surface.

Residual Soil (Holocene) Unit B1

Unit B1 is a silty clay (CL) with fine to medium gravel. It is equivalent to Borchardt soil horizons 2Bt and 3Bt. Unit B1 is present along the entire length of the trench. This unit represents two buried soil horizons.

Paleosol (Pleistocene) Unit B2

Unit B2 is a clayey sand (SC), with a trace of fine to medium gravel. It is equivalent to the upper (shallow) part of soil horizon 4BAb of Borchardt. Unit B2 is present from approximately Station 25 to the northeast termination of the trench.

Old Alluvium (Pleistocene) Unit C

The alluvium is a silty sandy well graded gravel with cobbles. It is dense to very dense, and varies from clast supported to matric supported. It contains clayey zones and lenticular beds of clayey sand and sand. The clasts are sub-rounded to sub-angular, typically contain medium thick to thick clay films, and sizes range fine to very coarse to cobble (maximum 12 inches). There are numerous imbricated clasts, and there is an overall fining upward sequence. The clast lithology is variable, primarily sandstone with shale, mafics, granitoids and lesser chert and silica carbonate. Unit C is equivalent to Borchardt soil horizons 5Bt1b and 5Bt2b.

DISCUSSION

The observed soil stratigraphy indicates the presence of two Holocene residual soil units and one Pleistocene paleosol. Soil units were laterally continuous and gradational. There were no indications of shearing, offset, folding or warping, and thus no indication of deformation or tectonism.

The shallow Unit A is present along the southwest portion of the trench, and is apparently eroded or graded (excavated) further to the northeast. The underlying Unit B1 is present along the entire length of the trench. Neither soil horizon is offset by faulting. The underlying buried paleosol Unit B2 is Pleistocene in age and present though most of the trench, although it pinches out to the southwest. This unit is not offset by faulting. At greater depth is a buried Pleistocene alluvial deposit, present along the complete trench length and not offset by faulting.

The Berrocal/Monte Vista/Shannon fault system includes low angle imbricate structural thrust faults, which generally dip toward the south and southwest and follow the northeastern margin of the Santa Cruz Mountains along the southwestern edge of the Santa Clara Valley. The closest mapped fault trace within this fault is located approximately along the south side of the clubhouse buildings, as shown on Figure 2 and 3 (the fault location is derived from McLaughlin et al, 2001). The basis for the fault's projection as shown by

McLaughlin et al is unclear (although virtually the same as the preceding projection Bailey & Everhart, 1964), and the location is clearly approximate. There are no offset bedrock units along this reach of the fault trace. Some fault traces within the Berrocal/Monte Vista/Shannon fault system are believed by some geologists and seismologists to have experienced sympathetic movement during the 1989 Loma Prieta Earthquake. Schmidt et al (1995) documents numerous locations of pavement and pipeline breaks associated with the 1989 Loma Prieta Earthquake. The breaks are concentrated in the general vicinity of the Berrocal/Monte Vista/Shannon fault system northwest of the site, and consist of three compressional breaks in concrete (rigid pavement surface), one break of unspecified deformation in concrete surface, and one additional coseismic underground water line break in the near site vicinity, although none of the breaks are within or adjacent to the site. The nearest break is approximately 400 feet distance from the subject site. There is no discernable pattern (plotted aerially) to the breaks in the site vicinity.

The nearby trenching by Hydro-Geo Consultants (2004) located at 1232 Hillcrest Drive partially shadows the subject site. The trenching exposed bedrock formation serpentinized ultramafic rocks ("Jos") and a sandstone unit which are, in turn, overlain (in depositional contact) with alluvium, with no indication of faulting between the bedrock units (serpentinite and sandstone) and the alluvium.

As discussed in the Aerial Photographic Interpretation, there are various tonal lineations suggestive of faulting in the vicinity. However, there are no lineations (or other indications of faulting) within or projecting towards the subject site.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings from our study, it is our opinion that there is no evidence of a fault surface trace trending through the subject site. Therefore, in our opinion, the risk of ground surface rupture at the subject site is remote.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The findings of this report are valid, as of the present time. However, the passing of time will change the conditions of the existing property due to natural processes, works of man, from legislation or the broadening of knowledge. Therefore, this report is subjected to review and should not be relied upon after a period of three years.

2. The conclusions and recommendations presented in this report are professional opinions derived from current standards of geotechnical and geological practice and no warranty is intended, expressed, or implied, is made or should be inferred.

REFERENCES

Aerial Photographs

Pacific Aerial Surveys, Oakland, California (PAS); United States Geologic Survey Library, Menlo Park, California (USGS); University of California Santa Cruz, Map and Air Photo Library (on-line); WAC Corporation, Eugene, Oregon (WAC); black and white vertical stereo pairs, except as noted.

Source	Imagery	Date	Scale
USDA (2)	CIV-285-45/46	7/31/39	1:20,000
USGS (?)	CDF5-3-71/72	5/14/48	1:10,000 (1)
USGS	16G-175/176	4/1/50	1:20,000
USGS	CIV-6DD-68/69	9/28/63	1:20,000
USGS	SCL-12-216/217	5/17/65	1:12,000
USGS	GS-VEZR-3-40/41/42	2/24/81	1:24,000
WAC	89CA-36/46/47	6/16/89	1:31,680

(1) originally flown 1:20,000, enlarged to 1:10,000

(2) flown by Fairchild Aerial Surveys

Reports and Publications

American Soil Testing, 2004, Soil and Foundation Investigation of Proposed Single Family Residence, 1232 Hillcrest Drive, San Jose, California, report dated June 18, 2004.

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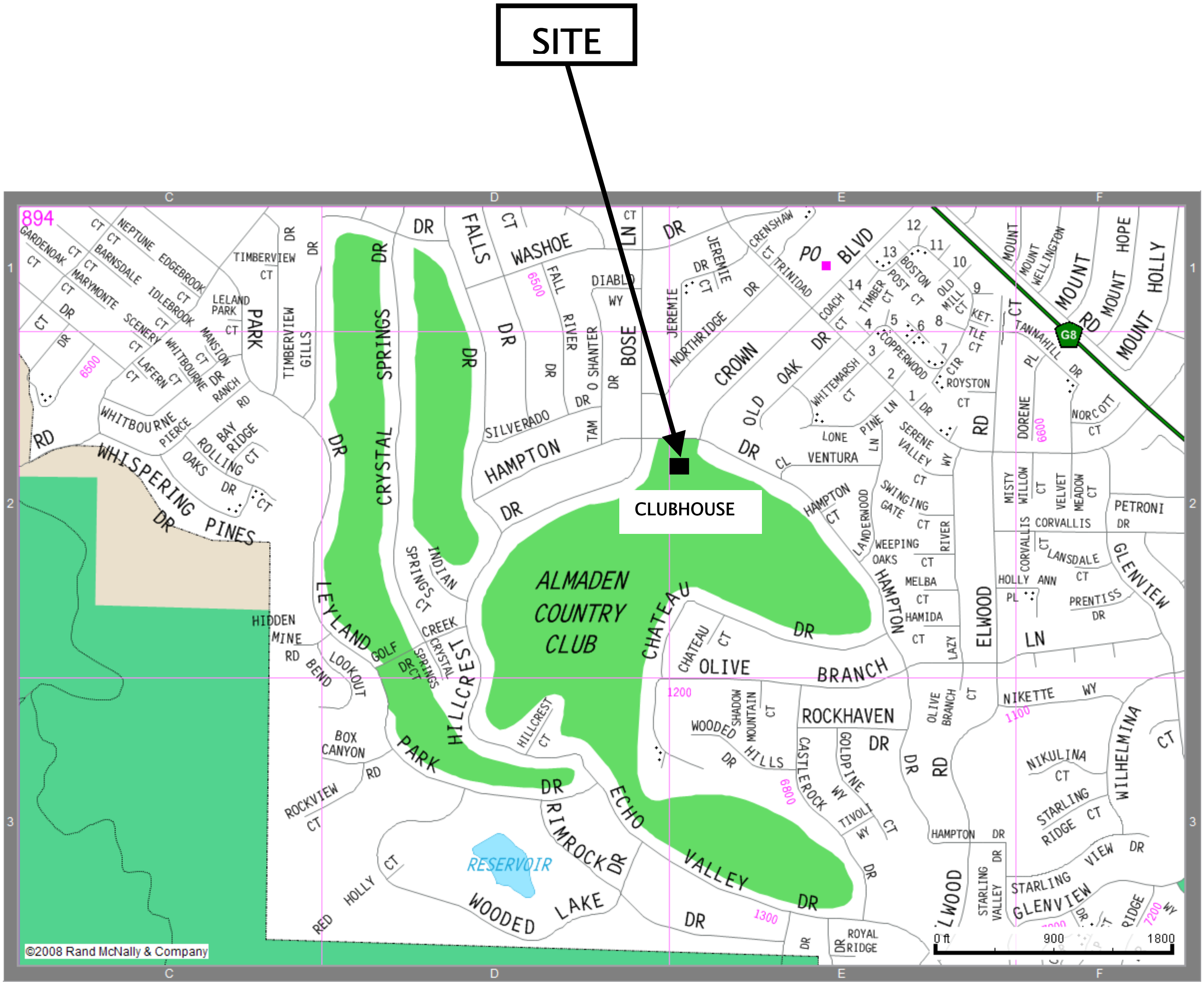
FIGURES



Silicon Valley Soil Engineering

2391 Zanker Road, #350
San Jose, CA 95131
(408) 324-1400

VICINITY MAP

Proposed Improvements
and Remodel
Almaden Golf and Country Club
6663 Hampton Drive
San Jose, California

File No.: SV1168A

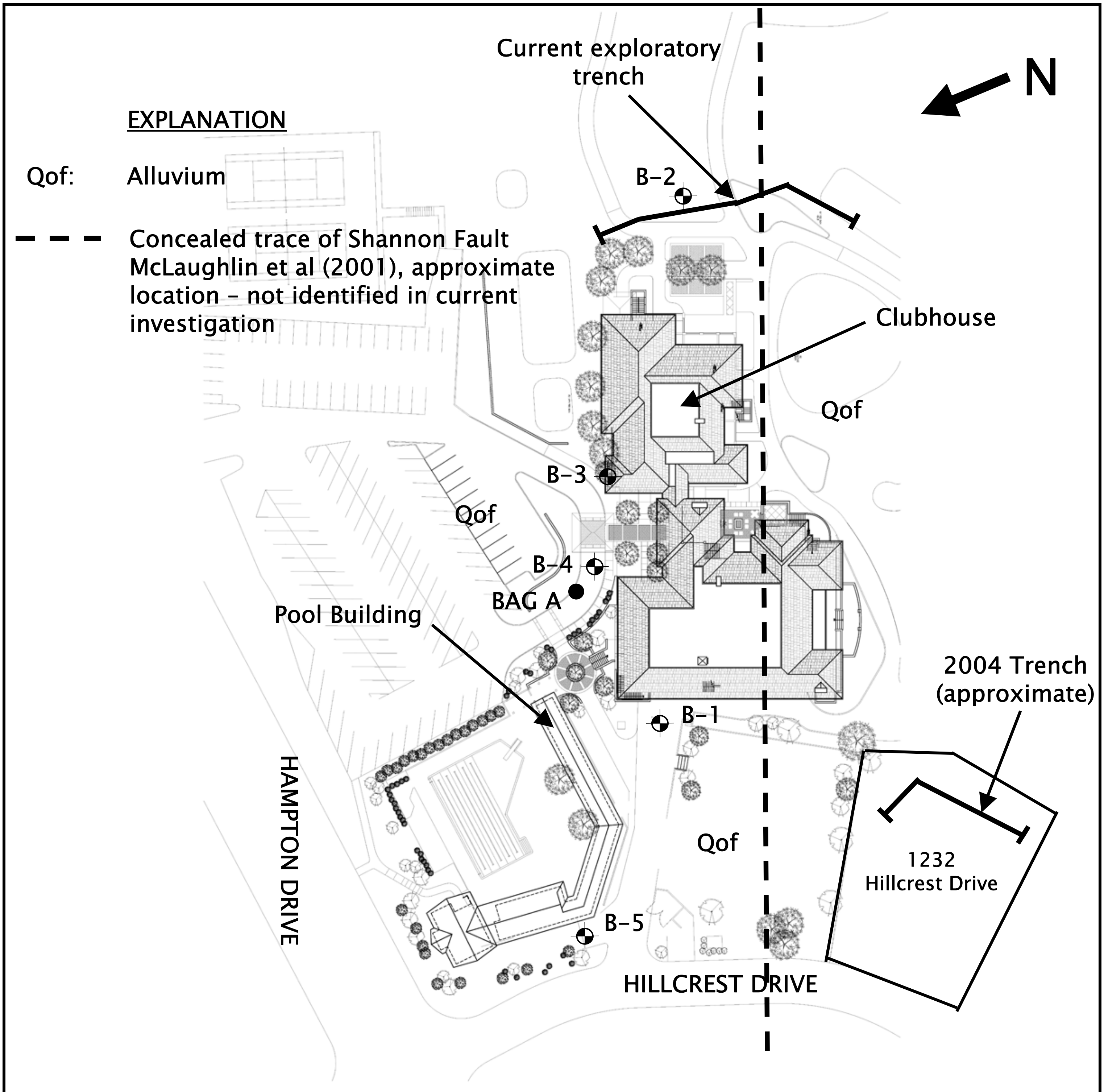
Drawn by: V.V.

