ATTACHMENT H

Biological Resource Analysis

99 Thomas Avenue
Brisbane, California

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TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

SECTION 1. INTRODUCTION

This Biological Resource Analysis has been prepared for the property located at 99 Thomas Avenue in the City of Brisbane, California (herein referred to as the project site) (Figures 1 and 2). This analysis has been prepared to provide a detailed description of biological resources existing on the project site and to identify potentially significant impacts that could be incurred by these biological resources from the construction of the proposed development. In this assessment, biological resources include both common and rare plant and animal species, as designated by the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), and the scientific community which includes organizations such as the California Native Plant Society, as well as waters of the United States and the State of California, regulated under the jurisdiction of the United States Army Corps of Engineers (Corps), the Regional Water Quality Control Board (RWQCB), and/or CDFW.

The proposed project includes the construction of a single-family home on a previously partially developed property. Included in this analysis is an assessment of the potential for construction of the proposed project to impact onsite biological resources.

SECTION 2. PROJECT SITE LOCATION AND SETTING

The project site is an approximately 1.2-acre parcel located at 99 Thomas Avenue, in the City of Brisbane, California (Figure 1) (Assessor's Parcel Number 007-350-170). The project site is located on the ridgeline of Thomas Hill, on the eastern end of San Bruno Mountain, and on the eastern perimeter of the residential portion of Brisbane (37°40'53.85"N, 122°23'49.81"W) (Figure 2). The site is surrounded by residential development to the west and south, and undeveloped parcels largely dominated by toyon (*Heteromeles arbutifolia*), coyote brush (*Baccharis pilularis*), and French broom (*Genista monspessulana*) to the east and north. The project site is currently zoned for single family residences.

2.1 PROPOSED PROJECT

The project proponents intend to construct a single- family home and associated ancillary buildings and infrastructure, access road and driveway, and landscaping. The proposed project would also include the removal of the current structure on the southwest portion of the project site as well as the existing septic tank located along the western border of the project site. The proposed site plan is included as Appendix A.

2.2 PROJECT SITE INVESTIGATIONS

Extensive site surveys were conducted on the project site on March 9 and 14, 2014, December 30, 2015, and May 27, 2016. Surveys included walking the complete project site to characterize current site conditions including vegetation, topography, and the presence of suitable resting, nesting, and/or roosting wildlife habitat. In addition, general current and historic uses of the site were noted, as well as general observations of the neighboring property uses. Prior to site investigations, literature reviews were conducted of known and potential special-status species, including analysis of the California Natural Diversity Database (CNDDB) and a query of the Inventory of Rare, Threatened, and Endangered Plants of California (California Native Plant Society; CNPS), and review of the on-site soils pursuant to the US Department of Agriculture (USDA).

Figure 1. Project Site Vicinity Map

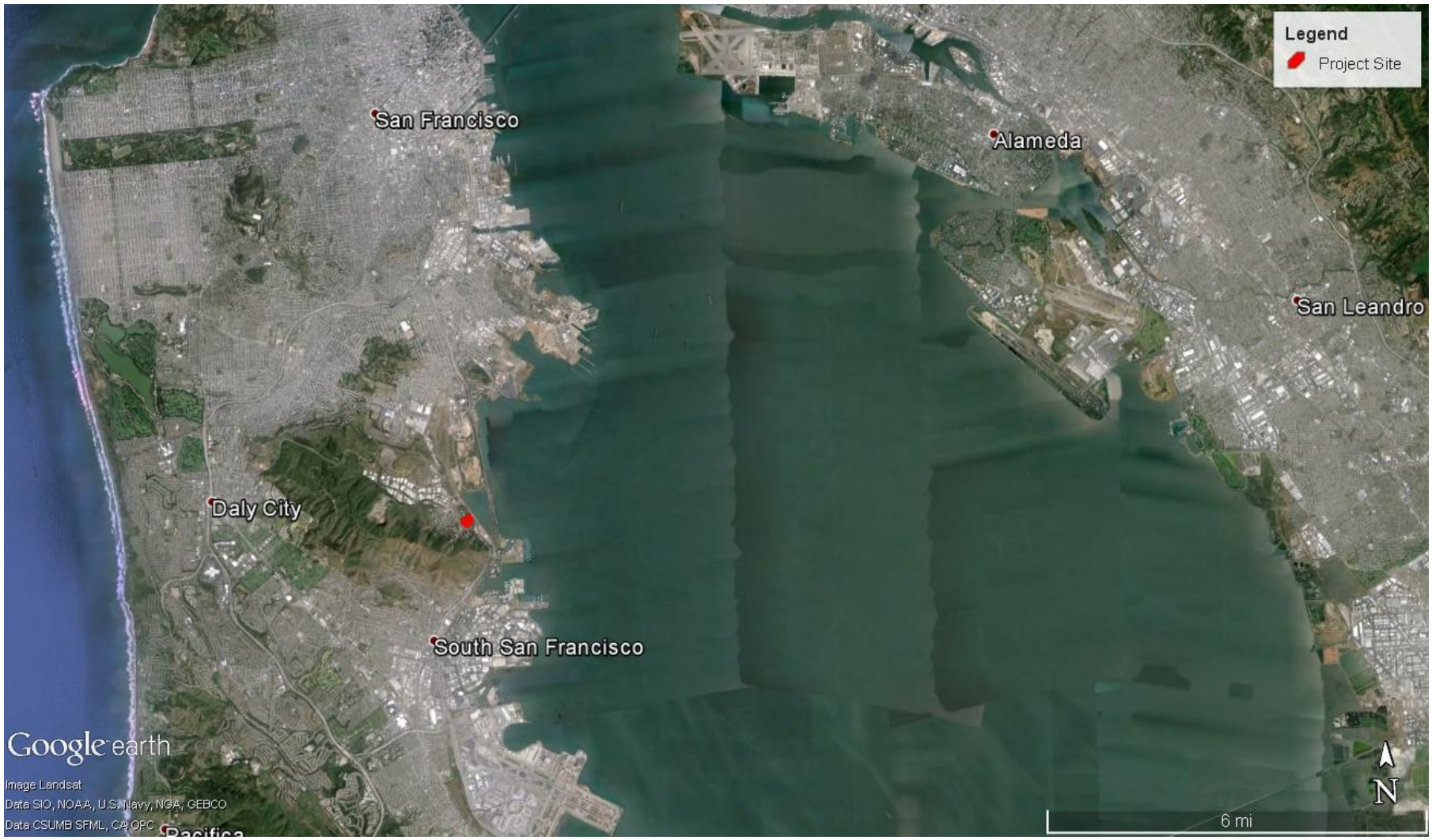

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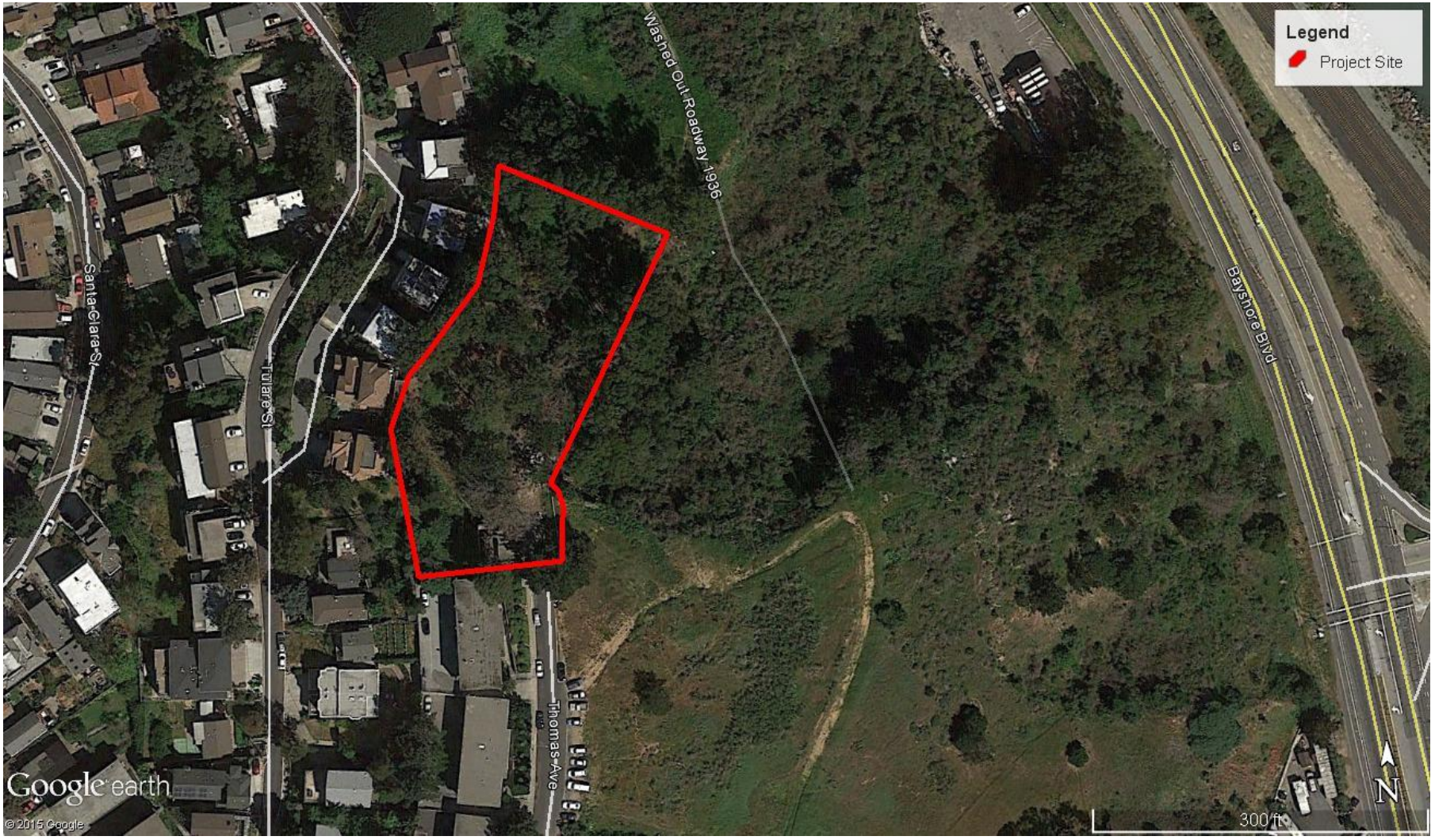
Figure 2. Project Site and Surrounding Area Aerial Map