Scale: NOT TO SCALE

FIGURE

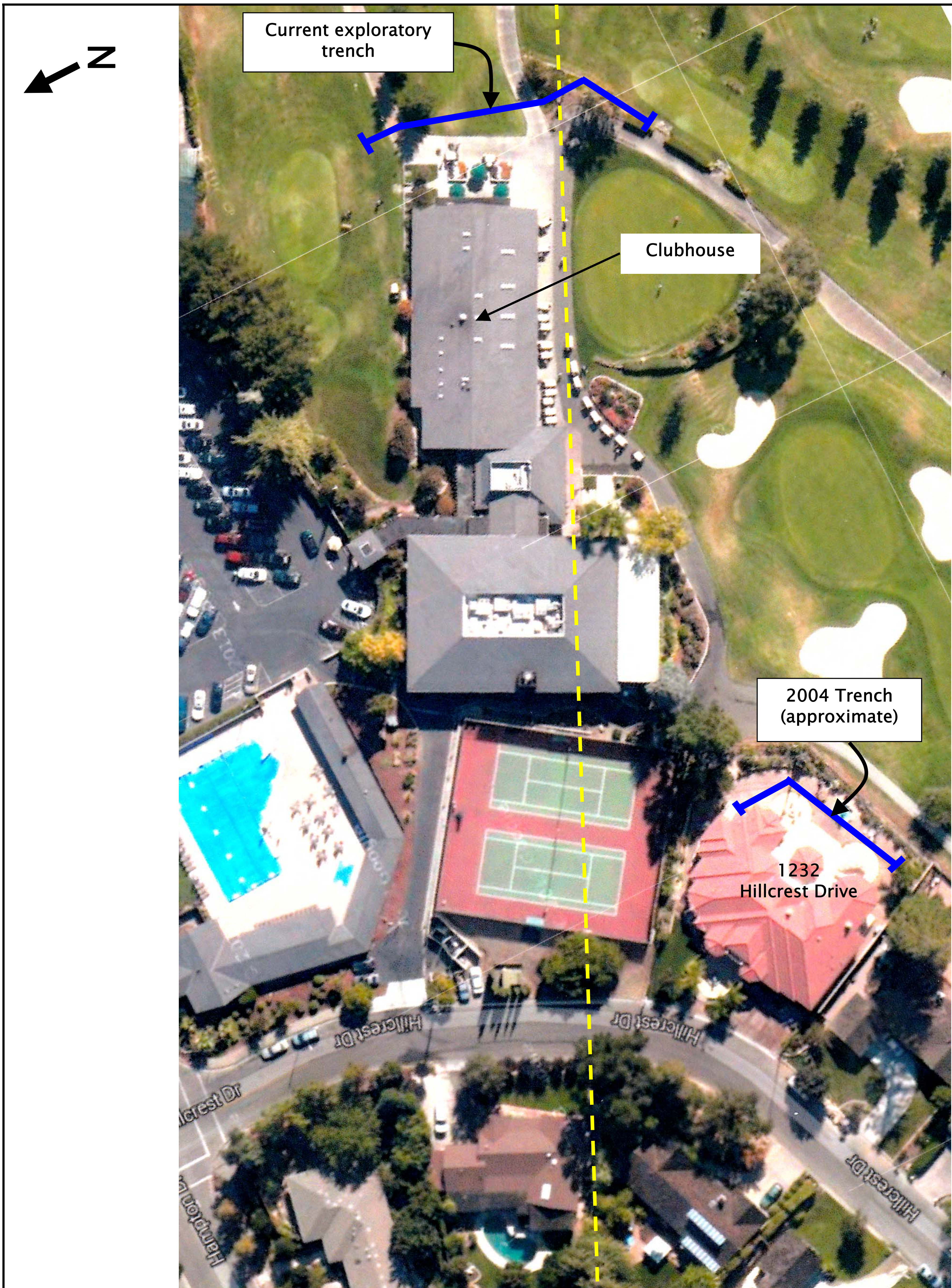
1

January 2014



NOTE: DENOTES APPROXIMATE EXPLORATORY BORING LOCATION
DENOTES APPROXIMATE EXPLORATORY BAG SAMPLE LOCATION

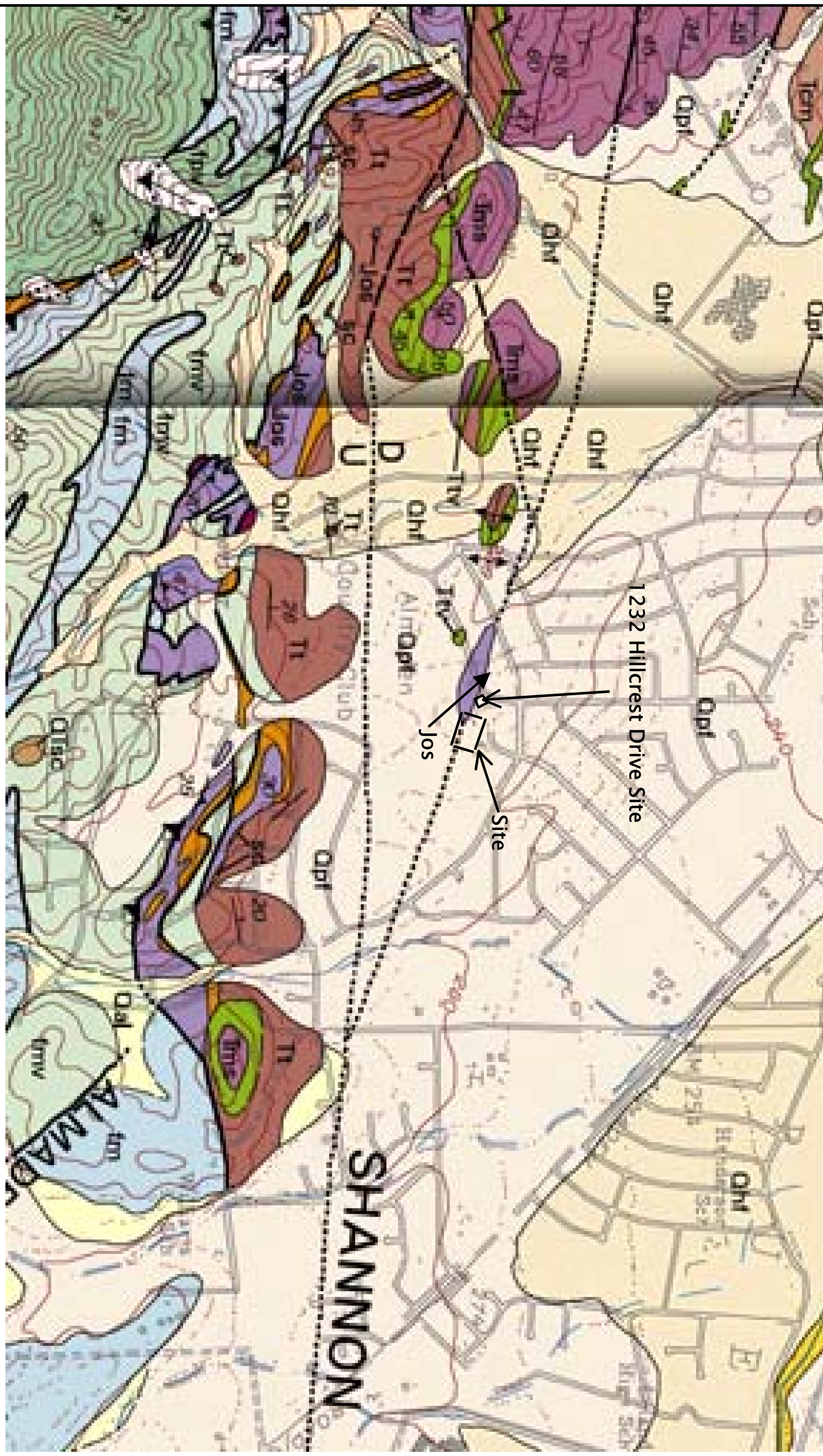
Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	SITE PLAN & GEOLOGIC MAP Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168A	FIGURE
		Drawn by: V.V.	2
		Scale: 1 inch = 90 feet	January 2014



EXPLANATION

– – – – Concealed trace of Shannon Fault as shown on McLaughlin et al (2001) – not identified in current investigation

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	TRENCH LOCATION Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168A Drawn by: V.V. Scale: 1 inch = 57 feet	FIGURE 3 January 2014



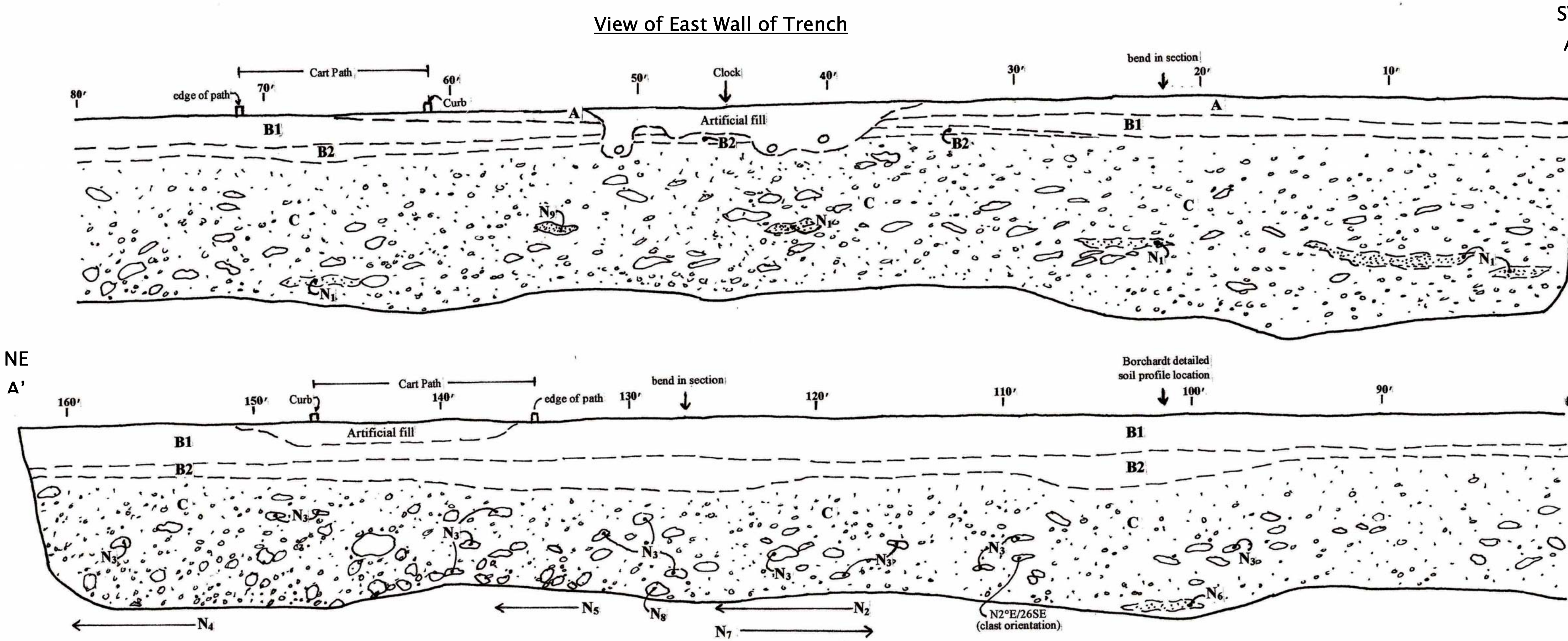
Source: McLaughlin, R. J., et al, 2001

EXPLANATION

1 Qhf: Alluvial fan deposits (Holocene)
2 Qpf: Alluvial fan deposits (Pleitocene)
3 Qof: Old floodplain deposits (Pleitocene?)
4 Tms: Monterey Shale (middle and lower Miocene)
5 Tt: Temblor Sandstone (middle Miocene to Oligocene?) --Locally includes:
6 Ttv: Volcanic and intrusive rocks (middle Miocene)
7 Jos: Serpentinized ultramafic rocks (Jurassic)

Silicon Valley Soil Engineering 2391 Zanker Road, #350 San Jose, CA 95131 (408) 324-1400	VICINITY GEOLOGY MAP Proposed Improvements and Remodel Almaden Golf and Country Club 6663 Hampton Drive San Jose, California	File No.: SV1168A Drawn by: V.V. Scale: NOT TO SCALE	FIGURE 4 January 2014

View of East Wall of Trench



Logged by: DFH & CH   Date: December 9-11, 2013

Earth Material Explanation for Trench T-1

Scale - Vertical = Horizontal - 1 inch = 5 feet

Residual Soil (Holocene)

Unit A: Mixture of disturbed native soils: sandy clay w/ silt, dark brown (10YR4/3), damp, med. Stiff, some fine to nedium gravel (equivalent to soil horizon Ap of Borchardt)

Residual Soil (Holocene)

Unit B1: Silty CLAY (CL), dark brown (10YR4/3), damp, stiff, some fine to medium gravel (equivalent to soil horizons 2Bt and 3Bt of Borchardt)

Paleosol (Pleistocene)

Unit B2: Clayey SAND (SC), med. reddish brown (5YR4/4), damp, dense, trace fine to medium gravel (equivalent to soil horizon 4Batb of Borchardt)

Old Alluvium (Pleistocene)

Unit C: Silty sandy well graded GRAVEL (GW) with some cobbles, variegated strong brown (7.5YR5/6) to yellowish brown (10YR5/4), damp, dense to very dense, varies from clast supported to matrix supported and contains clayey zones and lenticular beds of clayey sand and sand. Clasts sub-rounded to sub-angular, typically contains clay films, and sizes range fine to very coarse and sparse cobbles to 12”. Clast lithology predominantly sandstone but also includes shale, mafics, granitoids, and minor chert and silica carbonate. Imbricated clasts are present and overall a crude fining upward sequence (equivalent to soil horizons 5CBtb and 5BCtb of Borchardt)

Notes

- N_1 silty fine sand lens
- N_2 flatten clasts attitude change?
- N_3 flatten clasts dipping toward southeast
- N_4 decreased quantity of cobbles
- N_5 increased quantity of cobbles
- N_6 lens of silt/fine sandy silt
- N_7 decrease on cobble size on average
- N_8 fine sandy clay lens
- N_9 silty clay lens
- S_1, S_2, S^3, S_4, S_5, S_6, S_7 bulk, disturbed soil samples

SILICON VALLEY SOIL ENGINEERING
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San Jose, CA 95131

FIGURE 5 - TRENCH LOG A-A'

Proposed Improvements and Remodel
Almaden Golf and Country Club

6663 Hampton Drive - San Jose, California
File No. SV1168A   Drawn by: CH
Scale: As shown   Date: January 2014

APPENDIX

Soil Tectonics Pedochronological Report

APPENDIX A

PEDOCHRONOLOGICAL REPORT FOR ALMADEN COUNTRY CLUB, SAN JOSE, CALIFORNIA

Hoexter Consulting/Silicon Valley Soil Engineering Project No. SV1168A

2013-12-19

Soil Tectonics

P.O. Box 5335

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Glenn Borchardt, Ph.D.

Principal Soil Scientist

Certified Professional Soil Scientist No. 24836

PEDOCHRONOLOGICAL REPORT FOR ALMADEN COUNTRY CLUB, SAN JOSE, CALIFORNIA

Hoexter Consulting/Silicon Valley Soil Engineering Project No. SV1168A

2013-12-19

Glenn Borchardt

INTRODUCTION

An assessment of seismic and landslide risk due to ground movement can be aided greatly by the techniques of pedochronology (Borchardt, 1992, 1998), soil dating. This is because the youngest geological unit overlying fault traces is generally a soil horizon. The age and relative activity of ground movement often can be estimated by evaluating the age and relative disturbance of overlying soil units, as well as buried soils called paleosols. Terms, prefixes, and suffixes are defined in the Soils Glossary at the end of this report.

Soil horizons exhibit a wide range of physical, chemical, and mineralogical properties that evolve at varying rates. Soil scientists use various terms to describe these properties. A black, highly organic "A" horizon, for example, may form within a few centuries, while a dark brown, clayey "Bt" horizon may take up to 40,000 years to form. Certain soil properties are invariably absent in young soils. For instance, soils developed in granitic alluvium of the San Joaquin Valley do not have Munsell hues redder than 10YR until they are at least 100,000 years old (Birkeland, 1999; Harden, 1982). Still other properties, such as the movement and deposition of clay-size particles and the precipitation of calcium carbonate at extraordinary depths, indicate soil formation during a climate much wetter than at present. In the absence of a radiometric age date for the material from which a particular soil formed, an estimate of its age must take into account all the known properties of the soil and the landscape and climate in which it evolved.

METHOD

The first step in studying a soil is the compilation of the data necessary for describing it (Birkeland, 1999; Borchardt, 2010). At minimum, this requires a Munsell color chart, hand lens, acid bottle, and instruments for 1:1 soil:water pH and conductivity measurements. The second step may involve collecting samples of each horizon of the soil profile column for laboratory analysis of particle size. This is done to check the textural classifications made in the field and to evaluate the genetic relationships between horizons and between different soils in the landscape. When warranted, the clay mineralogy and chemistry of the soil also is analyzed to provide additional information on the changes undergone by the initial material from which the soil weathered. The last step is the comparison of this accumulated soil data with that for soils having developed under similar conditions, preferably in the same region. Such information is scattered in soil survey reports (e.g., Welch, 1981), soil science journals, and consulting reports. In a particular locality, there is seldom enough comparative data available for this purpose. That is why, at the very least, the study of one soil profile always makes the evaluation of the next that much easier.

RESULTS OF THIS EVALUATION

Soil Profile No. 1 was studied to assess the age of the alluvium NE of a suspect trace of the Shannon fault (Table 1).

Soil Profile No. 1

This profile contains what appears to be a Holocene soil underlain by a Pleistocene paleosol. The surface soil consists of a 16-cm thick dark brown (10YR3/3m) Ap horizon overlying two weak Bt horizons containing angular gravel (Figure 1). The upper one is a 32-cm thick grayish brown (10YR5/2m) gravelly silty clay loam 2Bt and the lower one is a 14-cm thick brown (10YR4/3m) silty clay loam gravel 3Bt horizon. These overlie a >288-cm thick Pleistocene paleosol that has a 23-cm thick brown (7.5YR4/4m) light clay loam 4BAb horizon (Figure 2). This overlies a coarse sandy gravel 5Btb horizon that extends beyond the base of the excavation at 350 cm. In particular, it has medium thick to thick clay films in the interstices of the coarse sand and angular to subrounded gravel (Figure 3).

The pH (Figure 4) and conductivities (Figure 5) of the soil horizons are indicative of a bisequum, which consists of two stacked soil profiles. Both the pH and the conductivity tend to decrease with depth in each profile. This regular pattern is further evidence that the upper soil is not artificial fill, which probably would have the same pH and conductivity throughout instead. The low conductivity of the Ap horizon at the surface may be a result of irrigation on the golf course, which removes salt faster than it is possibly furnished by the westerly winds from the nearby Pacific Ocean. The presence of irrigation pipe in the Ap horizon also is evidence of recent disturbance, of course, but there is no evidence that material from an off-site A horizon was used to bury it.

Interpretation

While the mottled nature of the 62-cm thick, modern portion of this profile looks suspiciously like artificial fill, I found no other evidence pointing toward that conclusion. It appears in three distinct upward fining layers: clay loam, gravelly silty clay loam, and silty clay loam gravel (Table 1). The Bt horizons have thin clay films, which generally are absent in fill and are quite unlike the medium thick to thick clay films in the much older paleosol beneath. It is possible that each was deposited as a thin debris flow during a dry climatic period such as at present.

The 4BAb horizon underlying the modern soil has a brown (7.5YR4/4m) color, which is much redder than the dark brown (10YR3/3m) color found in the Ap horizon at the surface (Figure 2). The 7.5YR color is typical of Pleistocene soils, while the 10YR color is typical of Holocene soils. The lack of clay films in the light clay loam 4BAb horizon indicates that it probably was an A horizon during the Pleistocene. The organics in that horizon appear to have been oxidized since burial—another indication that the overlying layers have been there for thousands of years and are not artificial fill. There appears to have been no clay illuviation from the Holocene soil above and there was little erosion that might have caused its removal before the 3Bt horizon was deposited.

The great thickness (>265 cm) of the underlying 5Bt horizon, along with the medium thick to thick clay films in the interstices and on the surfaces of the gravel alluvium indicates that the horizon dates from the early Wisconsin when precipitation was two to three times greater than at present (McFadden, 1982). These characteristics and the 7.5YR colors are typical of such Pleistocene alluvial soils in the Bay Area.

Soil Ages

As mentioned in Table 1:

Pedochronological estimates are based on available information. All ages should be considered subject to $\pm$50% variation unless otherwise indicated. Only the bold dates are absolute, that is, they are supported by carbon dating or some other isotopic method. These are the dates we need to be aware of:

t_o = date when soil formation or aggradation began, ka

t_b = date when soil or strata was buried, ka

t_d = duration of soil development or aggradation, ky

Soil properties have a great deal of variation from site-to-site. In well-controlled studies on similar parent materials, the variations among soils on topographic surfaces of known age can still range up to 50% (Harden, 1982). Nonetheless, descriptions, such as the one in Table 1, often show large relative differences between modern soils and paleosols. In the appropriate geomorphic setting, such as the alluvial fan in which Soil Profile No. 1 formed, we sometimes see the effects of climate change. The transition between the much wetter Pleistocene and the much dryer Holocene climate seems apparent in the profile. The date at which this climate change occurred varies throughout the world from 8,000 to 15,000 calendar years ago (8 ka to 15 ka).

The date for the definition of the Holocene/Pleistocene boundary has continually changed, depending on who is studying it and where. Until recently, it was not even possible to obtain suitable tree-ring or other data for calibrating carbon dates much greater than 8,000 yr B.P. The work on Greenland ice cores indicates that a major climatic transition occurred at 11.7 ka (Walker and others, 2009). This date now has even been included in some legal definitions. Unfortunately, this one-size-fits-all approach fails to take account of the many variations throughout the world. For instance, the transition appears to have occurred at about 10 ka in northern California and Nevada. The ages of various sediments indicating a major climatic change cluster around that time along with evidence (stoneline, colluviation, etc.) for hillslope stripping in the Sierra Foothills (Borchardt and others, 1980). An extremely dry period, with half the current precipitation and extensive calcite precipitation in well-dated alluvial soils, occurred at Union City between 10 ka and 7 ka (Borchardt and Lienkaemper, 1999). In San Ramon, the dry period was preceded by a wet period right up until 10 ka (Borchardt, 1997).

As Atwater and others (1977) showed, San Francisco Bay began filling rapidly after 10 ka. Streams, such as the one that produced the coarse alluvial gravels in the paleosol of Soil Profile No. 1, would have been graded to the base of canyons that cut what is now the floor of the Bay. The transition from coarse-to-fine was found to have occurred at about 10 ka in a similar topographic situation on the Niles Cone at Fremont (Borchardt, 1988).

Thus, for the above reasons, I estimate the modern soil overlying the Pleistocene paleosol at our site to be about 10 ka. If others wish to use the 11.7-ka date for the Holocene-Pleistocene transition in the Bay Area for legal reasons, I have no objection, since what we describe is still evidence for the transition, no matter what date is attached to it.

CONCLUSIONS

1. The soil on the NE side of the mapped trace of the Shannon fault at this site began forming about 80,000 years ago.
2. In particular, the clear smooth contact between the base of the Holocene soil and the underlying paleosol is especially suited to the evaluation of the most recent tectonic deformation.
3. Wherever the 3Bt/4BAb contact is not offset, folded, or warped, we may be assured that no surface fault rupture (SFR) has occurred there during the last 10,000 years.
4. The 4BAb horizon, which began forming more than 10,000 years ago, also appears to be a good datum for evaluating tectonism.
5. Similarly, my examination of the 5Btb horizon throughout the excavation showed no evidence of shearing, offset, folding, or warping due to tectonism or other ground movement.
6. In my opinion, due to the great age of these soils, a 50-ft setback is not required wherever the described soils are undisturbed by tectonism (Borchardt, 2010).

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Table 1. Description of Soil Profile No. 1 excavated NE of the Shannon fault SE of the club house at Almaden Country Club, San Jose, California. Abbreviations and definitions are given in Schoeneberger and others (2012) and Soil Survey Staff (1993, 1999, 2010).

Description of soil developed in alluvium by Glenn Borchardt, who measured and sampled the soil on December 11, 2013 at latitude N37.21368^o and longitude W121.86576^o at station 102' in the southeast wall of Trench T-1 at an elevation of 268' [268' (GPS)]. Mediterranean climate with mean annual precipitation of 14.61"/yr at Fremont (1948-2010). Slope 3%. Aspect SW. Grass. Excellent drainage. Water table deep. The parent material is gravelly silty clay loam to coarse sandy gravel. Soil pH is slightly acid in the surface and neutral in the subsoil. The soil is mapped as Botella clay loam of the *Pachic Argixerolls* subgroup (http://casoilresource.lawr.ucdavis.edu/soil_web/ssurgo.php?action=explain_component&mukey=1653016&cokey=1653016:1492365)

Horizon Depth, cm Description

Ap 0-16 Dark brown (10YR3/3m, 6/3d) clay loam with common fine to medium faint gray to light brown mottles; medium weak angular blocky structure; slightly sticky and slightly plastic when wet, friable when moist, and very hard when dry; common fine roots; few fine continuous random tubular pores; few thin clay films on peds; charcoal to 5 mm; clear smooth boundary; pH 6.2; conductivity 580 uS; Sample No. 13B131.

2Bt 16-48 Grayish brown (10YR5/2m, 5/4d) gravelly silty clay loam with common fine to medium faint gray to light brown mottles; medium moderate subangular to angular blocky structure; slightly sticky and slightly plastic when wet, friable when moist, and very hard when dry; few very fine roots; many fine to very coarse continuous random tubular pores; few thin clay films on peds; clear smooth boundary; pH 6.6; conductivity 640 uS; Sample No. 13B132.

3Bt 48-62 Brown (10YR4/3m, 5/3d) silty clay loam gravel with common fine to medium faint gray to light brown and distinct black (MnOx) mottles; medium moderate subangular to angular blocky structure; sticky and plastic when wet, friable when moist, and extremely hard when dry; few fine continuous random tubular pores; few thin clay films on peds; clear smooth boundary; pH 6.9; conductivity 530 uS; Sample No. 13B133.

*ESTIMATED AGE:	t_o	=	10.0	ka
	t_b	=	0	ka
	t_d	=	10.0	ky

4BAb 62-85 Brown (7.5YR4/4m, 6/4d) light clay loam; medium weak to moderate subangular blocky structure; sticky and plastic when wet, friable when moist, and very hard when dry; very few very fine roots; very few very fine continuous random tubular pores; clear wavy boundary; pH 6.9; conductivity 470 uS; Sample No. 13B134.

5Bt1b 85-160 Brown (7.5YR5/4m, 7/4d) coarse sandy gravel with few fine distinct dark brown clay films and black mangans on pebbles; massive to medium moderate subangular blocky structure; slightly sticky and nonplastic when wet, loose when moist, and very hard when dry; very few very fine roots; many fine interstitial pores; common medium thick to thick clay films coating pores and peds; abrupt wavy boundary; pH 6.8; conductivity 470 uS; Sample No. 13B135.

5Bt2b 160-350 Brown (7.5YR5/4m, 7/4d) coarse sandy gravel with few fine distinct black mangans on pebbles; massive structure; slightly sticky and nonplastic when wet, loose when moist, and very hard when dry; many fine interstitial pores; many medium thick to thick clay films coating pores and peds; pH 6.6; conductivity 630 uS; Sample No. 13B136

*ESTIMATED AGE:	t_o	=	70.0	ka
	t_b	=	10.0	ka
	t_d	=	80.0	ky

*Pedochronological estimates based on available information. All ages should be considered subject to ±50% variation unless otherwise indicated (Borchardt, 1992). Bold dates are absolute.

t_o = date when soil formation or aggradation began, ka

t_b = date when soil or strata was buried, ka

t_d = duration of soil development or aggradation, ky

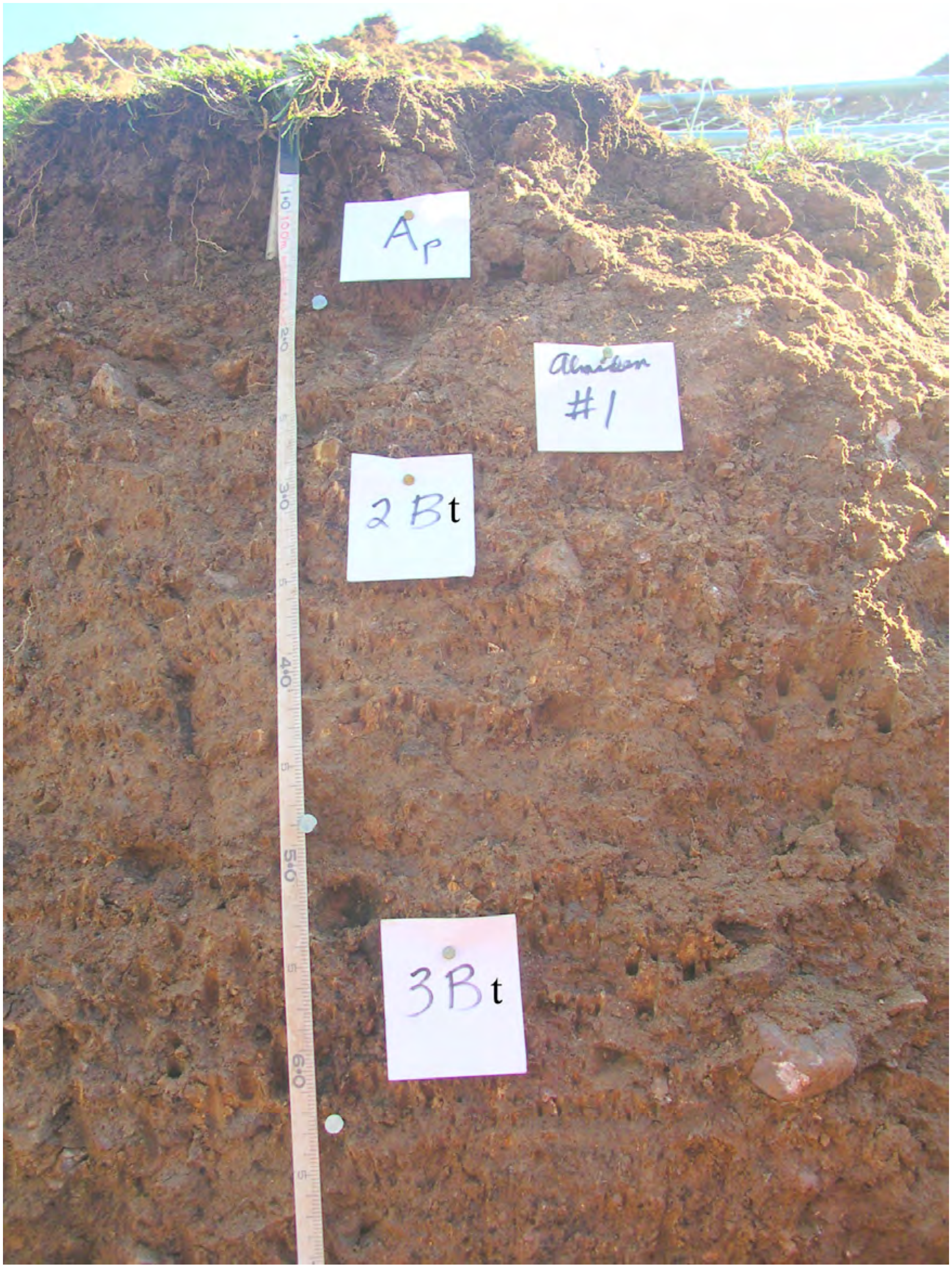

Figure 1. Modern soil overlying the paleosol NE of the Shannon fault at Almaden Country Club, San Jose, California.