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SECTION 3. EXISTING SITE CONDITIONS

The project site was developed in 1941 (according to Assessor's data) with a single residence, which has since been abandoned and gutted (just the walls and floors remain). This structure and its associated concrete driveway/parking area are located at the southern boundary of the project site, and are surrounded by a mix of ornamental and ruderal species that have thrived in the absence of regular maintenance. The remainder of the project site vegetation is characterized by Monterey pine (*Pinus radiata*) and blue gum eucalyptus (*Eucalyptus globulus*) woodland with a sparse, low-growing, herbaceous understory.

The project site is functionally divided in half due to the steep slope that runs north-south through the site. As detailed in the geotechnical report (prepared by BAGG Engineers), this slope is at a gradient of approximately 3:1 (horizontal:vertical) with slope heights that range from 40 to 80 feet. This slope separates the upper 2/3 of the site (southwestern portions), which is variably sloped with elevations ranging from approximately 243 feet above mean sea level (AMSL) to 281 feet AMSL, from the lower 1/3 of the site (northeastern portion) which is gently sloped with elevations ranging from 190 feet AMSL to 205 AMSL. Photographs of current site conditions are included in Appendix B.

3.1 VEGETATION COMMUNITIES

San Bruno Mountain and the surrounding area have historically been dominated by open (native) grasslands and coastal scrub and chaparral. These communities were maintained by a natural fire and grazing regime that precludes later stages of vegetative succession. Due to development and fire suppression, these naturally occurring communities no longer occur over much of the San Bruno Mountain landscape. This is the case for the project site, which is dominated by two vegetation communities, Monterey pine - blue gum eucalyptus woodland and ornamental, neither of which are naturally occurring vegetation communities.

3.1.1 MONTEREY PINE - BLUE GUM EUCALYPTUS WOODLAND

A majority of the site is dominated by Monterey pine - blue gum eucalyptus woodland. While neither of these species naturally occur in the San Francisco Bay Area, they have been naturalized along much of the California coast, and are considered somewhat invasive in much of this naturalized range. The northern and northeastern boundaries of the site are defined by densely planted blue gum eucalyptus trees; these trees likely represent the original eucalyptus trees on the site, which then quickly spread throughout the site.

The understory of this vegetation community is sparsely vegetated with low-growing, herbaceous, largely non-native species. Dominant understory species include species that thrive in disturbed areas such as sourgrass (*Oxalis pes-caprae*), hedge parsley (*Torilis* sp.),

cheeseweed mallow (*Malva parviflora*), and rattlesnake grass (*Briza maxima*). Less than 5% of the vegetation within the understory is comprised of woody species such as toyon and French broom. The small native component that exists within the understory vegetation includes toyon, miner's lettuce (*Claytonia parviflora*), and poison oak (*Toxicodendron diversilobum*).

3.1.2 ORNAMENTAL

The southwestern portion of the project site (the area surrounding the onsite residence) is dominated by a mix of decorative (planted) species or their escaped offspring (collectively referred to as ornamental species) such as redhot poker (*Kniphofia uvaria*) and lily of the Nile (*Agapanthus africanus*), and weedy species such as sourgrass, cheeseweed mallow, and rattlesnake grass. While not all ornamental or "weedy" species are non-native species, they are often foreign to the landscape in which they are planted. For example, the incense cedar (*Calocedrus decurrens*) that occurs on the project site is naturally occurring in northern California, but not in the San Francisco bay area. Several ornamental trees have been planted around the onsite residence, including silver wattle (*Acacia dealbata*), monkey puzzle (*Araucaria araucana*), and incense cedar.

3.2 AQUATIC RESOURCES

3.2.1 WATERS OF THE UNITED STATES

Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Per Section 404, a permit is required prior to dredging or discharge of fill material into waters of the United States, unless the activity is exempt from Section 404 regulation (some farming and forestry activities).

Waters of the United States generally include tidal waters, lakes, ponds, rivers, streams (including intermittent streams), and wetlands. Wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" [33 C.F.R. 328.3(b), 51 F.R. 41250, November 13, 1986]. Wetlands can be perennial or intermittent, and isolated or adjacent to other waters.

Other waters are non-tidal, perennial, and intermittent watercourses and tributaries to such watercourses [33 C.F.R. 328.3(a), 51 F.R. 41250, November 13, 1986]. The limit of Corps jurisdiction for non-tidal watercourses (without adjacent wetlands) is defined in 33 C.F.R. 328.4(c)(1) as the "ordinary high water mark" (OHWM). The OHWM is defined as the "*line on the shore established by the fluctuations of water and indicated by physical characteristics*

such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" [33 C.F.R. 328.3(e), 51 F.R. 41250, November 13, 1986]. The bank-to-bank extent of the channel that contains the water-flow during a normal rainfall year generally serves as a good first approximation of the lateral limit of USACE jurisdiction. The upstream limits of other waters are defined as the point where the OHWM is no longer perceptible.

The property does not contain any waters or wetlands that would be regulated by the federal government. Additionally, there are no depressional features that would support wetland hydrology, nor is there any evidence of seeps or springs.

3.2.2 WATERS OF THE STATE

3.2.2.1 REGIONAL WATER QUALITY CONTROL BOARD

The State Water Resources Control Board (SWRCB) and its nine regional water boards (Regional Water Quality Control Boards) have been charged with the protection and enhancement of water quality in the state of California. Pursuant to Section 401 of the Clean Water Act and the Porter Cologne Water Quality Control Act (Porter Cologne), the Regional Water Quality Control Board (RWQCB) has authority to regulate discharges of fill and dredged material into Waters of the State. Pursuant to Porter Cologne, waters of the State are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." This is generally taken to include all waters of the U.S., all surface waters not considered to be waters of the U.S. (non-jurisdictional wetlands), groundwater, and territorial seas (with territorial boundaries extending 3.0 nautical miles beyond outermost islands, reefs, and rocks and includes all waters between the islands and the coast).

While the Corps has established defined parameters for mapping and categorization of waters of the U.S. features, the SWRCB and RWQCB have not, and as such, rely on the wetland delineation and confirmation process established by and for the Corps; a Corps-confirmed wetland map is required for all projects proposing to impact waters of the State. While the permitting of impacts pursuant to Section 404 of the CWA (Corps - waters of the U.S.) is a separate process than the permitting of impacts pursuant to Section 401 of the CWA (RWQCB - waters of the State), a federal permit for impacts to waters of the U.S. would be inoperative without the complementary authorization of impacts to water of the State, as authorized by the RWQCB.

The property does not contain any waters or wetlands that would be regulated by the state government. Additionally, there are no depressional features that would support wetland hydrology, nor is there any evidence of seeps or springs.

3.2.2.1.1 National Pollutant Discharge Elimination System Permit Program

The National Pollutant Discharge Elimination System (NPDES) Permit Program, also authorized by the CWA, controls water pollution by regulating point sources (discrete conveyances such as pipes or constructed ditches) that discharge pollutants into waters of the United States. The implementation of this federal program has been charged to the State of California for implementation through the SWRCB and RWQCBs. In California, NPDES permits are also referred to as waste discharge requirements (WDRs) that regulate discharges to waters of the United States.

Also implemented by the RWQCB is the Municipal Storm Water Permitting Program, which regulates storm water discharges from municipal separate storm sewer systems (MS4s). The MS4 Permit Program was established to restore and maintain the chemical, physical, and biological integrity waters of the U.S./State and reduce/eliminate stormwater pollution. San Mateo County has an MS4 Permit that mandates the County to meet certain water quality standards. The City of Brisbane is a member agency in the San Mateo Countywide Pollution Prevention Program (SMCPPP). The SMCPPP complies with Provision C.3 of the Municipal Regional Stormwater Permit (MRP) issued to San Mateo County joint member agencies (the SMCPPP has 21 member agencies: the 20 cities in San Mateo County and unincorporated San Mateo County; together, these member agencies comprise the MS4 Permittee) by the San Francisco Bay Regional Water Quality Control Board. As an individual member agency, the City of Brisbane is individually responsible for implementing the MRP requirements.

While there are no waters of the U.S. or State on the project site, stormwater runoff from the site would enter the City of Brisbane stormdrain system and eventually waters of the U.S. and/or State, and as such, stormwater control/low impact development (LID) designs present in the SMCPPP have been incorporated into the project design in order to remain in compliance with the MRP.