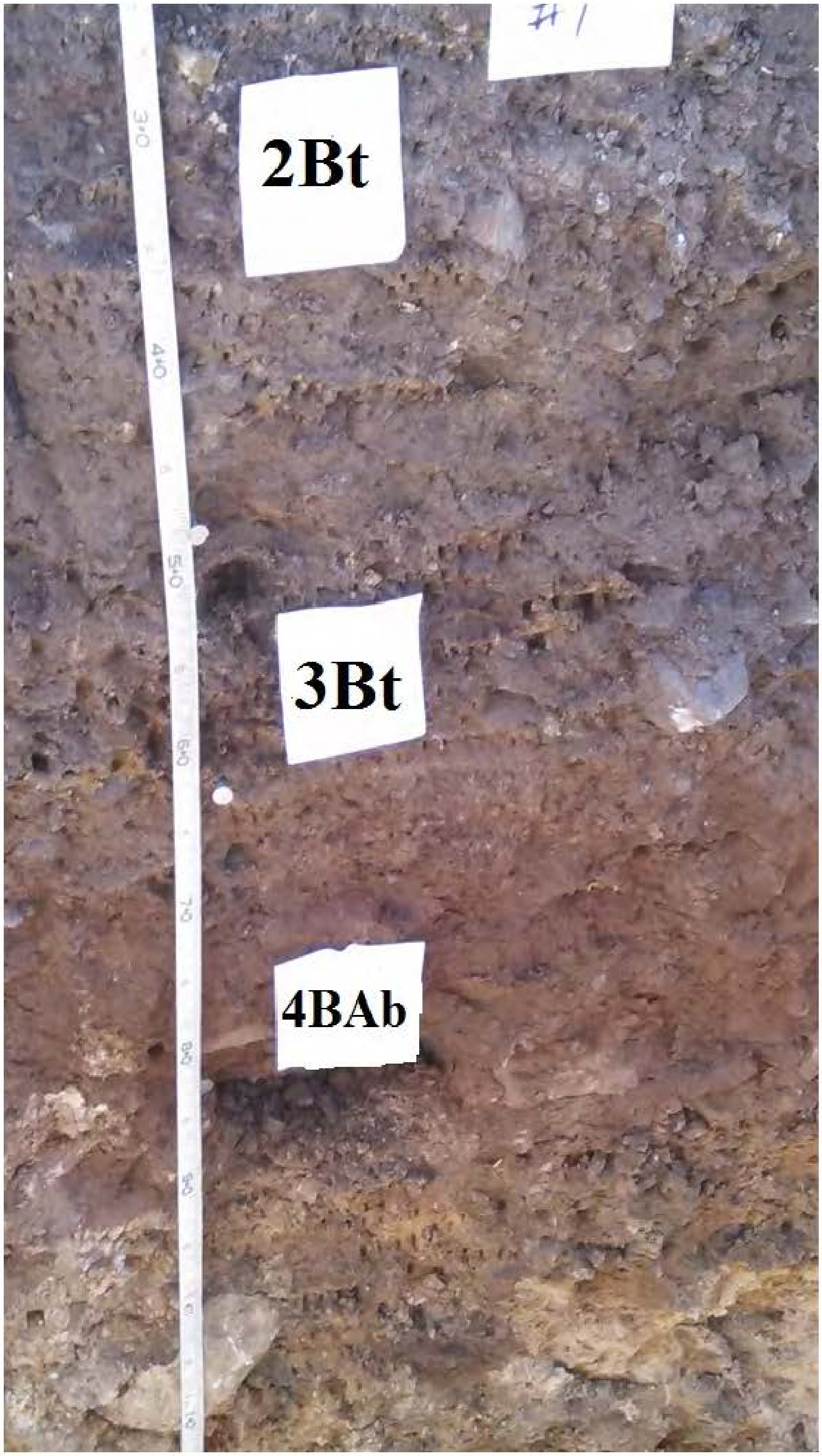

Figure 2. The 4BAb horizon, between 62 and 85 cm, was originally a black or very dark brown A horizon that formed at the top of the 288-cm thick Pleistocene paleosol.

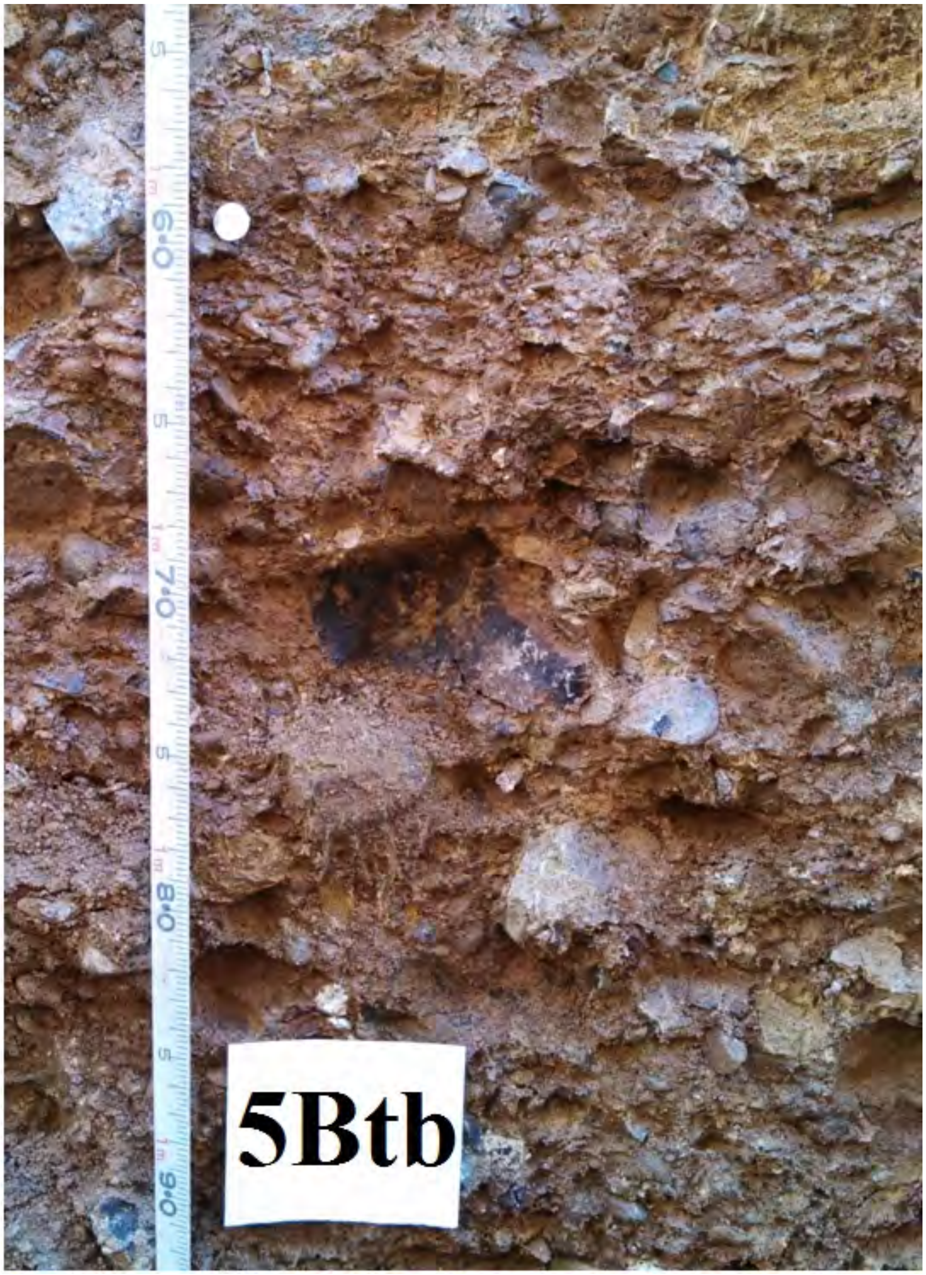

Figure 3. Close-up of the 5Btb horizon of the Pleistocene paleosol. Medium thick to thick clay films coat the gravels and plug the interstices between coarse sand grains.

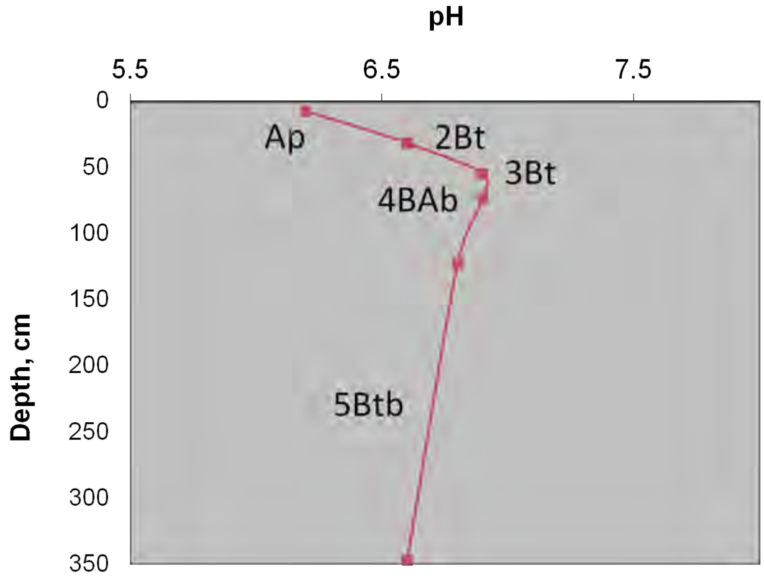

Figure 4. The pH in Soil Profile No. 1 increases with depth in the modern soil and decreases with depth in the paleosol.

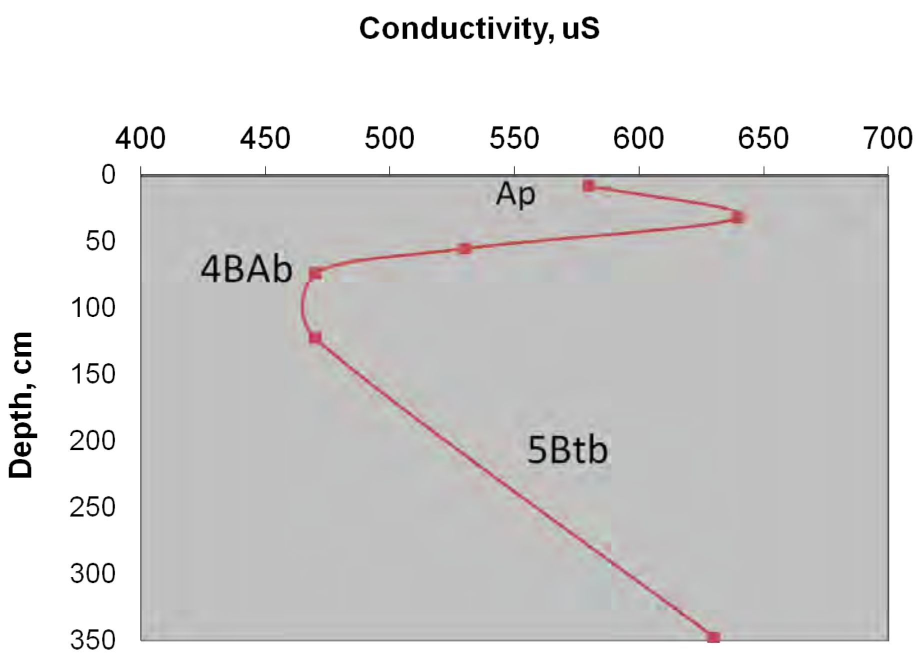

Figure 5. Soil conductivity (related to salt content) in Soil Profile No. 1 tends to increase with depth, with a maximum in the 2Bt of the modern soil and another maximum at the base of the 5Btb horizon of the paleosol

SOILS GLOSSARY

AGE. Elapsed time in calendar years. Because the cosmic production of C-14 has varied during the Quaternary, radiocarbon years (expressed as ky B.P.) must be corrected by using tree-ring and other data. Abbreviations used for corrected ages are: ka (kilo anno or years in thousands) or Ma (millions of years). Abbreviations used for intervals are: yr (years), ky (thousands of years). radiocarbon ages = yr B.P. Calibrated ages are calculated from process assumptions, relative ages fit in a sequence, and correlated ages refer to a matching unit. (See also yr B.P., HOLOCENE, PLEISTOCENE, QUATERNARY, PEDOCHRONOLOGY).

AGGRADATION. A modification of the earth's surface in the direction of uniformity of grade by deposition.

ALKALI (SODIC) SOIL. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 % or more of the total exchangeable bases), or both, that plant growth is restricted.

ALKALINE SOIL. Any soil that has a pH greater than 7.3. (See Reaction, Soil.)

ANGULAR ORPHANS. Angular fragments separated from weathered, well-rounded cobbles in colluvium derived from conglomerate.

ARGILLAN. (See Clay Film.)

ARGILLIC horizon. A horizon containing clay either translocated from above or formed in place through pedogenesis.

ALLUVIATION. The process of building up of sediments by a stream at places where stream velocity is decreased. The coarsest particles settle first and the finest particles settle last.

ANOXIC. (See also GLEYED SOIL). A soil having a low redox potential.

AQUICLUDE. A saturated body of sediment or rock that is incapable of transmitting significant quantities of water under ordinary hydraulic gradients.

AQUITARD. A body of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs but may serve as a storage unit for groundwater.

ATTERBERG LIMITS. The moisture content at which a soil passes from a semi-solid to a plastic state (plastic limit, PL) and from a plastic to a liquid state (liquid limit, LL). The plasticity index (PI) is the numerical difference between the LL and the PL.

BEDROCK. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

BISEQUUM. Two soils in vertical sequence, each soil containing an eluvial horizon and its underlying B horizon.

BOUDIN, BOUDINAGE. From a French word for sausage, describes the way that layers of rock break up under extension. Imagine the hand, fingers together, flat on the table, encased in soft clay and being squeezed from above, as being like a layer of rock. As the spreading clay moves the fingers (sausages) apart, the most mobile rock fractions are drawn or squeezed into the developing gaps.

BURIED SOIL. A developed soil that was once exposed but is now overlain by a more recently formed soil.

CALCAREOUS SOIL. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

CARBONATE MORPHOLOGY STAGES. Descriptive classes of calcite precipitation indicating increasing pedogenesis over time:

Stage	Description	Percent Carbonate
I	Bk horizon with few filaments and coatings	<10
I+	Bk with common filaments and continuous clast coatings	<10
II	Bk with continuous clast coatings, white masses, few nodules	>10
II+	Bk as above, but matrix is completely whitened, common nodules	>15
>II	K horizon that is 90% white, many nodules	>20
III+	K that is completely plugged	>40
IV	K as above, but upper part cemented and has weak platy structure	>50
V	K same as above, but laminar layer is strong with incipient brecciation	>50
VI	K brecciation and recementation, as well as pisoliths, are common	>50

CATENA. A sequence of soils of about the same age, derived from similar parent material and forming under similar climatic conditions, but having different characteristics due to variation in relief and drainage. (See also TOPOSEQUENCE.)

CEC. Cation exchange capacity. The amount of negative charge balanced by positively charged ions (cations) that are exchangeable by other cations in solution (meq/100 g soil = cmol(+)/kg soil).

CLAY. As a soil separate, the mineral soil particles are less than 0.002 mm in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

CLAY FILM. A coating of oriented clay on the surface of a sand grain, pebble, soil aggregate, or ped. Clay films also line pores or root channels and bridge sand grains. Frequency classification is based on the percent of the ped faces and/or pores that contain films: very few--<5%; few--5-25%; common--25-50%; many--50-90%; and continuous--90-100%. Thickness classification is based on visibility of sand grains: thin--very fine sand grains standout; moderately thick--very fine sand grains impart microrelief to film; thick--fine sand grains enveloped by clay and films visible without magnification. Synonyms: clay skin, clay coat, argillan, illuviation cutan.

CLAY LAMELLAE. Thin, generally wavy bands that appear as multiple micro-Bt horizons at the base of the solum in sandy Holocene deposits. The lamellae generally are 1-3 cm in thickness and 5 to 30 cm apart. There may be two to six or more clay lamellae comprising the Bt horizon of such a soil.

COBBLE. Rounded or partially rounded fragments of rock ranging from 7.5 to 25 cm in diameter.

COLLUVIUM. Any loose mass of soil or rock fragments that moves downslope largely by the force of gravity. Usually it is thicker at the base of the slope.

COLLUVIUM-FILLED SWALE. The prefailure topography of the source area of a debris flow.

COMPARATIVE PEDOLOGY. The comparison of soils, particularly through examination of features known to evolve through time.

CONCRETIONS. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

CONDUCTIVITY. The ability of a soil solution to conduct electricity, generally expressed as the reciprocal of the electrical resistivity. Electrical conductance is the reciprocal of the resistance (1/R = 1/ohm = ohm^{-1} = mho [reverse of ohm] = siemens = S), while electrical conductivity is the reciprocal of the electrical resistivity (EC = 1/r = 1/ohm-cm = mho/cm = S/cm or mmho/cm = dS/m). EC, expressed as uS/cm, is equivalent to the ppm of salt in solution when multiplied by 0.640. Pure rain water has an EC of 0, standard 0.01 N KCl is 1411.8 uS at 25C, and the growth of salt-sensitive crops is restricted in soils having saturation extracts with an EC greater than 2,000 uS/cm. Measurements in soils are usually performed on 1:1 suspensions containing one part by weight of soil and one part by weight of distilled water.

CONSISTENCE, SOIL. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are --

> Loose.--Noncoherent when dry or moist; does not hold together in a mass.
>
> Friable.--When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
>
> Firm.--When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
>
> Plastic.--When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
>
> Sticky.--When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.
>
> Hard.--When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
>
> Soft.--When dry, breaks into powder or individual grains under very slight pressure.
>
> Cemented.--Hard and brittle; little affected by moistening.

CTPOT. Easily remembered acronym for climate, topography, parent material, organisms, and time; the five factors of soil formation.

CUMULIC. A soil horizon that has undergone aggradation coincident with its active development.

CUTAN. (See Clay Film.)

DEBRIS FLOW. Incoherent or broken masses of rock, soil, and other debris that move downslope in a manner similar to a viscous fluid.

DEBRIS SLOPE. A constant slope with debris on it from the free face above.

DEGRADATION. A modification of the earth's surface by erosion.

DURIPAN. A subsurface soil horizon that is cemented by illuvial silica, generally deposited as opal or microcrystalline silica, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or HCl.

ELUVIATION. The removal of soluble material and solid particles, mostly clay and humus, from a soil horizon by percolating water.

EOLIAN. Deposits laid down by the wind, landforms eroded by the wind, or structures such as ripple marks made by the wind.

FAULT-LINE SCARP. A scarp that has been produced by differential erosion along an old fault line.

FAULTSLIDE. A landslide that shows physical evidence of its interaction with a fault.

FIRST-ORDER DRAINAGE. The most upstream, field-discernible concavity that conducts water and sediments to lower parts of a watershed.

FLOOD PLAIN. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

FOSSIL FISSURE. A buried rectilinear chamber associated with extension due to ground movement. The chamber must be oriented along the strike of the shear and must have vertical and horizontal dimensions greater than its width. It must show no evidence of faunal activity and its walls may have silt or clay coatings indicative of frequent temporary saturation with ground water. May be mistaken for an animal burrow. Also known as a paleofissure.

FRIABILITY. Term for the ease with which soil crumbles. A friable soil is one that crumbles easily.

GENESIS, SOIL. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum (A and B horizons) from the unconsolidated parent material.

GEOMORPHIC. Pertaining to the form of the surface features of the earth. Specifically, geomorphology is the analysis of landforms and their mode of origin.

GLEYED SOIL. A soil having one or more neutral gray horizons as a result of water logging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent water logging.

GRAVEL. Rounded or angular fragments of rock 2 to 75 mm in diameter. Soil textures with >15% gravel have the prefix "gravelly" and those with >90% gravel have the suffix "gravel."

HIGHSTAND. The highest elevation reached by the ocean during an interglacial period.

HOLOCENE. The most recent epoch of geologic time, extending from 10 ka to the present.

HORIZON, SOIL. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major soil horizons:

> O horizon.--The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.
>
> A horizon.--The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).
>
> E horizon -- This eluvial horizon is light in color, lying beneath the A horizon and above the B horizon. It is made up mostly of sand and silt, having lost most of its clay and iron oxides through reduction, chelation, and translocation.
>
> B horizon.--The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these.
>
> C horizon.--The relatively unweathered material immediately beneath the solum. Included are sediment, saprolite, organic matter, and bedrock excavatable with a spade. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a number precedes the letter C.
>
> R horizon.--Consolidated rock not excavatable with a spade. It may contain a few cracks filled with roots or clay or oxides. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Major horizons may be further distinguished by applying prefix Arabic numbers to designate differences in parent materials as they are encountered (e.g., 2B, 2BC, 3C) or by applying suffix numerals to designate minor changes (e.g., B1, B2).

The following is from the Natural Resources Conservation Service, except for the proposed addition of mn:

“Suffix Symbols

Lowercase letters are used as suffixes to designate specific kinds of master horizons and layers.

The term “accumulation” is used in many of the definitions of such horizons to indicate that these horizons must contain more of the material in question than is presumed to have been present in the parent material. The suffix symbols and their meanings are as follows:

a Highly decomposed organic material

This symbol is used with O to indicate the most highly decomposed organic materials, which have a fiber content of less than 17 percent (by volume) after rubbing.

b Buried genetic horizon

This symbol is used in mineral soils to indicate identifiable buried horizons with major genetic features that were developed before burial. Genetic horizons may or may not have formed in the overlying material, which may be either like or unlike the assumed parent material of the buried soil. This symbol is not used in organic soils, nor is it used to separate an organic layer from a mineral layer.

c *Concretions or nodules*

This symbol indicates a significant accumulation of concretions or nodules. Cementation is required. The cementing agent commonly is iron, aluminum, manganese, or titanium. It cannot be silica, dolomite, calcite, or more soluble salts.

co *Coprogenous earth*

This symbol, used only with L, indicates a limnic layer of coprogenous earth (or sedimentary peat).

d *Physical root restriction*

This symbol indicates noncemented, root-restricting layers in natural or human-made sediments or materials. Examples are dense basal till, plowpans, and other mechanically compacted zones.

di *Diatomaceous earth*

This symbol, used only with L, indicates a limnic layer of diatomaceous earth.

e *Organic material of intermediate decomposition*

This symbol is used with O to indicate organic materials of intermediate decomposition. The fiber content of these materials is 17 to 40 percent (by volume) after rubbing.

f *Frozen soil or water*

This symbol indicates that a horizon or layer contains permanent ice. The symbol is not used for seasonally frozen layers or for dry permafrost.

ff *Dry permafrost*

This symbol indicates a horizon or layer that is continually colder than 0^{o} C and does not contain enough ice to be cemented by ice. This suffix is not used for horizons or layers that have a temperature warmer than 0^{o} C at some time of the year.

g *Strong gleying*

This symbol indicates either that iron has been reduced and removed during soil formation or that saturation with stagnant water has preserved it in a reduced state. Most of the affected layers have chroma of 2 or less, and many have redox concentrations. The low chroma can represent either the color of reduced iron or the color of uncoated sand and silt particles from which iron has been removed. The symbol g is not used for materials of low chroma that have no history of wetness, such as some slates or E horizons. If g is used with B, pedogenic change in addition to gleying is implied. If no other pedogenic change besides gleying has taken place, the horizon is designated Cg.

h *Illuvial accumulation of organic matter*

This symbol is used with B to indicate the accumulation of illuvial, amorphous, dispersible complexes of organic matter and sesquioxides if the sesquioxide component is dominated by aluminum but is present only in very small quantities. The organo-sesquioxide material coats sand and silt particles. In some horizons these coatings have coalesced, filled pores, and cemented the horizon. The symbol h is also used in combination with s as "Bhs" if the amount of the sesquioxide component is significant but the color value and chroma, moist, of the horizon are 3 or less.

i *Slightly decomposed organic material*

This symbol is used with O to indicate the least decomposed of the organic materials. The fiber content of these materials is 40 percent or more (by volume) after rubbing.

j *Accumulation of jarosite*

Jarosite is a potassium or iron sulfate mineral that is commonly an alteration product of pyrite that has been exposed to an oxidizing environment. Jarosite has hue of 2.5Y or yellower and normally has chroma of 6 or more, although chromas as low as 3 or 4 have been reported. [Note: No longer used to indicate "juvenile."]

jj *Evidence of cryoturbation*

Evidence of cryoturbation includes irregular and broken horizon boundaries, sorted rock fragments, and organic soil materials existing as bodies and broken layers within and/or between mineral soil layers. The organic bodies and layers are most commonly at the contact between the active layer and the permafrost.

k *Accumulation of secondary carbonates*

This symbol indicates an accumulation of visible pedogenic calcium carbonate (less than 50 percent, by volume). Carbonate accumulations exist as carbonate filaments, coatings, masses, nodules, disseminated carbonate, or other forms.

kk *Engulfment of horizon by secondary carbonates*

This symbol indicates major accumulations of pedogenic calcium carbonate. The suffix kk is used when the soil fabric is plugged with fine grained pedogenic carbonate (50 percent or more, by volume) that exists as an essentially continuous medium. The suffix corresponds to the stage III plugged horizon or higher of the carbonate morphogenetic stages (Gile et al., 1966).

m *Cementation or induration*

This symbol indicates continuous or nearly continuous cementation. It is used only for horizons that are more than 90 percent cemented, although they may be fractured. The cemented layer is physically root-restrictive. The dominant cementing agent (or the two dominant ones) may be indicated by adding defined letter suffixes, singly or in pairs. The horizon suffix km or kkm indicates cementation by carbonates; qm, cementation by silica; sm, cementation by iron; yym, cementation by gypsum; kqm, cementation by lime and silica; and zm, cementation by salts more soluble than gypsum.

ma *Marl*

This symbol, used only with L, indicates a limnic layer of marl.

mn *Mangans*

This symbol indicates an accumulation of manganese oxide, generally as ped coatings called mangans (First used by Borchardt on 20130418.)

n *Accumulation of sodium*

This symbol indicates an accumulation of exchangeable sodium.

o *Residual accumulation of sesquioxides*

This symbol indicates a residual accumulation of sesquioxides.

p *Tillage or other disturbance*

This symbol indicates a disturbance of the surface layer by mechanical means, pasturing, or similar uses. A disturbed organic horizon is designated Op. A disturbed mineral horizon is designated Ap even though it is clearly a former E, B, or C horizon.

q *Accumulation of silica*

This symbol indicates an accumulation of secondary silica.

r *Weathered or soft bedrock*

This symbol is used with C to indicate cemented layers (moderately cemented or less cemented). Examples are weathered igneous rock and partly consolidated sandstone, siltstone, or slate. The excavation difficulty is low to high.

s *Illuvial accumulation of sesquioxides and organic matter*

This symbol is used with B to indicate an accumulation of illuvial, amorphous, dispersible complexes of organic matter and sesquioxides if both the organic-matter and sesquioxide components are significant and if either the color value or chroma, moist, of the horizon is 4 or more. The symbol is also used in combination with h as "Bhs" if both the organic-matter and sesquioxide components are significant and if the color value and chroma, moist, are 3 or less.

se *Presence of sulfides*

Typically dark colors (e.g., value <4, chroma <2); may have a sulphurous odor.

ss *Presence of slickensides*

This symbol indicates the presence of slickensides. Slickensides result directly from the swelling of clay minerals and shear failure, commonly at angles of 20 to 60 degrees above horizontal. They are indicators that other vertic characteristics, such as wedge-shaped peds and surface cracks, may be present.

t *Accumulation of silicate clay*

This symbol indicates an accumulation of silicate clay that either has formed *in situ* within a horizon or has been moved into the horizon by illuviation, or both. At least some part of the horizon should show evidence of clay accumulation either as coatings on surfaces of peds or in pores, as lamellae, or as bridges between mineral grains.

u *Presence of human-manufactured materials (artifacts)*

This symbol indicates the presence of manufactured artifacts that have been created or modified by humans, usually for a practical purpose in habitation, manufacturing, excavation, or construction activities. Examples of artifacts are processed wood products, liquid petroleum products, coal, combustion by-products, asphalt, fibers and fabrics, bricks, cinder blocks, concrete, plastic, glass, rubber, paper, cardboard, iron and steel, altered metals and minerals, sanitary and medical waste, garbage, and landfill waste.

v *Plinthite*

This symbol indicates the presence of iron-rich, humus-poor, reddish material that is firm or very firm when moist and hardens irreversibly when exposed to the atmosphere and to repeated wetting and drying.

w *Development of color or structure*

This symbol is used with B to indicate the development of color or structure, or both, with little or no apparent illuvial accumulation of material. It should not be used to indicate a transitional horizon.

x *Fragipan character*

This symbol indicates a genetically developed layer that has a combination of firmness and brittleness and commonly a higher bulk density than the adjacent layers. Some part of the layer is physically root-restrictive.

y *Accumulation of gypsum*

This symbol indicates an accumulation of gypsum (<50% by volume).

yy *Dominance of gypsum*

This symbol indicates an accumulation of gypsum (>50% by volume); light colored (e.g., value >7, chroma <4); may be pedogenically derived or inherited transformation of primary gypsum from parent material.

z *Accumulation of salts more soluble than gypsum*

This symbol indicates an accumulation of salts that are more soluble than gypsum; e.g., NaCl.

HUMUS. The well-decomposed, more or less stable part of the organic matter in mineral soils.

ILLUVIATION. The deposition by percolating water of solid particles, mostly clay or humus, within a soil horizon.

INTERFLUVE. The land lying between streams.

ISOCHRONOUS BOUNDARY. A gradational boundary between two sedimentary units indicating that they are approximately the same age. Opposed to a nonisochronous boundary, which by its abruptness indicates that it delineates units having significant age differences.

KROTOVINA. An animal burrow filled with soil.

LEACHING. The removal of soluble material from soil or other material by percolating water.

LOWSTAND. The lowest elevation reached by the ocean during a glacial period.

MANGAN. A thin coating of manganese oxide (cutan) on the surface of a sand grain, pebble, soil aggregate, or ped. Mangans also line pores or root channels and bridge sand grains.

MODERN SOIL. The portion of a soil section that is under the influence of current pedogenetic conditions. It generally refers to the uppermost soil regardless of age.

MODERN SOLUM. The combination of the A and B horizons in the modern soil.

MORPHOLOGY, SOIL. The physical make-up of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

MOTTLING, SOIL. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance--few, common, and many; size--fine, medium, and coarse; and contrast--faint, distinct and prominent. The size measurements are these: fine, less than 5 mm in diameter along the greatest dimension; medium, from 5 to 15 mm, and coarse, more than 15 mm.

MRT (MEAN RESIDENCE TIME.) The average age of the carbon atoms within a soil horizon. Under ideal reducing conditions, the humus in a soil will have a C-14 age that is half the true age of the soil. In oxic soils humus is typically destroyed as fast as it is produced, generally yielding MRT ages no older than 300-1000 years, regardless of the true age of the soil.

MUNSELL COLOR NOTATION. Scientific description of color determined by comparing soil to a Munsell Soil Color Chart (Available from Macbeth Division of Kollmorgen Corp., 2441 N. Calvert St., Baltimore, MD 21218). For example, dark yellowish brown is denoted as 10YR3/4m in which the 10YR refers to the hue or proportions of yellow and red, 3 refers to value or lightness (0 is black and 10 is white), 4 refers to chroma (0 is pure black and white and 20 is the pure color), and m refers to the moist condition rather than the dry (d) condition.