3.2.2.1 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

California Fish and Game Code 1602 grants CDFW jurisdiction over rivers, streams and lakes; this jurisdiction includes to all features exhibiting bed, bank, and channel. The extent of CDFW's jurisdiction on these features extends to the top of bank or the edge of riparian canopy (whichever is greater). The property does not contain any waters or wetlands that would be regulated by CDFW. There is no evidence of headwaters, and no distinct drainage features with bed and bank conditions.

SECTION 4. POTENTIAL IMPACTS TO SPECIAL-STATUS SPECIES

Special-status species, include species considered to be rare by state and federal resource agencies (CDFW and USFWS) and/or the scientific community (CNPS), and are accordingly legally protected via local, state, and/or federal law.

For purposes of this assessment, special-status species are defined as plants or animals protected either pursuant to:

1. Federal Endangered Species Act (FESA)
2. State Endangered Species Act (CESA)
3. California Fish and Game Codes that protect nesting birds (Section 3503), raptors (Section 3503.5), and "fully protected species" (Sections 3511, 4700, 5050, and 5515)
4. Migratory Bird Treaty Act
5. CNPS "rare" designation - all of the plants constituting California Rare Plant Rank 1A, 1B, and 2 meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Secs. 2062 and 2067 of the CESA of the California Department of Fish and Game Code, and are eligible for state listing (CNPS Inventory, 2015)
6. or, CDFW "species of special concern" (SSC) designation.

A search of the California Natural Diversity Database (CNDDB) and the California Native Plant Society (CNPS) Inventory of Rare, Threatened, and Endangered Plants of California was conducted for state and federally listed and candidate species, as well as CNPS-ranked species known to occur in the vicinity of the property. The species identified in this search were compiled in tables (Tables 1 and 2) and evaluated to likelihood of occurrence on the project site. The potential for species to be adversely affected by the proposed project was classified as high, moderate, or low, using the definitions provided below. When a species was not expected to occur on or adjacent to the project site, the potential for adverse effects was identified as "none."

High: The potential for a species to occur was considered high when the project site was located within the range of the species, recorded observations were identified within known dispersal distance of the project site, and suitable habitat was present on the project site.

Moderate: The potential for a species to occur was considered moderate when the project site was located within the range of the species, recorded observations were identified nearby but outside known dispersal distance of the project site, and suitable habitat was present on the project site. A moderate classification was also assigned when recorded observations were identified within known dispersal distance of the project site but habitat on the project site was of limited or marginal quality.

Low: The potential for a species to be adversely affected was considered low when the project site was within the range of the species, but no recorded observations within known dispersal distance were identified, and habitat on the project site was limited or of marginal quality. The potential for adverse effects was also classified as low when the project site was located at the edge of a species' range and recorded observations were extremely rare, but habitat in the study area was suitable.

4.1 SPECIAL-STATUS PLANTS

Due to the project site's proximity to San Bruno Mountain, a total of 30 special-status plant species are known to occur in the vicinity of the project site (Figure 3). The closest of these recorded occurrences of special-status plant species (according to the CNDDB and CNPS databases) is approximately 0.4 mile southwest of the project site on the eastern slopes of San Bruno Mountain (white-rayed pentachaeta [*Pentachaeta bellidiflora*; CNDDB Occurrence No. 6] and Diablo Helianthella [*Helianthella castanea*; CNDDB Occurrence No. 12]). Due to the location and highly disturbed nature of the project site, site conditions present on the project site do not reflect those found on San Bruno Mountain (i.e., those that support regionally known special-status species). Due to the existing site conditions (i.e., previously developed site dominated by disturbed and excavated soils, late successional stage and non-native canopy and subcanopy vegetation, and non-native understory vegetation), suitable habitat for regionally known special-status plant species does not occur on the project site. Accordingly, no occurrences of special-status plant species have been documented on or adjacent to the project site, and, further, no special-status plant species are expected to occur on the project site. The existing conditions present on the project site render it unsuitable habitat and highly unlikely to support regionally known special-status plants.

4.2 STATE AND FEDERALLY LISTED WILDLIFE

No occurrences of special-status wildlife species have been documented on or adjacent to the project site, however, due to the project site's proximity to San Bruno Mountain, a total of eight state and/or federally listed species are known to occur in the vicinity of the project site (Figure 3). Of the eight listed species known to occur in the vicinity of the project site, none have potential to occur on or adjacent to the project site.

While the project site does not provide suitable habitat for the four regionally known federally listed butterfly species, due to the regional significance of these species, known from the San Bruno Mountain area, these species are further discussed below. A description of these species is included below, including the species' distribution, habitat, life cycle, threats to the species, current habitat conservation efforts, and potential impacts to the species resulting from development of the proposed project.

4.2.1 BAY CHECKERSPOT BUTTERFLY (EUPHYDRYAS EDITHA SSP. BAYENSIS)

Potential for species to be adversely affected by the proposed project: **None**

Federal Listing Status: Threatened
State Listing Status: None

The bay checkerspot butterfly is a medium-sized butterfly with a wing span of just over 2 inches. The forewings have black bands along all the veins on the upper surface, which in contrasts with bright red, yellow, and white spots, give this species its unique appearance and its name. This species' life history is tied to its host plant(s): dwarf plantain (*Plantago erecta*) (primary) and owl's clover (*Castilleja densiflora* or *C. exserta*) (secondary). Larvae feed on the leaves of these host plants and adults feed on the nectar (Miller and Brown 1981).

Adult bay checkerspot butterflies can be seen between late February and early May, each living just 10 days. Adult males emerge from their chrysalises four to eight days before females, and immediately initiate mating upon the emergence of females (Baughman et. al. 1988). Eggs are generally laid between March and April, at the base of this species' host plants, in up to five egg masses of 5 to 250 eggs. Caterpillars hatch from these eggs after approximately 10 days, grow for two or more weeks (molting three times), then rest for the summer (diapause). Caterpillars spend the winter in a chrysalis and emerge between late February and early May (Black and Vaughan 2005a).

Historically, the bay checkerspot butterfly's range included the length of the San Francisco peninsula, from Twin Peaks to southern Santa Clara County, and a few pockets in Alameda and Contra Costa Counties. However, this range has been greatly reduced due to habitat loss and fragmentation, extreme weather, air pollution, pesticides, vehicle strikes, fire, overgrazing, illegal collecting, and invasion of exotic species (USFWS 1998).

The bay checkerspot butterfly was listed as federally threatened in 1987 (Federal Register 52:35366-35378), with critical habitat originally designated for this species in 2001 (Federal Register 66:21450-21489). This critical habitat ruling was contested in 2005 (Home Builders Association of Northern California v. U.S. Fish and Wildlife Service cv-01363-LKK-JFM), and revised critical habitat units were designated in 2008 (Federal Register 73:50406-50452). Primary Constituent Elements (PCEs) found within each critical habitat unit and determined to be necessary for survival and recovery of the bay checkerspot butterfly include 1) open grasslands that can support host plant survival, 2) host plants, 3) spring-flowering plants (i.e., adult nectar sources), 4) serpentine soils, and 5) stable soil holes/cracks or rock outcrops for larval summer diapause. The project site is not located within critical habitat designated for the bay checkerspot butterfly; the closest critical habitat is Unit 1, which occurs 0.3 mile south and west of the project site (Figure 4).

The closest record of bay checkerspot butterfly is for a colony occurring along the eastern ridge of San Bruno Mountain, approximately 0.3 mile southwest of the project site (CNDDB Occurrence No. 9) (Figure 3). While the project site is in close proximity to extant records for this species, no serpentine grasslands or host plant species occur on or adjacent to the project site. The late successional stage of the vegetation on and adjacent to the project site precludes the growth of host plant species on the project site and consequently the use of the site by bay checkerspot butterfly. Accordingly, ***the proposed project is not expected to impact the bay checkerspot butterfly.***

4.2.2 CALLIPPE SILVERSPOT BUTTERFLY (SPEYERIA CALLIPPE SSP. CALLIPPE)

Potential for species to be adversely affected by the proposed project: **None**

Federal Listing Status: Endangered
State Listing Status: None

The Callippe silverspot butterfly is a medium-sized butterfly with a wing span of just over 2.25 inches. The dorsal sides of the wings exhibit a brown, tan, and black scalloped pattern, while the ventral sides of the wings are brown to orange-brown with distinct black and silver spots, which gives this species its unique appearance and its name. The basal areas of the wings and body are densely hairy (Black and Vaughn 2005c).

This species' life history is tied to its larval host plant: Johnny jump-up (*Viola pedunculata*). Callippe silverspot butterflies can be seen in/near native grasslands from mid-May to late July, depending on location and microclimate, when they emerge as adults and migrate to hilltops to mate. At this point, the perennial Johnny jump-ups have gone to seed and dried out; the female lays her eggs are laid on or near these desiccated remains. These eggs hatch in approximately one week and larvae crawl to the ground under the plant to enter diapause until late winter/early spring. In the spring, larvae seek out Johnny jump-up plants, and following 2-3 months of feeding and 4 molts, the caterpillar forms a chamber made of leaves and silk in which to pupate, and emerges as an adult approximately two weeks later. Adults live for approximately three weeks, during which time they feed on floral nectar and mate (op. cit.).