OVERBANK DEPOSIT. Fine-grained alluvial sediments deposited from floodwaters outside of the fluvial channel.

OXIC. A soil having a high redox potential. Such soils typically are well drained, seldom being waterlogged or lacking in oxygen. Rubification in such soils tends to increase with age.

PALEO SOIL TONGUE. A soil tongue that formed during a previous soil-forming interval.

PALEOSEISMOLOGY. The study of prehistoric earthquakes through the examination of soils, sediments, and rocks.

PALEOSOL. A soil that formed on a landscape in the past with distinctive morphological features resulting from a soil-forming environment that no longer exists at the site. The former pedogenic process was either altered because of external environmental change or interrupted by burial.

PALINSPASTIC RECONSTRUCTION. Diagrammatic reconstruction used to obtain a picture of what geologic and/or soil units looked like before their tectonic deformation.

PARENT MATERIAL. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

PED. An individual natural soil aggregate, such as a granule, a prism, or a block.

PEDOCHRONOLOGY. The study of pedogenesis with regard to the determination of when soil formation began, how long it occurred, and when it stopped. Also known as soil dating. Two ages and the calculated duration are important:

t_o = age when soil formation or aggradation began, ka

t_b = age when the soil or stratum was buried, ka

t_d = duration of soil development or aggradation, ky

Pedochronological estimates are based on available information. All ages should be considered subject to $\pm$50% variation unless otherwise indicated.

PEDOCHRONOPALEOSEISMOLOGY. The study of prehistoric earthquakes by using pedochronology.

PEDOLOGY. The study of the process through which rocks, sediments, and their constituent minerals are transformed into soils and their constituent minerals at or near the surface of the earth.

PEDOGENESIS. The process through which rocks, sediments, and their constituent minerals are transformed into soils and their constituent minerals at or near the surface of the earth.

PERCOLATION. The downward movement of water through the soil.

pH VALUE. The negative log of the hydrogen ion concentration. Measurements in soils are usually performed on 1:1 suspensions containing one part by weight of soil and one part by weight of distilled water. A soil with a pH of 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid or "sour" soil is one that gives an acid reaction; an alkaline soil is one that gives an alkaline reaction. In words, the degrees of acidity or alkalinity are expressed as:

Extremely acid	<4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	>9.0
Used if significant:	
Very slightly acid	6.6 to 6.9
Very mildly alkaline	7.1 to 7.3

PHREATIC SURFACE. (See Water Table.)

PLANATION. The process of erosion whereby a portion of the surface of the Earth is reduced to a fundamentally even, flat, or level surface by a meandering stream, waves, currents, glaciers, or wind.

PLEISTOCENE. An epoch of geologic time extending from 10 ka to 1.8 Ma; it includes the last Ice Age.

PROFILE, SOIL. A vertical section of the soil through all its horizons and extending into the parent material.

QUATERNARY. A period of geologic time that includes the past 1.8 Ma. It consists of two epochs--the Pleistocene and Holocene.

PROGRADATION. The building outward toward the sea of a shoreline or coastline by nearshore deposition.

RELICT SOIL. A surface soil that was partly formed under climatic conditions significantly different from the present.

RUBIFICATION. The reddening of soils through the release and precipitation of iron as an oxide during weathering. Munsell hues and chromas of well-drained soils generally increase with soil age.

SALINE SOIL. A soil that contains soluble salts in amounts that impair the growth of crop plants but that does not contain excess exchangeable sodium.

SAND. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 mm. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

SECONDARY FAULT. A minor fault that bifurcates from or is associated with a primary fault. Movement on a secondary fault never occurs independently of movement on the primary, seismogenic fault.

SHORELINE ANGLE. The line formed by the intersection of the wave-cut platform and the sea cliff. It approximates the position of sea level at the time the platform was formed.

SILT. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of very find sand (0.05 mm.) Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

SLICKENSIDES. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may form along a fault plane; at the bases of slip surfaces on steep slopes; on faces of blocks, prisms, and columns undergoing shrink-swell. In tectonic slickensides the striations are strictly parallel.

SLIP RATE. The rate at which the geologic materials on the two sides of a fault move past each other over geologic time. The slip rate is expressed in mm/yr, and the applicable duration is stated. Faults having slip rates less than 0.01 mm/yr are generally considered inactive, while faults with Holocene slip rates greater than 0.1 mm/yr generally display tectonic geomorphology.

SMECTITE. A fine, platy, aluminosilicate clay mineral that expands and contracts with the absorption and loss of water. It has a high cation-exchange capacity and is plastic and sticky when moist.

SOIL. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

SOIL SEISMOLOGIST. Soil scientist who studies the effects of earthquakes on soils.

SOIL SLICKS. Curvilinear striations that form in swelling clayey soils, where there is marked change in moisture content. Clayey slopes buttressed by rigid materials may allow minor amounts of gravitationally driven plastic flow, forming soil slicks sometimes mistaken for evidence of tectonism. Soil slicks disappear with depth and the striations are seldom strictly parallel as they are when movement is major. (See also SLICKENSIDES.)

SOIL TECTONICS. The study of the interactions between soil formation and tectonism.

SOIL TONGUE. That portion of a soil horizon extending into a lower horizon.

SOLUM. Combined A and B horizons. Also called the true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

STONELINE. A thin, buried, planar layer of stones, cobbles, or bedrock fragments. Stonelines of geological origin may have been deposited upon a former land surface. The fragments are more often pebbles or cobbles than stones. A stoneline generally overlies material that was subject to weathering, soil formation, and erosion before deposition of the overlying material. Many stonelines seem to be buried erosion pavements, originally formed by running water on the land surface and concurrently covered by surficial sediment.

STRATH TERRACE. A gently sloping terrace surface bearing little evidence of aggradation.

STRUCTURE, SOIL. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are--platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

SUBSIDIARY FAULT. A branch fault that extends a substantial distance from the main fault zone.

TECTOTURBATION. Soil disturbance resulting from tectonic movement.

TEXTURE, SOIL. Particle size classification of a soil, generally given in terms of the USDA system which uses the term "loam" for a soil having equal properties of sand, silt, and clay. The basic textural classes, in order of their increasing proportions of fine particles are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sand clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

TOPOSEQUENCE. A sequence of kinds of soil in relation to position on a slope. (See also CATENA.)

TRANSLOCATION. The physical movement of soil particles, particularly fine clay, from one soil horizon to another under the influence of gravity.

UNIFIED SOIL CLASSIFICATION SYSTEM. The particle size classification system used by the U.S. Army Corps of Engineers and the Bureau of Reclamation. Like the ASTM and AASHO systems, the sand/silt boundary is at 80 um instead of 50 um used by the USDA. Unlike all other systems, the gravel/sand boundary is at 4 mm instead of 2 mm and the silt/clay boundary is determined by using Atterberg limits.

VERTISOL. A soil with at least 30% clay, usually smectite, that fosters pronounced changes in volume with change in moisture. Cracks greater than 1 cm wide appear at a depth of 50 cm during the dry season each year. One of the ten USDA soil orders.

WATER TABLE. The upper limit of the soil or underlying rock material that is wholly saturated with water. Also called the phreatic surface.

WAVE-CUT PLATFORM. The relatively smooth, slightly seaward-dipping surface formed along the coast by the action of waves generally accompanied by abrasive materials.

WEATHERING. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

WETTING FRONT. The greatest depth affected by moisture due to precipitation.

yr B.P. Uncorrected radiocarbon age expressed in years before present, calculated from 1950. Calendar-corrected ages are expressed in ka, or, if warranted, as A.D. or B.C.

APPENDIX F

Asbestos Assessment

AllWest Environmental, Inc.

January 2012

AllWest Environmental, Inc.

Specialists in Physical Due
Diligence and Remedial Services

530 Howard Street, Suite 300
San Francisco, CA 94105
Tel 415.391.2510
Fax 415.391.2008

ASBESTOS ASSESSMENT

Almaden Country Club
6663 Hampton Drive
San Jose, California 95120

PREPARED FOR:

Almaden Country Club
6663 Hampton Drive
San Jose, California 95120

ALLWEST PROJECT 11141.30
January 3, 2012

PREPARED BY:

Kevin Reeve
Operations Manager

REVIEWED BY:

Bob Gerhold
Project Manager
Certified Asbestos Consultant #92-0157

TABLE OF CONTENTS

AllWest Environmental, Inc.

Specialists in Physical Due
Diligence and Remedial Services

530 Howard Street, Suite 300
San Francisco, CA 94105
Tel 415.391.2510
Fax 415.391.2008

ASBESTOS ASSESSMENT

Almaden Country Club
6663 Hampton Drive
San Jose, California

I. EXECUTIVE SUMMARY

AllWest Environmental was retained by Almaden Country Club, to identify asbestos containing materials (ACM) and or Asbestos Containing Construction Materials (ACCM), at the above referenced property. On December 15 and 16, 2011 Mr. Kevin D. Reeve conducted the asbestos assessment.

This executive summary is provided solely for the purpose of overview. Any party who relies on this report must read the full report. The executive summary may omit a number of details, any one of which could be crucial to the proper understanding and risk assessment of the subject matter.

The subject property is a private golf club located at 6663 Hampton Drive, San Jose, California. The assessment was limited to the Club House Buildings: a two-story structure designed and constructed in 1976 (Building A) and the single-story structure designed and constructed in 1966 (Building B).

The purpose of the assessment was to aide planning of future renovations. AllWest surveyed the buildings and identified 23 types of suspect ACM within the premises. We collected suspect ACM bulk samples from wallboard and joint compound, wall texturing, cove base mastic, resilient sheet flooring, 2' x 4' ceiling panels, 1' x 1' tacked ceiling tiles, thermal system insulation fittings and runs, ceramic floor and wall tile, exterior stucco, roofing field and duct seam sealant. One or more representative bulk samples of each type of suspect ACM were collected during the survey. Except for actual sample collection, the investigation did not involve destructive testing. Forty-one (41) suspect ACM samples were collected.

Identified ACMs at the property include:

- Wallboard and joint compound (throughout Buildings A and B);
- Wall texturing (throughout Buildings A and B);
- Duct seam sealant (roof of Building A);
- Red resilient flooring (snack bar);
- Thermal system insulation on runs and fittings (throughout Building B and possibly Building A)

No other materials analyzed were reported to contain asbestos.

In general, identified ACM'S were in good condition. The Bay Area Air Quality Management District (BAAQMD) and Cal/OSHA regulate ACM in California. Prior to disturbance by demolition or renovation, ACM materials must be removed. AllWest recommends the identified ACM be removed prior to renovation and or demolition.

II. BUILDING DESCRIPTION

The subject property is a private golf club located at 6663 Hampton Drive, San Jose, California. The Club House buildings AllWest evaluated are: the two-story structure designed and constructed in 1976 (Building A) is utilized for offices, dining rooms and a kitchen; and the single-story structure designed and constructed in 1966 (Building B) is utilized for a golf pro shop, men's and women's locker rooms, snack bar and maintenance offices. The buildings contain typical construction materials of that era including textured and non-textured drywall/taping mud, resilient sheet flooring, carpeting, lay-in ceiling panels, tacked-on ceiling tiles, cove base and ceramic floor tiles.

The buildings are approximately 24,645 square feet in size. Interior finishes included wall to wall carpeting, resilient sheet flooring, textured and non-textured drywall/taping mud, ceramic floor and wall tiles, lay-in ceiling panels, tacked-on ceiling tiles, duct seam sealant, thermal system insulation and cove base and associated mastic. The building is currently occupied by the Almaden Country Club.

III. ASBESTOS INVESTIGATIVE METHODS

Bulk Samples

The survey identified and sampled homogenous, suspect asbestos containing materials including drywall/taping compound, wall texturing, ceramic floor tile, grout and mortar, cove base mastic, resilient sheet flooring, lay-in ceiling panels, tacked-on ceiling tiles, thermal system insulation, exterior stucco, roofing field and duct seam sealant. Forty-one (41) samples were collected during the assessment.

Sampling Methodology

Representative asbestos bulk samples were collected from discrete locations throughout the building. Sampling was performed in a manner that minimized damage and potential asbestos exposure to the surveyor and building occupants. The samples were collected using hand tools which are routinely decontaminated between each sampling to prevent cross contamination. Each individual sample is placed into a separate, clean sample bag and assigned a unique sample identification number. The number and type of samples collected were chosen in a "manner sufficient to determine" asbestos content for remodeling.

For wallboard systems comprised of joint compound and or texture coat, the wallboard system components were collected together and composited by the laboratory to meet local Air Quality Management District (AQMD) removal notification requirements.

Many building materials are often comprised of inseparable or associated layers. Examples of this type are multiple vinyl floor tile layers, mastics, adhesives, linoleums and paper backings. For these types of samples, the laboratory analyzes and provides a result for each separate layer.

Laboratory Analytical Methods

Material identification of the suspect asbestos samples was performed by *Micron Labs* located in El Monte, California, using Polarized Light Microscopy with Dispersion Staining (PLM/DS) in accordance with the U.S. EPA "Method for the Determination of Asbestos in Bulk Building Materials" (EPA-600/R-93/116, July, 1993).

Reported results for similar samples may vary due to lack of sample homogeneity, varying composition, on site mixing of materials during original installation and analyst variability. Results are reported as a percent range of total asbestos present. Also specified in the analytical are the type(s) of asbestos detected. Other, non-asbestos materials may also be identified in the analysis with the percent concentration.

None Detected

When "None Detected" appears on a report, it means that asbestos was not observed and that, if present, it exists in concentrations less than the limit of reliable detection (< 1%) and/or the fiber dimensions are too small for accurate optical microscopic resolution by normal PLM methodology.

Trace Asbestos

Reported results are the microscopist's visual estimate by area of asbestos concentration. These estimates are then formulated into results given in percent of asbestos by weight. Results for heterogeneous samples examined by component are reported as a composite. For example, if sheetrock joint compound percentage was 2-3% asbestos, the composite result may be reported as <1% (Trace), asbestos for the sheetrock system. The lower limit of reliable detection for the PLM method is 1%. Samples which contain more than 1% asbestos are reported in 1% ranges. For a lower limit of detection, "point counting" gravimetry is used. This method is described below.

Point Counting

The USEPA in 1990, required point counting results to be reported on their removal notifications for certain materials with PLM results of less than 10% asbestos. Point counting is conducted by the EPA Method 600/R-93/116 or 600/M4-82-020 and is a quantitative method, which allows more precision than standard PLM analysis.

Asbestos Material Categories

Federal regulations provide "categories" to classify asbestos material types. In California, Air Quality Management Districts require ACM be listed by category in their notification forms. Table 1 below, which provides the asbestos sampling results, also provides categories for these materials.

The **Regulated Asbestos Containing Material (RACM)** category designation is for friable asbestos, sprayed on or toweled-on surfacing, fireproofing or thermal system insulation (TSI).

The **Category I** designation is used for non-friable materials such as: tar based roofing, mastics, putties, paints, vinyl floor tile and resilient sheet flooring (excepting the friable paper backing).

The **Category II** designation is used for certain other types of non-friable materials such as: Transite pipe and panels, cementitious products, gaskets, clapboard, siding shingles, or any non-friable materials that would be rendered friable by mechanical means during removal. Category I materials may be demolished in place depending upon the means of demolition. Note that Vinyl Floor Tile is considered to be rendered friable by some mechanical removal or demolition means.