Historically, the Callippe silverspot butterfly occupied grasslands ranging over much of the northern San Francisco Bay region. On the San Francisco peninsula, this butterfly is currently known only to exist on San Bruno Mountain. In the East Bay, it was known from Richmond in the north to the Castro Valley in Alameda County, however, the only remaining population of this butterfly in Alameda County occurs in an undisclosed city park. The range has been greatly reduced due to habitat loss and fragmentation caused by development or non-native plant invasion. The Callippe silverspot butterfly was listed as

federally threatened in 1997 (Federal Register 62:64306-64320). No critical habitat has been designated for this species.

The closest record of Callippe silverspot butterfly is for a colony occurring along the southeastern ridge of San Bruno Mountain, approximately 0.3 mile south of the project site (CNDDB Occurrence No. 5) (Figure 3). While the project site is in close proximity to extant records for this species, no native grasslands or host plants occur on or adjacent to the project site. The late successional stage of the vegetation on and adjacent to the project site precludes the growth of host plant species on the project site and consequently the use of the site by Callippe silverspot butterfly. Accordingly, ***the proposed project is not expected to impact the Callippe silverspot butterfly.***

4.2.3 MISSION BLUE BUTTERFLY (ICARICIA ICARIOIDES SSP. MISSIONENSIS)

Potential for species to be adversely affected by the proposed project: **None**

Federal Listing Status: Endangered
State Listing Status: None

The mission blue butterfly is a small butterfly with a wing span of 1 to 1.5 inches. This species is sexually dimorphic. Males' wings are iridescent blue and lavender with black margins and long white hair-like scales on the dorsal side, and white with gray and black spots on the ventral side; male's bodies are dark blue-brown. Females' wings are brown with blue basal areas with black margins and long white hair-like scales on the dorsal side, and grey with dark spots on the ventral side (Black and Vaughn 2005c).

This species' life history is tied to its host plant(s): lupine (*Lupinus albifrons*, *L. variicolor*, and *L. formosus*). Larvae feed on the leaves of these host plants. Adult mission blue butterflies can be seen from late March through early July, depending on location and microclimate. Adults feed on hairy false goldenaster (*Heterotheca villosa*), bluedicks (*Dichelostemma capitatum*), and seaside buckwheat (*Eriogonum latifolium*), and can be found in coastal chaparral and perennial grasslands in close proximity to the aforementioned perennial lupines that are host plants to mission blue larvae. Adults generally live for 6 to 10 days (op. cit.).

Females lay eggs on the leaves, stems, flowers, and seed pods of host plants. These eggs hatch after 4-7 days. Larvae feed, molt, and crawl to the ground under the plant to enter diapause until spring. The third and fourth instar phases of the larval lifecycle are assisted by ants, which are attracted to the sugar- and protein-rich substance secreted by the larvae, and enticed into tending behavior, protecting the larvae from predators and parasites. Pupation occurs in the soil beneath the host plant (op. cit.).

Historically, the mission blue butterfly's range included much of the San Francisco peninsula. However, this range has been greatly reduced due to habitat loss and fragmentation associated with development, non-native plant invasion, and diseases that affect host plants. This species is currently limited to just a few sites in San Mateo County, and is known to exist primarily on San Bruno Mountain. The mission blue butterfly was listed as federally threatened in 1976 (Federal Register 41:22041-22044). Critical habitat was proposed for this species in 1977 (Federal Register 42:7972-7976), however, no critical habitat was ever designated for mission blue butterfly.

Lupines are early successional species, occurring on relatively recently disturbed areas, and are common on San Bruno Mountain along the sides of roads and trails. Lupines are out-competed by late successional woody perennials, and non-native vegetation and land practices that favor continued, uninterrupted succession, such as fire suppression and removal of grazing / browsing pressure typically result in decreased production of the host species.

The closest record of mission blue butterfly is for a colony occurring along the southeastern ridge of San Bruno Mountain, approximately 0.3 mile south of the project site (CNDDB Occurrence No. 4) (Figure 3). While the project site is in close proximity to extant records for this species, no native grasslands or host plants occur on or adjacent to the project site. The late successional stage of the vegetation on and adjacent to the project site precludes the growth of host plant species on the project site and consequently the use of the site by mission blue butterfly. Accordingly, ***the proposed project is not expected to impact the mission blue butterfly.***

4.2.4 SAN BRUNO ELFIN BUTTERFLY (CALLOPHRYS MOSSII SSP. BAYENSIS)

Potential for species to be adversely affected by the proposed project: **None**

Federal Listing Status: Endangered
State Listing Status: None

The San Bruno Elfin butterfly is a small butterfly with a wing span of just over 1 inch. This species is sexually dimorphic. The dorsal side of males' wings is gray-brown with a tan patch on the inner margin of the hindwing, while the dorsal side of female's wings is light brown to tan with dark borders. The ventral side of both male and female wings is coppery to purple-brown, marked with an uneven dark line that separates the inner (darker) and outer (lighter) halves of the wings (Black and Vaughn 2005d).

This species' life history is tied to its host plant: broadleaf stonecrop (*Sedum spathulifolium*). Larvae feed on the leaves of these host plants. Adult San Bruno elfin butterflies can be seen between late February and mid-April, generally living for 7 to 10 days. Females lay eggs in small clusters/strings on the leaves of host plants; these eggs

hatch after 5-7 days. Newly hatched larvae tunnel into the leaves of the host plant, feed, and molt twice. Third instar larvae move to the flowers of the host plant and are tended by ants (as described above). Larvae finally move toward the base of the host plant to pupate and enter into diapause until February of the following year (op. cit.).

Historically, the San Bruno elfin butterfly's range included much of the San Francisco peninsula. However, this range has been greatly reduced due to habitat loss and fragmentation, caused primarily by development. This species is currently known from just a few colonies in San Mateo County, with the largest population on San Bruno Mountain. The San Bruno elfin butterfly was listed as federally threatened in 1976 (Federal Register 41:22041-22044). Critical habitat was proposed for this species in 1977 (Federal Register 42:7972-7976), however, no critical habitat was ever designated for San Bruno elfin butterfly.

The closest record of San Bruno elfin is for a colony occurring along the northeastern ridgeline and slope of San Bruno Mountain, approximately 0.9 mile west of the project site (CNDDB Occurrence No. 4) (Figure 3). While the project site is in moderate proximity to extant records for this species, no native grasslands or host plants occur on or adjacent to the project site. The late successional stage of the vegetation on and adjacent to the project site precludes the growth of host plant species on the project site and consequently the use of the site by San Bruno elfin butterfly. Accordingly, ***the proposed project is not expected to impact the San Bruno elfin butterfly.***

4.2.5 SPECIAL-STATUS BATS

No occurrences of special-status bats have been recorded within three miles of the project site and no evidence of roosting bats was observed onsite during the December 30, 2015, and May 27, 2016 site investigations. However, the trees and abandoned structure on the project site provide potentially suitable roosting habitat for four special-status bat species (California Species of Concern) that are known to occur in the San Francisco bay area: western mastiff bat (*Eumops perotis*), western red bat (*Lasiurus blossevillii*), Townsend's big-eared bat (*Pelcotus townsendii*), and pallid bat (*Antrozous pallidus*). Due to the presence of this potentially suitable roosting habitat on the site, an additional presence/absence survey for roosting bats was conducted by Ms. McGarvey on November 20, 2017. No roosting bats were observed during this survey. In the absence of proximally recorded occurrences for special-status bats and in light of negative results multiple surveys for roosting bats, and the avoidance measures presented in the Recommended Conditions of Project Approval section (below) which would protect special-status bats from project-related take, ***the proposed project is not expected to impact special-status bats.***

4.3 FULLY PROTECTED SPECIES

No occurrences of fully protected species have been documented on or adjacent to the project site, however, the site provides suitable habitat for one fully protected species known from the vicinity of the project site: white-tailed kite.

4.3.1 WHITE-TAILED KITE (ELANUS LEUCURUS)

Potential for species to be adversely affected by the proposed project: **None**

Federal Listing Status: None
State Listing Status: Fully Protected

The white-tailed kite is a medium-sized raptor with a wing span of approximately 39 inches. This species is easily identified by its primarily white body with a grey back and wings and red eyes. White-tailed kite is found throughout much of California, but is most common in coastal and valley lowlands in or in close proximity to grasslands, agricultural fields, or emergent wetlands. White-tailed kites forage predominantly in open grasslands, agricultural fields, and emergent wetlands hovering as much as 30 meters above the ground in search of prey (primarily on voles [*Microtus* spp.] and other small, diurnal mammals). White-tailed kites build stick nests in dense tree stands adjacent to suitable foraging habitat. Females generally lay a single clutch of 4-5 eggs each year, incubating eggs for approximately 28 days. The young generally fledge between 35 and 40 days after hatching.

While no CNDDB records for white-tailed kite occur have been documented in the vicinity of the project site, this species is known to occur in and near Brisbane. In addition, the trees on the project site provide suitable nesting habitat for white-tailed kites, as evidenced by the large stick nest observed onsite. Regardless of the onsite presence of suitable nesting habitat for white-tailed kites, avoidance measures presented in the Recommended Conditions of Project Approval section (below) would protect white-tailed kites from project-related take. As such, ***the proposed project is not expected to impact white-tailed kites.***

4.4 NESTING BIRDS/RAPTORS

4.4.1 MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755; as amended in 1936; 1960, 1968, 1969, 1974, 1978, 1986, and 1998) (MBTA) prohibits the take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) of any migratory bird or any part, nest, or egg of any such bird. Common migratory birds on the San Francisco peninsula include ducks and geese, shorebirds and seabirds, raptors, and passerine birds.