IV. ASBESTOS SAMPLING DATA

Identified ACMs at the property include:

- Wallboard and joint compound (throughout Buildings A and B);
- Wall texturing (throughout Buildings A and B);
- Duct seam sealant (roof of Building A);
- Red resilient flooring (snack bar);
- Thermal system insulation on runs and fittings (throughout Building B and possibly Building A)

No other materials analyzed were reported to contain asbestos. Asbestos sampling data is presented in Appendix A.

V. CONCLUSIONS AND RECOMMENDATIONS

Asbestos containing materials were identified in wallboard and joint compound, wall texturing, resilient sheet flooring, duct seam sealant and thermal system insulation within the assessed structures. The ACM was found to be intact and in good condition.

Prior to renovation/demolition, ACM materials must be removed. The removal requires compliance with applicable Cal/OSHA and Bay Air Quality Management District (BAAMQD) regulations. Contractors conducting removal must complete, pay for and file notifications. Asbestos abatement contractors must be registered through Cal/OSHA. Removal of the wallboard and joint compound, wall texturing and thermal system insulation is considered Class I work by OSHA while resilient flooring and duct seam sealant is typically considered Class II. Waste generated from Class I work is considered friable asbestos-containing waste while Class II removal is usually non-hazardous, asbestos containing waste.

No further assessment is recommended.

VI. LIMITATIONS

This Asbestos, Lead and Hazardous Material Survey report was prepared for the sole and exclusive use of *Almaden Country Club,* the only intended beneficiary of our work. This report is intended exclusively for the purpose outlined herein and the site locations and project indicated and is intended to be used in its entirety. No excerpts may be taken to be representative of the findings of this assessment. The scope of services performed in execution of this investigation may not be appropriate to satisfy other users, and any use or reuse of this document or its findings, conclusions or recommendations presented herein is at the sole risk of the user. This report is not a specification for further work and should not be used to bid out any of the recommendations found within. The survey report presents abatement options that are not intended to be used as, or take the place of an asbestos abatement work plan document. Roofing materials were excluded from this assessment.

The professional opinions set forth in this report are based solely upon and limited to *AllWest's* visual observations and data collected at the subject site. The opinions and recommendations in this report apply to site conditions and features as they existed at time of *AllWest's* work. They cannot necessarily apply to conditions and features of which *AllWest* is unaware and has not had the opportunity to evaluate. *AllWest* does not warrant or guarantee the subject property suitable for any particular purpose, or certify the subject site as "clean" or free of asbestos, lead paint or hazardous materials. As with any assessment, it is possible that existing ACM remains undiscovered. In the event of renovation or demolition of subject property, suspect building materials should be analyzed for asbestos content.

Any suspect ACMs or lead paint not identified by this survey which are likely to be disturbed by renovation or demolition activities in the subject building should either be analyzed for asbestos content or removed prior to such construction activities by a licensed asbestos abatement contractor using proper engineering controls (i.e. negative air enclosures) and work practices (i.e. wet removal methods).

APPENDIX A

Table A-1
Asbestos Sampling Data
6663 Hampton Drive
San Jose, California
Project No. 11141.30

Sample ID	Material	Sample Location	Approx Quantity	ACM Concentrations	Category
BUILDING A					
A-1A	Grout and mortar for 12" tan ceramic floor tile	2nd floor hallway near kitchen	NQ	ND	NA
A-2A	Grout and mortar for 6" red ceramic floor tile	2nd floor near ice machine	NQ	ND	NA
A-3A	2'x2' lay-in ceiling panels	2nd floor dinning room	NQ	NA	NA
A-3B	2'x2' lay-in ceiling panels	2nd floor storage room	NQ	NA	NA
A-4A	Wallboard and joint compound	2nd floor storage room		wallboard: ND JC: <1% chrysotile	RACM
A-4B	Wallboard and joint compound	1st floor storage room	20,000 SF	wallboard: ND JC: <1% chrysotile	RACM
A-4C	Wallboard and joint compound	1st floor break room		wallboard: ND JC: <1% chrysotile	RACM
A-5A	Wall texturing	1st floor break room		<1% chrysotile	RACM
A-5B	Wall texturing	1st floor hallway		<1% chrysotile	RACM
A-5C	Wall texturing	1st floor kitchen	20,000 SF	ND	RACM
A-5D	Wall texturing	1st floor office area		ND	RACM
A-5E	Wall texturing	1st floor storage area		ND	RACM
A-6A	Exterior stucco	exterior of east wall	NQ	ND	NA
A-7A	2' x 4' white ceiling panels with gouges	1st floor hallway	NQ	ND	NA
A-7B	2' x 4' white ceiling panels with gouges	1st floor break room	NQ	ND	NA
A-8A	Cove base mastic	1st floor storage room	NQ	ND	NA
A-9A	Grout and mortar for 12" tan marble pattern ceramic floor tile	1st floor men's room	NQ	ND	NA
A-10A	Roofing field	Roof near roof hatch	NQ	ND	NA
A-11A	Duct seam sealant	Duct near roof hatch	150 SF	5% chrysotile	Category I
BUILDING B					
B-1A	Grout and mortar for 4" grey ceramic wall tile	Men's locker room	NQ	ND	NA
B-2A	Grout and mortar for 12" grey ceramic floor tile	Men's locker room	NQ	ND	NA
B-3A	12" tacked white ceiling tiles	Pro shop office	NQ	ND	NA
B-3B	12" tacked white ceiling tiles	Pro shop office	NQ	ND	NA
B-4A	Wallboard and joint compound	Closet near pro shop		wallboard: ND JC: <1% chrysotile	RACM
B-4B	Wallboard and joint compound	1st floor mechanical room	12,000 SF	wallboard: ND JC: <1% chrysotile	RACM
B-4C	Wallboard and joint compound	Shoe Room		wallboard: ND JC: <1% chrysotile	RACM
B-5A	Wall texturing	Men's locker room		ND	RACM
B-5B	Wall texturing	Shoe Room		ND	RACM
B-5C	Wall texturing	Pro shop office	12,000 SF	ND	RACM
B-5D	Wall texturing	pro shop		<1% chrysotile	RACM
B-5E	Wall texturing	closet near pro shop		<1% chrysotile	RACM
B-6A	Red resilient sheet flooring	Snack bar	225 SF	30% chrysotile	Category I
B-6B	Red resilient sheet flooring	Snack bar		NA	Category I

Sample ID	Material	Sample Location	Approx Quantity	ACM Concentrations	Category
B-7A	**Thermal system insulation runs**	**Mezzanine mechanical area**	**NQ***	**5% chrysotile 30% Amosite**	**RACM**
B-8A	**Thermal system insulation elbows**	**Mezzanine mechanical area**	**NQ***	**5% chrysotile 30% Amosite**	**RACM**
B-8B	**Thermal system insulation elbows**	**Mezzanine mechanical area**		**NA**	**RACM**
B-9A	2' x 4' white ceiling panels with gouges	Snack bar	NQ	ND	NA
B-9B	2' x 4' white ceiling panels with gouges	Snack bar	NQ	ND	NA
B-10A	Exterior stucco	South exterior wall	NQ	ND	NA
B-11A	Roofing field	Near entrance to mezzanine	NQ	ND	NA
B-12A	Roofing field	Covered walkway	NQ	ND	NA

Note:

RACM: friable asbestos, sprayed on or toweled-on surfacing, fireproofing or thermal system insulation (TSI)

Category I: non-friable materials such as: tar based roofing, mastics, putties, paints, vinyl floor tile and resilient sheet flooring (excepting the friable paper backing)

NQ: Not Quantified

ND: None Detected

NA: Not Applicable or Not Analyzed

LF: Linear Foot

SF: Square Foot

JC: Joint Compound

*: unable to quantify as material may be hidden within wall cavities

APPENDIX B

Bulk Sample Log

Micron Labs
El Monte, California

Company AllWest Envrionmental

No. of Samples 37

Client Project No. 11141.30

Client Project Ref. Almaden CC

Turnaround Time ☑ Normal ☐ Next Day ☐ Rush

☐ Analyze All ☑ Stop 1st Positive

For Lab Use Only

Micron Job No. 1311023

Sample Data Log

	Date Collected	Client Sample ID	Sample Location	Sample Description	Analytical Result
1	12/15/11	A-1A	hallway near kitchen	grout and mortar	ND
2	12/15/11	A-2A	near ice machine	grout and mortar	ND
3	12/15/11	A-3A	dining area	2'x2' rough ceiling panels	ND
4	12/15/11	A-3B	storage room 2nd floor	2'x2' rough ceiling panels	ND
5	12/15/11	A-4A	storage room 2nd floor	wallboard and joint comp	ND/<1 Chrys.
6	12/15/11	A-4B	1st floor storage room	wallboard and joint comp	ND/<1 ''
7	12/15/11	A-4C	1st floor break room	wallboard and joint comp	ND/ND
8	12/15/11	A-5A	1st floor break room	wall texturing	<1 Chrys.
9	12/15/11	A-5B	1st floor hallway	wall texturing	<1 ''
10	12/15/11	A-5C	1st floor kitchen hall	wall texturing	ND
11	12/15/11	A-5D	1st floor office area	wall texturing	ND
12	12/15/11	A-5E	1st floor storage area	wall texturing	ND
13	12/15/11	A-6A	exterior east wall	exterior stucco	ND
14	12/15/11	A-7A	1st floor hallway	2'x4' ceiling panels	ND
15	12/15/11	A-7B	1st floor break room	2'x4' ceiling panels	ND
16	12/15/11	A-8A	1st floor storage room	brown cove base mastic	ND
17	12/15/11	A-9A	1st floor men's room	grout and mortar	ND/ND
18	12/15/11	B-1A	Men's locker room	grout and mortar	ND/ND
19	12/15/11	B-2A	Men's locker room	grout and mortar	ND
20	12/15/11	B-3A	pro shop office	12" ceiling tile	ND

Relinquished by [signature]		Date 12/16/11	Time 1600
Received by [signature]		Date 12-16-11	Time 10:13 Am

A-1A, A-2A -- Grout only — B-2A - Mortar Only

Bulk Sample Log

Micron Labs
El Monte, California

Company AllWest Envrionmental

No. of Samples 37

Client Project No. 11141.30

Client Project Ref. Almaden CC

For Lab Use Only

Micron Job No. 1311023

Turnaround Time ☑ Normal ☐ Next Day ☐ Rush

☐ Analyze All ☑ Stop 1st Positive

Sample Data Log

	Date Collected	Client Sample ID	Sample Location	Sample Description	Analytical Result
1	12/15/11	B-3B	pro shop office	12" ceiling tile	ND
2	12/15/11	B-4A	closet near pro shop	wallboard and joint comp	ND / <1 Chrys
3	12/15/11	B-4B	1st floor mech. room	wallboard and joint comp	ND / <1 "
4	12/15/11	B-4C	Shoe room	wallboard and joint comp	ND / <1 "
5	12/15/11	B-5A	men's locker room	wall texturing	ND
6	12/15/11	B-5B	Shoe room	wall texturing	ND
7	12/15/11	B-5C	pro shop office	wall texturing	ND
8	12/15/11	B-5D	pro shop	wall texturing	<1 chry
9	12/15/11	B-5E	Closet near pro shop	wall texturing	<1 chry
10	12/15/11	B-6A	Snack bar	red resilient sheet flooring	30 Chry
11	12/15/11	B-6B	snack bar	red resilient sheet flooring	–
12	12/15/11	B-7A	Maint. mezzanine	TSI Runs	5 Chry 20 amos
13	12/15/11	B-8A	Maint. Mezzanine	TSI Elbows	5 Chry + 20 amos
14	12/15/11	B-8B	Maint. Mezzanine	TSI Elbows	–
15	12/15/11	B-9A	snack bar area	2'x4' ceiling panels	ND
16	12/15/11	B-9B	snack bar area	2'x4' ceiling panels	ND
17	12/15/11	B-10A	south exterior wall	exterior stucco	ND
18					
19					
20					

Relinquished by [signature]	Date 12/16/11	Time 1600
Received by [signature]	Date 12-16-11	Time 10:13 AM

Bulk Sample Log

Micron Labs
El Monte, California

Company AllWest Environmental

No. of Samples 4

Client Project No. 11141.30

Client Project Ref. Almaden CC

For Lab Use Only

Micron Job No. 1311024

Turnaround Time ☑ Normal ☐ Next Day ☐ Rush

☐ Analyze All ☑ Stop 1st Positive

Sample Data Log

	Date Collected	Client Sample ID	Sample Location	Sample Description	Analytical Result
1	12/16/11	A-10A	near roof hatch	roofing field	ND
2	12/16/11	A-11A	near roof hatch	Duct seam sealant	5% Chrys
3	12/16/11	B-11A	near maint. entrance	roofing field	ND
4	12/16/11	B-12A	covered walkway	roofing field	ND
5					
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18					
19					
20					

Relinquished by [signature]		Date 12/19/11	Time 0730
Received by [signature]		Date 12-20-11	Time 10:30

APPENDIX C

APPLICATION FOR AUTHORIZATION TO USE

REPORT TITLE: ASBESTOS ASSESSMENT
6663 HAMPTON DRIVE
SAN JOSE, CA 95120

PROJECT NUMBER: 11141.30

To: AllWest Environmental, Inc.
530 Howard Street, Suite 300
San Francisco, CA 94105

From (Applicant): ______________________________

____

____

(Please clearly identify name and address of person/entity applying for permission to use or copy this document)

Ladies and Gentlemen:

Applicant hereby applies for permission to rely upon AllWest's work product, as described above, for the purpose of: (state here the purpose for which you wish to rely upon the work product)

Applicant only can accept and rely upon AllWest work product under the strict understanding that Applicant is bound by all provisions in the Terms and Conditions attached to the report. Every report, recommendation, finding, or conclusion issued by AllWest shall be subject to the limitations stated in the Agreement and subject report(s). If this is agreeable, please sign below and return one copy of this letter to us along with the applicable fees. Upon receipt and if acceptable, our signed letter will be returned. AllWest may withhold permission at its sole discretion or require additional re-use fees or terms.

FEES: A $1,000 coordination and reliance fee, payable in advance, will apply. If desired, for an additional $75 report reproduction fee, we will reissue the report in the name of the Applicant; the report date, however, will remain the same. All checks will be returned if your request for reliance is not approved.

REQUESTED BY	**APPROVED BY**
______________________ Applicant Company	**AllWest Environmental, Inc.**
______________________ Print Name and Title	______________________ Print Name and Title
______________________ Signature and Date	______________________ Signature and Date

GENERAL CONDITIONS TO THE WORK AUTHORIZATION AGREEMENT

It is hereby agreed that the Client retains AllWest to provide services as set forth in the Work Authorization attached hereto (the "Work"). This contract shall be controlled by the following terms and conditions, and these terms and conditions shall also control any further assignments performed pursuant to this Work Authorization. Client's signature on this Work Authorization constitutes Client's agreement to the General Conditions.