The trees and shrubs on the project site provide suitable nesting habitat for a variety of raptors and passerines, as evidenced by the large stick nest observed onsite. Regardless of the onsite presence of suitable nesting habitat, avoidance measures have been built into the project plan that would protect nesting raptors and passerines from project-related take. As such, ***the proposed project is not expected to impact MBTA-protected species.***

4.4.2 CALIFORNIA FISH AND GAME CODES

California Fish and Game Code (Section 3503) prohibits the take of nest or eggs of any bird. California Fish and Game Code Section 3801 established two exceptions to this prohibition, European starling (*Sturnus vulgaris*) and European house sparrow (*Passer domesticus*), which "may be taken and possessed by any person at any time." Raptors and other fully protected species are further protected in Sections 3503.5 and 3511, which states that raptors/fully protected birds or parts thereof may not be taken or possessed at any time.

The trees and shrubs on the project site provide suitable nesting habitat for a variety of raptors and passerines, as evidenced by the large stick nest observed onsite. Regardless of the onsite presence of suitable nesting habitat for raptors and passerines, avoidance measures have been built into the project plan that would protect nesting raptors and passerines from project-related take. As such, ***the proposed project is not expected to impact California Fish and Game Code-protected species.***

Figure 3. 99 Thomas Avenue CNDDB Map

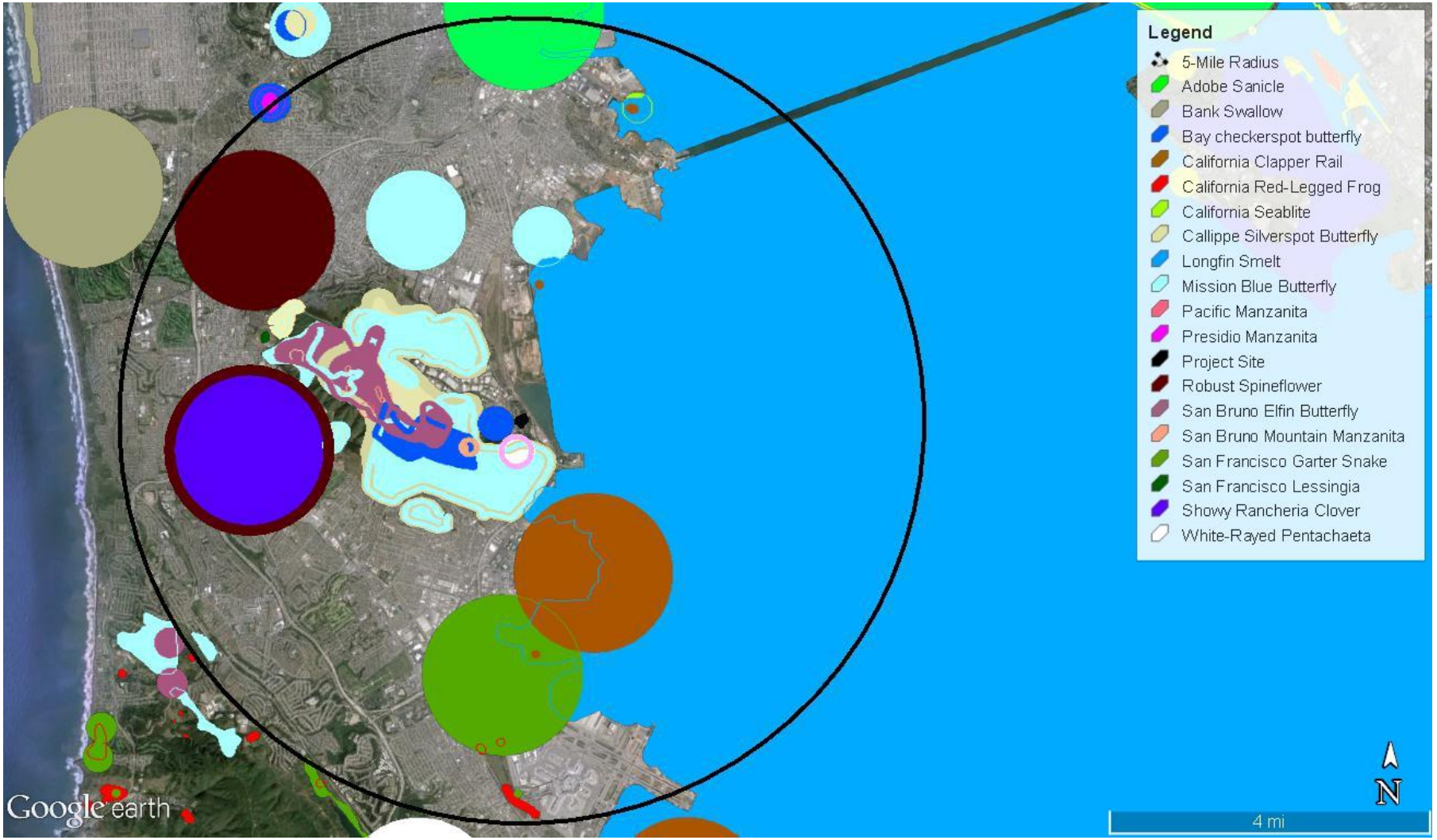

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Figure 4. Critical Habitat Map

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Table 1. Special-Status Plant Species Known to Occur in the Vicinity of the Project Site

Common Name	Scientific Name	Status	Habitat Type/Components	Occurrence Information	Probably of Occurring on the Project Site
Bent-Flowered Fiddleneck	***Amsinckia lunaris***	CNPS Rank 1B.2	Valley and foothill grassland, cismontane woodland, coastal bluff scrub	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Amsinckia species were observed on the project site during biological surveys.
Franciscan Manzanita	***Arctostaphylos franciscana***	Federally Endangered CNPS Rank 1B.1	Coastal scrub (serpentine)	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No manzanita species were observed on the project site during biological surveys.
San Bruno Mountain Manzanita	***Arctostaphylos imbricata***	California Endangered CNPS Rank 1B.1	Rocky. Chaparral and coastal scrub	The closest record for this species is located approximately 0.7 mile west of the project site (CNDDB Occurrence No. 4) on San Bruno Mountain.	**None.** Suitable habitat does not occur on the project site. No manzanita species were observed on the project site during biological surveys.
Presidio Manzanita	***Arctostaphylos montana* ssp. *ravenii***	Federally Threatened California Endangered CNPS Rank 1B.1	Serpentine outcrops in chaparral, coastal prairie, coastal scrub.	The closest record for this species is located approximately 5.0 miles northwest of the project site (CNDDB Occurrence No. 1).	**None.** Suitable habitat does not occur on the project site. No manzanita species were observed on the project site during biological surveys.
Montara Manzanita	***Arctostaphylos montaraensis***	CNPS Rank 1B.2	Chaparral (maritime) and coastal scrub	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No manzanita species were observed on the project site during biological surveys.
Pacific Manzanita	***Arctostaphylos pacifica***	California Endangered CNPS Rank 1B.2	Chaparral and coastal scrub	The closest record for this species is located approximately 1.9 miles west of the project site (CNDDB Occurrence No. 1) on San Bruno Mountain.	**None.** Suitable habitat does not occur on the project site. No manzanita species were observed on the project site during biological surveys.
Alkali Milk-Vetch	***Astragalus tener* var. *tener***	CNPS Rank 1B.2	Alkaline. Playas, valley and foothill grassland, vernal pools.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Astragalus species were observed on the project site during biological surveys.
Pappose Tarplant	***Centromadia parryi ssp. parryi***	CNPS Rank 1B.2	Often alkaline. Chaparral, coastal prairie, meadows and seeps, marshes and swamps (coastal salt), and valley and foothill grasslands (vernally mesic)	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No tarplant or tarweed species were observed on the project site during biological surveys.
San Francisco Bay Spineflower	***Chorizanthe cuspidata var. cuspidata***	CNPS Rank 1B.2	Sandy. Coastal bluff scrub, coastal dunes, coastal prairie, and coastal scrub	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Chorizanthe species were observed on the project site during biological surveys.
Robust Spineflower	***Chorizanthe robusta var. robusta***	Federally Endangered CNPS Rank 1B.1	Sandy or gravelly. Chaparral (maritime), cismontane woodland (openings), coastal dunes, and coastal scrub	The closest record for this species is an historic observation (1913) west of the project site (CNDDB Occurrence No. 2). Exact location is unknown.	**None.** Suitable habitat does not occur on the project site. No Chorizanthe species were observed on the project site during biological surveys.

Common Name	Scientific Name	Status	Habitat Type/Components	Occurrence Information	Probably of Occurring on the Project Site
Franciscan Thistle	***Cirsium andrewsii***	CNPS Rank 1B.2	Mesic. Sometimes serpentine. Broadleafed upland forest, coastal bluff scrub, coastal prairie, and coastal scrub.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. Italian thistle (*Carduus pycnocephalus*) is the only thistle genus/species observed on the project site during biological surveys.
Compact Cobwebby Thistle	***Cirsium occidentale var. compactum***	CNPS Rank 1B.2	Chaparral, coastal dunes, coastal prairie, and coastal scrub.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. Italian thistle (*Carduus pycnocephalus*) is the only thistle genus/species observed on the project site during biological surveys.
San Francisco Collinsia	***Collinsia multicolor***	CNPS Rank 1B.2	Sometimes serpentine. Closed-cone coniferous forest and coastal scrub.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Collinsia species were observed on the project site during biological surveys.
Fragrant Fritillary	***Fritillaria liliacea***	CNPS Rank 1B.2	Often serpentine. Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Fritillaria species were observed on the project site during biological surveys.
Blue Coast Gilia	***Gilia capitata ssp. chamissonis***	CNPS Rank 1B.1	Coastal dunes and coastal scrub.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Gilia species were observed on the project site during biological surveys.
Diablo Helianthella	***Helianthella castanea***	CNPS Rank 1B.2	Usually rocky, axonal soils. Often partial shade. Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland.	The closest record for this species occurs approximately 0.4 mile south of the project site (CNDDB Occurrence No. 12).	**None.** Suitable habitat does not occur on the project site. No Helianthella species were observed on the project site during biological surveys.
Congested-Headed Hayfield Tarweed	***Hemizonia congesta ssp. congesta***	CNPS Rank 1B.2	Valley and foothill grasslands (sometimes roadsides)	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No tarplant or tarweed species were observed on the project site during biological surveys.
Shortleaf Dwarf Cudweed	***Hesperevax sparsiflora var. brevifolia***	CNPS Rank 1B.2	Coastal bluff scrub (sandy), coastal dunes, and coastal prairie	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Hesperevax species were observed on the project site during biological surveys.
Water Star-Grass	***Heteranthera dubia***	CNPS Rank 2B.2	Marshes and swamps (alkaline, still or slow-moving water)	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Heteranthera species were observed on the project site during biological surveys.
Kellogg's Horkelia	***Horkelia cuneata var. sericea***	CNPS Rank 1B.1	Sandy or gravelly openings. Closed-cone coniferous forest, chaparral (maritime), coastal dunes, and coastal scrub.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Horkelia species were observed on the project site during biological surveys.

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Common Name	Scientific Name	Status	Habitat Type/Components	Occurrence Information	Probably of Occurring on the Project Site
San Francisco Lessingia	***Lessingia germanorum***	Federally Endangered California Endangered CNPS Rank 1B.1	Coastal scrub (remnant dunes)	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Lessingia species were observed on the project site during biological surveys.
Arcuate Bush-Mallow	***Malacothamnus arcuatus***	CNPS Rank 1B.2	Chaparral and cismontane woodland.	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. Cheeseweed mallow (*Malva parviflora*) is the only mallow genus/species observed on the project site during biological surveys.
Northern Curly-Leaved Monardella	***Monardella sinuata* ssp. *nigrescens***	CNPS Rank 1B.2	Sandy. Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest	CNPS 1-Quad Search	**None.** Suitable habitat does not occur on the project site. No Monardella species were observed on the project site during biological surveys.
White-Rayed Pentachaeta	***Pentachaeta bellidiflora***	Federally Endangered California Endangered CNPS Rank 1B.1	Cismontane woodland and valley and foothill grassland (often serpentine)	The closest record for this species occurs approximately 0.4 mile south of the project site (CNDDB Occurrence No. 6).	**None.** Suitable habitat does not occur on the project site. No Pentachaeta species were observed on the project site during biological surveys.
Choris' Popcornflower	***Plagiobothrys chorisianus var. chorisianus***	CNPS Rank 1B.2	Mesic. Chaparral, coastal prairie, and coastal scrub.	The closest record for this species occurs approximately 1.0 mile east of the project site (CNDDB Occurrence No. 39).	**None.** Suitable habitat does not occur on the project site. No Plagiobothrys species were observed on the project site during biological surveys.
Adobe Sanicle	***Sanicula maritima***	CNPS Rank 1B.1	Clay, serpentinite. Chaparral, coastal prairie, meadows and seeps, valley and foothill grassland.	The closest record for this species is an historic observation (1895) north of the project site (CNDDB Occurrence No. 5). Exact location unknown (considered extirpated).	**None.** Suitable habitat does not occur on the project site. No Sanicula species were observed on the project site during biological surveys.
San Francisco Campion	***Silene verecunda* ssp. *verecunda***	CNPS Rank 1B.2	Sandy. Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, and valley and foothill grassland	The closest record for this species occurs approximately 1.9 mile west of the project site (CNDDB Occurrence No. 7).	**None.** Suitable habitat does not occur on the project site. Windmill pink (*Silene gallica*) is the only Silene species observed on the project site during biological surveys.
California Seablight	***Suaeda californica***	Federally Endangered CNPS Rank 1B.1	Coastal salt marshes and swamps	This species was planted during restoration efforts approximately 4.2 miles northeast of the project site (CNDDB Occurrence No. 18).	**None.** Suitable habitat does not occur on the project site. No Suaeda species were observed on the project site during biological surveys.
Showy Indian Clover	***Trifolium amoenum***	Federally Endangered CNPS Rank 1B.1	Coastal bluff scrub and valley and foothill grassland (sometime serpentine)	The closest record for this species is an historic observation (1895) located west of the project site (CNDDB Occurrence No. 22). Exact location is unknown.	**None.** Suitable habitat does not occur on the project site. No Trifolium species were observed on the project site during biological surveys. Two non-native Trifolium species (T. *campestre* and T. *glomeratum*) occur adjacent to the project site.
San Francisco Owl's-Clover	***Triphysaria floribunda***	CNPS Rank 1B.2	Usually serpentine. Coastal prairie, coastal scrub, and valley and foothill grassland	The closest record for this species occurs approximately 1.0 mile west of the project site (CNDDB Occurrence No. 14).	**None.** Suitable habitat does not occur on the project site. No Triphysaria species were observed on the project site during biological surveys.

Table 2: Special-Status Wildlife Species Known to Occur in the Vicinity of the Project Site

Common Name	Scientific Name	Status	Habitat Type/Components	Occurrence Information	Probably of Occurring on the Project Site
Bay Checkerspot Butterfly	***Euphydryas editha* ssp. *bayensis***	Federally Threatened	· Serpentine grassland · Host plants: *Plantago erecta*, *Castilleja densiflorus*, and *C. exserta*	The closest extant record for this species occurs approximately 0.7 mile west of the project site (CNDDB Occurrence No. 5).	**None.** Onsite vegetation is comprised of late successional species. Larval host species do not occur on or adjacent to the project site.
Ridgeway's Rail	***Rallus obsoletus***	Federally Endangered California Endangered	· Coastal wetlands · Brackish areas	The closest record for this species occurs approximately 1.7 miles northeast of the project site (CNDDB Occurrence No. 111) in the Confluence Marsh southwest of Candlestick Point.	**None.** No suitable habitat occurs on or near the project site.
California Red-Legged Frog	***Rana draytonii***	Federally Threatened California Species of Concern	· Grassland · Riparian · Creeks/Streams with plunge pools or ponds	The closest record for this species occurs approximately 4.0 miles southwest of the project site (CNDDB Occurrence No. 1114).	**None.** No suitable habitat occurs on or near the project site.
Callippe Silverspot Butterfly	***Speyeria callippe* ssp. *callippe***	Federally Endangered	· Grassland · Host plant: *Viola pedunculata*	The closest record for this species occurs approximately 0.4 mile south of the project site (CNDDB Occurrence No. 5) on San Bruno Mountain.	**None.** Onsite vegetation is comprised of late successional species. Larval host species do not occur on or adjacent to the project site.
Longfin Smelt	***Spirinchus thaleichthys***	Federal Candidate Species California Threatened	· San Francisco Bay and Delta	The closest record for this species occurs approximately 0.5 mile east of the project site (CNDDB Occurrence No. 22) in the San Francisco Bay.	**None.** No waters of the State/U.S. occur on the project site. No suitable habitat occurs on or adjacent to the project site.
Mission Blue Butterfly	***Icaricia icarioides* ssp. *missionensis***	Federally Endangered	· Coastal Chaparral · Grassland · Host plants: *Lupinus albifrons, L. variicolor*, and *L. formosus*	The closest record for this species occurs approximately 0.4 mile south of the project site (CNDDB Occurrence No. 4) on San Bruno Mountain.	**None.** Onsite vegetation is comprised of late successional species. Larval host species do not occur on or adjacent to the project site.
San Bruno Elfin Butterfly	***Callophrys mossii* ssp. *bayensis***	Federally Endangered	· Coastal Scrub · Rocky outcrops and cliffs	The closest record for this species occurs approximately 1.0 mile west of the project site (CNDDB Occurrence No. 4) on San Bruno Mountain.	**None.** Onsite vegetation is comprised of late successional species. Larval host species do not occur on or adjacent to the project site.
San Francisco Garter Snake	***Thamnophis sirtalis ssp. tetrataenia***	Federally Endangered California Endangered	· Densely vegetated ponds · Adjacent open uplands	The closest record for this species occurs approximately 3.2 miles south of the project site (CNDDB Occurrence No. 13).	**None.** No suitable habitat occurs on or near the project site.
White-tailed Kite	***Elanus leucurus***	California Fully Protected	· Forages in grasslands · Nests in trees with dense canopy	This species is known to occur in the San Francisco Bay Area.	**None.** While suitable nesting habitat occurs onsite, project-related site disturbance would not impact nesting birds of any kind.