Client agrees that AllWest is responsible only for the services set forth within the Scope of Work. In addition to the services to be performed by AllWest as described in the Work Authorization, the following items shall for the purposes of this Agreement be termed "Additional Services": (a) work resulting from changes in scope or magnitude of the Work as described therein, (b) work resulting from changes necessary because of construction cost over-runs, (c) work resulting from implementation of alternative or different designs from that first contemplated by the Parties, (d) work resulting from corrections or revisions required because of errors or omissions in construction by the building contractors, (e) work due to extended design or construction time schedules, (f) layout surveys in review of in-place constructed elements, and (g) services as an expert witness in connection with any public hearing, arbitration or proceedings of a court of record with respect to the Work on the Project. AllWest will be compensated by Client for any Additional Services on a time and materials basis in accordance with rates specified under the Work Authorization with appropriate fee increases for inflation. The Client is solely responsible for making any disclosures or reports to any third party and for the taking of corrective, remedial, or mitigative action.

FEES AND COSTS

1. AllWest shall charge for work performed by its personnel at the rates identified in the Work Authorization. These rates are subject to reasonable increases by AllWest upon giving Client 30 days advance notice. Reimbursable Costs will be charged to the Client in addition to the fees for the basic services under this Agreement and all Additional Services (defined below) under the Agreement. Reimbursable Costs include, but are not limited to, expenses for travel, including transportation, meals, lodging, long distance telephone and other related expenses, as well as the costs of reproduction of all drawings for the Client's use, costs for specifications and type-written reports, permit and approval fees, automobile travel reimbursement, costs and fees of subcontractors, and soil and other materials testing. No overtime is accrued for time spent in travel. All costs incurred which relate to the services or materials provided by a contractor or subcontractor to AllWest shall be invoiced by AllWest on the basis of cost plus twenty percent (20%). Automobile travel reimbursement shall be at the rate of fifty- eight cents ($0.58) per mile. All other reimbursable costs shall be invoiced and billed by AllWest at the rate of 1.1 times the direct cost to AllWest. Reimbursable costs will be charged to the client only as outlined in the Work Authorization if the scope of work is for Phase I Environmental Site Assessment, Property Condition Assessment, Seismic Assessment or ALTA survey. Invoices for work performed shall be submitted monthly. Payment will be due upon receipt of invoice. Client shall pay interest on the balance of unpaid invoices which are overdue by more than 30 days, at a rate of 18% per annum as well as all attorney fees and costs incurred by AllWest to secure payment of unpaid invoices. AllWest may waive such fees at its sole discretion.

LIMITATION OF LIABILITY

2. AllWest will perform its work in accordance with the existing standard of care of its industry, as of the time of the work being performed in that locale. AllWest makes no warranties, express or implied regarding its work. Client expressly agrees that to the fullest extent permitted by law, AllWest's maximum liability, as well as that of its employees and agents, to Client for any claims arising from AllWest's services, shall be $50,000 or its fees, whichever is higher. In the event Client makes a written request for a higher limitation of liability, AllWest may increase this limit for a mutually negotiated higher fee commensurate with the increased risk to AllWest, provided however, that such agreed increase in fee and limitation of liability amount is memorialized by separate written agreement which expressly amends the terms of this clause. As used in this paragraph, the term "liability" means liability of any kind, whether in contract (including breach of warranty), in tort (including negligence), in strict liability, or otherwise, for any and all injuries, claims, losses, expenses, or damages whatsoever arising out of or in any way related to AllWest's services or the services of AllWest's subcontractors, consultants, agents, officers, directors, and employees from any cause(s). AllWest shall not be liable for any claims of loss of profits or any other indirect, incidental, or consequential damages of any nature whatsoever.

INDEMNIFICATION

3. Notwithstanding any other provision of this Agreement, Client agrees, to the fullest extent permitted by law, to waive any claim against, release from any liability or responsibility for, and to assume the defense of, indemnify and hold harmless AllWest, its employees, agents and sub-consultants (collectively, Consultant) from and against any and all damages, liabilities, claims, actions or costs of any kind, including reasonable attorney's fees and defense costs, arising or alleged to arise out of or to be in any way connected with the Project or the performance or non-performance of Consultant of any services under this Agreement, excepting only any such liabilities determined by a court or other forum of competent jurisdiction to have been caused by the negligence or willful misconduct of Consultant. This provision shall be in addition to any rights of indemnity that Consultant may have under the law and shall survive and remain in effect following the termination of this Agreement for any reason. Should any part of this provision be determined to be unenforceable, AllWest and Client agree that the rest of the provision shall apply to the maximum extent permitted by law. The Client's duty to defend AllWest shall arise immediately upon tender of any matter potentially covered by the above obligations to indemnify and hold harmless.

MEDIATION & JUDICIAL REFERENCE

4. In an effort to resolve any conflicts or disputes that arise regarding the performance of this agreement, the Client & AllWest agree that all such disputes shall be submitted to non-binding mediation, using a mutually agreed upon mediation service experienced in the resolution of construction disputes. Unless the parties mutually agree otherwise, such mediation shall be a condition precedent to the initiation of any other adjudicative proceedings. It is further agreed that any dispute that is not settled pursuant to such mediation shall be adjudicated by a court appointed referee in accordance with the Judicial Reference procedures as set forth in California Code of Civil Procedure Section 638 et seq. The parties hereby mutually agree to waive any right to a trial by jury regarding any dispute arising out of this agreement.

The parties further agree to include a similar mediation, Judicial Reference & waiver of jury trial provision in their agreements with other independent contractors & consultants retained for the project and require them to similarly agree to these dispute resolution procedures. The cost of said Mediation shall be split equally between the parties. This agreement to mediate shall be specifically enforceable under the prevailing law of the jurisdiction in which this agreement was signed.

HAZARDOUS WASTE

5. Client acknowledges that AllWest and its sub-contractors have played no part in the creation of any hazardous waste, pollution sources, nuisance, or chemical or industrial disposal problem, which may exist, and that AllWest has been retained for the sole purpose of performing the services set out in the scope of work within this Agreement, which may include, but is not necessarily limited to such services as assisting the Client in assessing any problem which may exist and in assisting the Client in formulating a remedial program. Client acknowledges that while necessary for investigations, commonly used exploration methods employed by AllWest may penetrate through contaminated materials and serve as a connecting passageway between the contaminated material and an uncontaminated aquifer or groundwater, possibly inducing cross contamination. While back-filling with grout or other means, according to a state of practice design is intended to provide a seal against such passageway, it is recognized that such a seal may be imperfect and that there is an inherent risk in drilling borings of performing other exploration methods in a hazardous waste site.

AllWest will not sign or execute hazardous waste manifests or other waste tracking documents on behalf of Client unless Client specifically establishes AllWest as an express agent of Client under a written agency agreement approved by AllWest. In addition, Client agrees that AllWest shall not be required to sign any documents, no matter requested by whom, that would have the effect of AllWest providing any form of certification, guarantee, or warranty as to any matter or to opine on conditions for which the existence AllWest cannot ascertain. Client also agrees that it shall never seek or otherwise attempt to have AllWest provide any form of such certification, guarantee or warranty in exchange for resolution of any disputes between Client and AllWest, or as a condition precedent to making payment to AllWest for fees and costs owing under this Agreement.

Client understands and agrees that AllWest is not, and has no responsibility as, a generator, operator, treater, storer, transporter , arranger or disposer of hazardous or toxic substances found or identified at the site, including investigation-derived waste. The Client shall undertake and arrange for the removal, treatment, storage, disposal and/or treatment of hazardous material and investigation derived waste (such as drill cuttings). AllWest's responsibilities shall be limited to recommendations regarding such matters and assistance with appropriate arrangements if authorized by Client.

FORCE MAJUERE

6. Neither party shall be responsible for damages or delays in performance under this Agreement caused by acts of God, strikes, lockouts, accidents or other events or condition (other than financial inability) beyond the other Party’s reasonable control.

TERMINATION

7. This Agreement may be terminated by either party upon seven (7) days' written notice should the other party substantially fail to perform in accordance with its duties and responsibilities as set forth in this Agreement and such failure to perform is through no fault of the party initiating the termination. Client agrees that if it chooses to terminate AllWest for convenience, and AllWest has otherwise satisfactorily performed its obligations under this Agreement to that point, AllWest shall be paid no less than eighty percent (80%) of the contract price, provided, however, that if AllWest shall have completed more than eighty percent of the Work at the time of said termination, AllWest shall be compensated as provided in the Work Authorization for all services performed prior to the termination date which fall within the scope of work described in the Work Authorization and may as well, at its sole discretion and in accordance with said Schedule of Fees, charge Client, and Client agrees to pay AllWest’s reasonable costs and labor in winding up its files and removing equipment and other materials from the Project.

Upon notice of termination by Client to AllWest, AllWest may issue notice of such termination to other consultants, contractors, subcontractors and to governing agencies having jurisdiction over the Project, and take such other actions as are reasonably necessary in order to give notice that AllWest is no longer associated with the Project and to protect AllWest from claims of liability from the work of others.

DOCUMENTS

8. Any documents prepared by AllWest, including, but not limited to proposals, project specifications, drawings, calculations, plans and maps, and any ideas and designs incorporated therein, as well as any reproduction of the above are instruments of service and shall remain the property of AllWest and AllWest retains copyrights to these instruments of service. AllWest grants to Client a non-exclusive license to use these instruments of service for the purpose of completing and maintaining the Project. The Client shall be permitted to retain a copy of any instruments of service, but Client expressly agrees and acknowledges that the instruments of service may not be used by the Client on other projects, or for any other purpose, except the current one, unless Client first obtains a written agreement expanding the license to such use from AllWest, and with appropriate compensation to AllWest.

Client shall furnish, or cause to be furnished to AllWest all documents and information known to Client that relate to the identity, location, quantity, nature, or characteristics of any asbestos, PCBs, or any other hazardous materials or waste at, on or under the site. In addition, Client will furnish or cause to be furnished such reports, data, studies, plans, specifications, documents and other information on surface or subsurface site conditions, e.g., underground tanks, pipelines and buried utilities, required by AllWest for proper performance of its services. IF Client fails to provide AllWest with all hazardous material subject matter reports including geotechnical assessments in its possession during the period that AllWest is actively providing its services (including up to 30 days after its final invoice), Client shall release AllWest from any and all liability for risks and damages the Client incurs resulting from its reliance on AllWest’s professional opinion. AllWest shall be entitled to rely upon Client - provided documents and information in performing the services required in this Agreement; however, AllWest assumes no responsibility or liability for the accuracy or completeness of Client-provided documents. Client-provided documents will remain the property of the Client.

ACCESS TO PROJECT

9. Client grants to AllWest the right of access and entry to the Project at all times necessary for AllWest to perform the Work. If Client is not the owner of the Project, then Client represents that Client has full authority to grant access and right of entry to AllWest for the purpose of AllWest's performance of the Work. This right of access and entry extends fully to any agents, employees, contractors or subcontractors of AllWest upon reasonable proof of association with AllWest. Client’s failure to provide such timely access and permission shall constitute a material breach of this Agreement excusing AllWest from performance of its duties under this Agreement.

CONFIDENTIAL INFORMATION

10. Both Client and AllWest understand that in conjunction with AllWest's performance of the Work on the project, both Client and AllWest may receive or be exposed to Proprietary Information of the other. As used herein, the term "Proprietary Information" refers to any and all information of a confidential, proprietary or secret nature which may be either applicable to, or relate in any way to: (a) the personal, financial or other affairs of the business of each of the Parties, or (b) the research and development or investigations of each of the Parties. Proprietary Information includes, for example and without limitation, trade secrets, processes, formulas, data, know-how, improvements, inventions, techniques, software technical data, developments, research projects, plans for future development, marketing plans and strategies. Each of the Parties agrees that all Proprietary Information of the other party is and shall remain exclusively the property of that other party. The parties further acknowledge that the Proprietary Information of the other party is a special, valuable and unique asset of that party, and each of the Parties agrees that at all times during the terms of this Agreement and thereafter to keep in confidence and trust all Proprietary Information of the other party, whether such Proprietary Information was obtained or developed by the other party before, during or after the term of this Agreement. Each of the Parties agrees not to sell, distribute, disclose or use in any other unauthorized manner the Proprietary Information of the other party. AllWest further agrees that it will not sell, distribute or disclose information or the results of any testing obtained by AllWest during the performance of the Work without the prior written approval of Client unless required to do so by federal, state or local statute, ordinance or regulation.

INDEPENDENT CONTRACTOR

11. Both Client and AllWest agree that AllWest will act as an independent contractor in the performance of the Work under this Agreement. All persons or parties employed by AllWest in connection with the Work are the agents, employees or subcontractors of AllWest and not of Client. Accordingly, AllWest shall be responsible for payment of all taxes arising out of AllWest's activities in performing the Work under this Agreement.

ENTIRE AGREEMENT

12. This Agreement contains the entire agreement between the Parties pertaining to the subject matter contained in it and supersedes and replaces in its entirety all prior and contemporaneous proposals, agreements, representations and understandings of the Parties. The Parties have carefully read and understand the contents of this Agreement and sign their names to the same as their own free act.

MODIFICATION / WAIVER / PARTIAL INVALIDITY

13. The terms of this Agreement may be modified only by a writing signed by both Parties. Failure on the part of either party to complain of any act or omission of the other, or to declare the other party in default, shall not constitute a waiver by such party of its rights hereunder. If any provision of this Agreement or its application be unenforceable to any extent, the Parties agree that the remainder of this Agreement shall not be affected and shall be enforced to the greatest extent permitted by law.

INUREMENT / TITLES

14. Subject to any restrictions on transfers, assignments and encumbrances set forth herein, this Agreement shall inure to the benefit of and be binding upon the undersigned Parties and their respective heirs, executors, legal representatives, successors and assigns. Paragraph titles or captions contained in this Agreement are inserted only as a matter of convenience, and for reference only, and in no way limit, define or extend the provisions of any paragraph. , et al., incurred in that action or proceeding, in addition to any other relief to which it or they may be entitled.

INTERPRETATION / ADDITIONAL DOCUMENTS

15. The words "Client" and "AllWest" as used herein shall include the plural as well as the singular. Words used in the neuter gender include the masculine and feminine. Words used in the masculine gender include the feminine and neuter. If there is more than one Client, the obligations hereunder imposed on Client shall be joint and several. The terms of this Agreement were fully negotiated by the Parties and shall not be construed for or against the Client or AllWest but shall be interpreted in accordance with the general meaning of the language in an effort to reach the intended result.

AUTHORITY

16. Each of the persons executing this Agreement on behalf of a corporation does hereby covenant and warrant that the corporation is duly authorized and existing under the laws of its respective state of incorporation, that the corporation has and is qualified to do business in its respective state of incorporation, that the corporation has the full right and authority to enter into this Agreement, and that each person signing on behalf of the corporation is authorized to do so. If the Client is a joint venture, limited liability company or a partnership, the signatories below warrant that said entity is properly and duly organized and existing under the laws of the state of its formation and pursuant to the organizational and operating document of the entity, and the laws of the state of its formation, said signatory has authority act on behalf of and commit the entity to this Agreement.

COUNTERPARTS

17. This Agreement may be signed in counterparts by each of the Parties hereto and, taken together, the signed counterparts shall constitute a single document.

THIRD PARTY BENEFICIARIES / CONTROLLING LAW

18. There are no intended third party beneficiaries of this Agreement. The services, data & opinions expressed by AllWest are for the sole use of the client, are for a particular project and may not be relied upon by anyone other than the client. This Agreement shall be controlled by the laws of the State of California and any action by either party to enforce this Agreement shall be brought in San Francisco County, California.

TIME BAR TO LEGAL ACTION

19. All legal actions by either party against the other related to this Agreement, shall be barred after one year has passed from the time the claimant knew or should have known of its claim, and under no circumstances shall be initiated after two years have passed from the date by which AllWest completes its services.