**It is of note that the San Francisco Bay is designated Critical Habitat for several state and federally listed species, however, the proposed project will not impact the Bay, and as such, these species are not discussed herein.

SECTION 5. POTENTIAL IMPACTS TO WILDLIFE CORRIDORS

A wildlife corridor is an area of habitat adjoining two or more larger areas of similar wildlife habitat, often connecting wildlife populations separated by natural or created activities, disturbances, or structures. Wildlife corridors are used by individuals and populations for dispersal and migration, allowing for genetic exchange, population growth, and access to larger stretches of suitable habitats, and functionally reduce fragmentation.

The project site's regional location is not within or adjacent to known regional or local wildlife corridors for any common or special-status species. The proposed project site abuts existing residential development on the southern and western perimeters. Further, the project site does not provide suitable habitat for any regionally known species that would utilize migration corridors. As such, the development of the site would not interrupt any regional or local migration corridors.

SECTION 6. POTENTIAL IMPACTS TO AQUATIC RESOURCES

6.1 U.S. ARMY CORPS OF ENGINEERS

The property does not contain any waters or wetlands that would be regulated by the federal government. As such, coordination with the Corps would not be required for the development of the project site.

6.2 REGIONAL WATER QUALITY CONTROL BOARD

The property does not contain any waters or wetlands that would be regulated by the RWQCB. As such, coordination with the RWQCB would not be required for the development of the project site.

6.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The property does not contain any linear (flowing) features that would be regulated by CDFW government. As such, coordination with the CDFW would not be required for the development of the project site.

SECTION 7. LOCAL ORDINANCES

7.1 SAN BRUNO MOUNTAIN HABITAT CONSERVATION PLAN

The San Bruno Mountain Habitat Conservation Plan (HCP) was implemented in 1982 as a way to preserve and enhance habitat for special-status butterflies, in conjunction with limited development on San Bruno Mountain. The HCP is an effort to address both the problem of the butterflies' potential extinction and private landowner's desire to develop their land. It is the result of several years of work by San Mateo County, the cities of Brisbane, Daly City and South San Francisco, Visitacion Associates, other private landowners, the Committee to Save San Bruno Mountain, the State of California and the U.S. Fish and Wildlife Service. The HCP Manager is the San Mateo County Parks Department. The project site is located on the perimeter of the southeastern portion of the HCP area (Figure 5). As such, coordination with the HCP Manager is required for development within the HCP area.

The project site's location relative to specific planning areas and management units within the HCP area, key habitats within and near the HCP area, and local and regional landscape features has also been evaluated in order to analyze impacts that the proposed project may have in regard to the HCP.

7.1.1 SOUTHEASTERN RIDGE PLANNING AREA

The project site is located in the Southeastern Ridge Planning Area. The HCP identifies the following three elements of concern within this planning area:

1) "The majority of the San Bruno Mountain populations of the Mission Blue and Callippe Silverspot butterflies are found on the upper slopes of the Southeast Ridge. For this reason, grading is an important concern; it should be minimized and be well monitored in order not to destroy habitat essential to the insects."

The project site is separated from the southeast ridge of San Bruno Mountain by 0.5 mile and residential development. Further, the project site does not contain any habitat elements necessary for the Mission Blue and Callippe Silverspot butterflies.

2) "Another important concern is the contiguity between this colony and the rest of the Mountain, including areas around the quarry and at the western end of Guadalupe Valley."

While the project site is located at the western end of Guadalupe Valley, it is located on a previously developed parcel, immediately adjacent to occupied single family homes, and as such, the development of the project site would not affect the contiguity between the southeastern ridge of San Bruno Mountain and the rest of the mountain range.

3) "A third concern is whether increased human activity in the area will increase the potential for accidental fires and vandalism and threaten the habitats of the butterflies and other species found there, including endemic plants."

The proposed project includes the construction of a single-family home at the terminus of an existing road, on a previously developed property. The site is comprised of non-native ruderal species and those planted for erosion control or ornamental purposes, it is highly disturbed, and no special-status species of any kind have been observed onsite. Further, existing site conditions (partially fenced boundary, dilapidated remains of former residence, sufficient privacy from onlookers) make the site (and adjacent undeveloped areas) more prone to accidental fires and vandalism if it were to remain undeveloped.

7.1.1.1 BRISBANE ACRES

Brisbane Acres is an area of 154 acres located south and east of the urbanized portion of Brisbane, consisting of steep slopes primarily covered by brush and grassland. It is bordered on the west by the transmission line, on the north by residential Brisbane, on the east by Bayshore Boulevard and on the south by the County Park.

7.1.1.1.1 Management Unit

Brisbane Acres has been divided into two major management units; Unit 2-03-01 is proximal to existing development, while Unit 2-03-02 is the area closest to the parklands and as such is considered the more sensitive of the two. The project site is located within Management Unit 01 of the Brisbane Acres portion of the Southeastern Ridge Planning Area (Administrative Parcel [Management Unit] 2-03-01). Due to the close proximity of Management Unit 2-03-01 to existing residential portions of Brisbane, it is considered to be already affected to some extent by adjoining development and under greater threat of continued development than Unit 2-03-02.

A Revised Operating Program for Management Unit 2-03-01 has been prepared for the project site parcel (Appendix C). The project site will become Management Unit 2-03-19, and is referenced as such in the Revised Operating Program. This Revised Operating Program includes project information and landowner obligations and will be appended to the HCP upon approval.

7.1.2 PROXIMITY TO REGIONALLY SIGNIFICANT AREAS

The project site is not located within any delineated Essential Conservation Areas or Essential Habitat Connectivity Areas. Further, it is separated from these areas by natural landscape blocks, as delineated by the San Mateo County Parks Department. Additional maps depicting the site's location relative to these delineated areas are included as Appendix D.

7.1.3 DEVELOPMENT SPECIFICATIONS

The HCP has specific requirements for development within the boundaries of the HCP. These requirements are based on habitat quality, quantity, and location. Applicable requirements are outlined below for the proposed project.

7.1.3.1 CONSERVED AREA

Per the HCP, 40% of the acreage of parcels to be developed shall be dedicated to the HCP and conserved as endangered species habitat. However, guidance outlined in the 2006 Revised Operating Program for Management Units 2-03-01 and 2-03-02 Section 4.b.(l)(c) allows for the payment of a mitigation fee to the City for habitat acquisition in lieu of designation of 40% of the parcel as conserved habitat. As such, as mitigation for impacts within the HCP management area, the project proponent proposes to pay a one-time fee (in addition to the annual HCP assessment fee), to be computed by multiplying the "mitigation fee land area" (40% of the property acreage - approximately 0.48 acre, 20,902 square feet) by the ''mitigation fee market value" (the highest or most recent per square foot sales price, whichever is greater) within the Administrative Parcel 2-03-02 (upper acres) purchased by the City or sold through private transactions, as adjusted for inflation. The fee amount would be finalized and paid prior to Building Permit issuance.

7.1.3.2 BUFFERS AND LANDSCAPING

Per the requirements set forth in Phases 3 and 4 of the Planning Assistance and Plan Revision sections of the HCP, a strip of land at least 30 feet wide must surround the development to provide some isolation for conserved habitat. The purpose of the buffer is twofold: to protect the development from fires occurring in Conserved Habitat and to protect Conserved Habitat from changes in storm water runoff and from irrigation associated with the development. Since impacts within the HCP coverage area will be mitigated via an in-lieu fee program through the City of Brisbane, a 30-foot buffer strip surrounding the development project is not required.

7.1.4 FUNDING

The project proponent shall pay the County an annual fee to fund operations and management covered under and required by the HCP.

7.1.5 10(A) PERMIT

When a local government issues a building permit or a grading permit in compliance with the applicable conditions of the Agreement, such issuance automatically authorizes takings under the Section l0(A) Permit.

Figure 5. San Bruno Mountain HCP Map

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7.2 CITY OF BRISBANE OPEN SPACE PLAN

In 1998, the Brisbane City Council approved the formation of a 7-member Open Space & Ecology Committee (Committee) to identify, evaluate, and analyze open space resources within the jurisdictional boundaries of the City of Brisbane. Over the course of two years, with the help of city staff and interested citizens, the Committee created the Open Space Plan for the City of Brisbane (Open Space Plan), which was approved by the City Council in 2001). Within the Open Space Plan, Brisbane Acres is considered a unique region due to its land use history, physical conditions, and distinctive natural resources. Parcels within Brisbane Acres were evaluated for conservation value and evaluated for presence of sensitive habitat and/or species and location relative to San Bruno Mountain and adjacent developed parcels. The project site and the surrounding parcels are not identified in the Open Space Plan as having significant resources.

7.3 CITY OF BRISBANE GENERAL PLAN

On June 21, 1994, the City of Brisbane's 1994 General Plan was adopted. The General Plan is the City's basic planning document, providing the blueprint for development in the City and addresses all aspects of development, including land use, housing, traffic, natural resources, open space, safety, and noise. The City has been in the process of a General Plan Update, but it has yet to be completed, and as such, the 1994 General Plan remains the authoritative planning document.

The Conservation Element of the General Plan addresses the conservation, development and use of natural resources, including water, forests, soils, waterways, wildlife and mineral deposits. Issues considered in this element include flood control, water and air quality, erosion and endangered species. The following conservation policies, presented within the Conservation Element, address the management of resources on the project site:

Policy 119 Comply with the provisions of the Habitat Conservation Plan and the Agreement with respect to the San Bruno Mountain Area Habitat Conservation Plan.

Policy 123 Conserve important biological communities through sensitive project design.

The project proponent has consulted with the City of Brisbane and the HCP Habitat Manager for planning guidance and HCP requirements for the proposed project and has accordingly designed the proposed project to comply with the San Bruno Mountain HCP. As the project site does not currently support sensitive biological communities, in lieu of preserving 40% of the property's acreage, the project proponent will pay a mitigation fee to the City for habitat acquisition (as outlined in Section 7.1.3.1).

Policy 120 Cooperate with local, State and Federal agencies in conservation efforts for biological resources.

Policy 122 Cooperate with other agencies in conservation efforts.

Johnson Marigot LLC (environmental consultant) has been retained by the project proponent to query and coordinate with applicable local, state, and federal agencies regarding the proposed project and provide guidance on appropriate conservation efforts to be undertaken to remain in compliance with local, state, and federal ordinances and laws regarding biological resources on the project site.

Policy 127 Encourage the use of plants that are compatible with the natural flora in landscape programs.

Policy 128 Encourage the use of native plants in landscape programs that provide food and shelter to indigenous wildlife.

The landscaping plan for the proposed project has been developed in compliance with local ordinances and with guidance from the City.

Policy 129 Require erosion controls to mitigate soil disturbance.

Stormwater control/LID designs present in the SMCPPP have been incorporated into the project design in order to remain in compliance with the MRP as well as the City's General Plan.

7.4 CITY OF BRISBANE TREE REMOVAL GUIDELINES

The City of Brisbane has provided guidance for tree removal on private property. A tree removal permit is required for removal or severe trimming (50% of the foliage crown or 30% reduction in height) for the following categories of trees:

1. Any tree which has a trunk measuring 30 inches or greater in circumference [approximately 9.5 inch diameter], at a height of 24 inches above natural grade.
2. Any tree designated as protected by resolution of the City Council
3. Any tree, regardless of size, that was required as part of the granting of a permit, license or other approval by the City
4. Any tree, regardless of size, that was required by the City as a replacement tree for an unlawfully removed tree
5. Any tree, regardless of size, planted or maintained by the City

A total of 56 trees are present on the project site. Of these, 29 are Monterey pine, 16 are blue gum eucalyptus, five are ornamental species (monkey puzzle, silver wattle, and lollypop trees), and four are other native species: one coast live oak (*Quercus agrifolia*), two incense cedar, and one Douglas fir (*Pseudotsuga menziesii*). The proposed project includes the removal of 40 trees, 31 of which have a circumference of greater than 30 inches, and one of which is a protected species. Accordingly, a tree removal permit would be required for the removal of these trees.

SECTION 8. RECOMMENDED CONDITIONS OF PROJECT APPROVAL

8.1 PROJECT IMPLEMENTATION SCHEDULE

The removal of trees and existing onsite structures should occur outside of bird nesting season and bat maternity season (i.e., September 1 through January 31). Project-related ground-disturbance should likewise commence outside of the nesting season for birds, and if such work should continue into/through the nesting season, it should be with minimal breaks during which the project site would be free from ground-disturbance. Should a break from ground-disturbance occur for greater than 1 week during the nesting season, the applicant should hire a qualified biologist to conduct a survey for nesting birds prior to recommencement of ground-disturbing activities, with the results of the survey submitted to the City Planning Department.

SECTION 9. REFERENCES

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List of Appendices

Appendix A. Kom Residence Site Plan

Appendix B. Representative Site Photos

Appendix C. Revised Operating Program for Management Unit 2-03-01

Appendix D. HCP Locational Maps

STORMWATER SITE DESIGN MEASURE:

DIRECT RUNOFF AT (N) UNCOVERED PARKING AREA TO WEST OF (N) GARAGE AND (N) LAWN AREA INTO VEGETATED PLANTERS BELOW - SEE LANDSCAPE DRAWINGS

(E) SEPTIC TANK - TO BE REMOVED

(E) 15'-0" SIDE YARD SETBACK

(E) 10'-0" FRONT YARD SETBACK

(E) DERELICT BUILDING TO BE REMOVED

MULTI-FAMILY APARTMENT BUILDING

(E) GATE TO BE REPLACED w/ (N) GATE - T.B.D.

(E) FIRE HYDRANT No. 75

THOMAS AVENUE

(N) ADDRESS IDENTIFICATION NUMBERS TO BE VISIBLE FROM THOMAS AVENUE AND PER REQUIREMENTS OF 2013 CFC CHAPTER 5, SECTION 505.1 AND 2.

PROVIDE SIGNS MARKING (N) DRIVEWAY AS "FIRE LANE NO PARKING" PER 2013 CFC APPENDIX D SECTION D103.6

(N) GUARDRAIL - T.B.D. SEE LANDSCAPE DRAWINGS

PER RECOMMENDATIONS FROM SOILS ENGINEER AND PROJECT GEOLOGIST, NO PORTION OF THE PROPOSED BUILDING FOUNDATIONS OCCUR WITHIN 18'-0" OF THE DESIGNATED CLIFF EDGE - SHOWN DASHED

VACANT LOT

SINGLE FAMILY RESIDENCE

(N) UNCOVERED PARKING AREA

(N) 2-CAR GARAGE
SLAB F/N = 271.0'
(LOW)

(N) LAWN
[+268.0']

(N) DRIVEWAY

(N) RESIDENCE
LOWER F.F. = 259.5'
MAIN F.F. (ENTRY) = 271.0'
UPPER F.F. = 281.2'

FOUNTAIN

(N) DECK
+271.0'

(N) LOWER DECK
+244

(E) 15'-0" SIDE YARD SETBACK

(E) 10'-0" REAR YARD SETBACK

(E) PROPERTY LINES, TYP.

R= 1150.00' D= 5° 57' 40" L= 119.65'

R= 100.00' D= 53° 27' 46" L= 93.31'

R= 246.16' D= 43° 18' 41" L= 187.59'

R= 1280.00' D= 1° 29' 58" L= 33.50'

R= 25.00' D= 106° 14' 57" L= 46.36'

S 86° 09' 35" W 130.35'

S 26° 21' 03" W 253.98'

S 67° 06' 41" W 165.27'

2 SITE PLAN
1" = 20'-0"
0 5 20 40ft
N

(E) PROPERTY LINE

(E) CONTOURS [SHOWN @ +2'-0" HEIGHT INTERVALS]

(N) CONTOURS - SEE CIVIL DRAWINGS

(E) TREE TO BE REMOVED

(E) TREE TO REMAIN

HATCH INDICATES AREA FOR FIRETRUCK TURN AROUND

(N) TREE - SEE LANDSCAPE DRAWINGS

ABBREVIATIONS:

TW TOP OF WALL / TOP OF CURB

TP TOP OF FINISHED PAVING

G.1.113

Representative Photos of the 99 Thomas Avenue Project Site

Photos taken on December 30, 2015

Photograph 1. Southernmost portion of the project site.
(Standing east of the project site - offsite - facing west)
*Note the abandoned structure

Photograph 2. Central portion of the project site.
(At end of existing driveway - southern portion of the project site - facing north)
*Note the disturbed nature of the project site

Photograph 3. Central portion of the project site.
(Standing at the northwestern end of the project site, facing southwest)
*Note the sparsely vegetated understory

Photograph 4. Central portion of the project site.
(At east-central corner of the project site - facing north)
*Note the steep slope that bisects the property

Representative Photo Location Map

Draft Operating Program for Management Unit 2-03-19

2-03-19. This Management Unit comprises a 1.2 acre (52,255 square foot) parcel at 99 Thomas Avenue, Brisbane, CA (APN No. 007-350-170) that is planned for development as a single family home site.

Obligations: The landowner/developer has the following obligations under the San Bruno Mountain Habitat Conservation Plan (HCP):

1. Funding: The landowner shall provide the following funding:

    a. One-time Habitat Conservation Funding: Based on the environmental assessment and consistent with the guidance outlined in the 2006 Revised Operating Program for Management Units 2-03-01 and 2-03-02 Section 4.b(1)(c), prior to the City's issuance of a building permit for the construction of the single family home, the landowner shall demonstrate that development of the parcel is consistent with protecting 40 percent of the Brisbane Acres as conserved habitat. This shall be by payment of a one-time fee to the City for habitat acquisition in lieu of 40% of the parcel being established as conserved habitat. This fee shall be computed by multiplying 40 percent of the overall land area in square feet by the highest or most recent per square foot sales price, whichever is greater, within HCP Administrative Parcel 2-03-02 (upper acres) purchased by the City or sold through private transactions, as adjusted for inflation, using the Employment Cost Index-West or any successor index. The overall property area is 52,255 square feet and 40 percent is 20,902 square feet. This fee shall be paid concurrently with, or prior to, the time of receipt of a grading permit from the City of Brisbane.

    b. On-going HCP Funding Program: Upon the City's issuing a certificate of occupancy for the single family home, the landowner shall be assessed on the landowner's property tax bill an annual assessment, which assessment shall be adjusted for inflation as provided in the HCP funding program. Such assessment shall be (i) based on the 2009 HCP amendment and (ii) placed in the San Mateo County administered San Bruno Mountain Conservation Fund. See Chapter V-B for details of funding and timing of assessments.

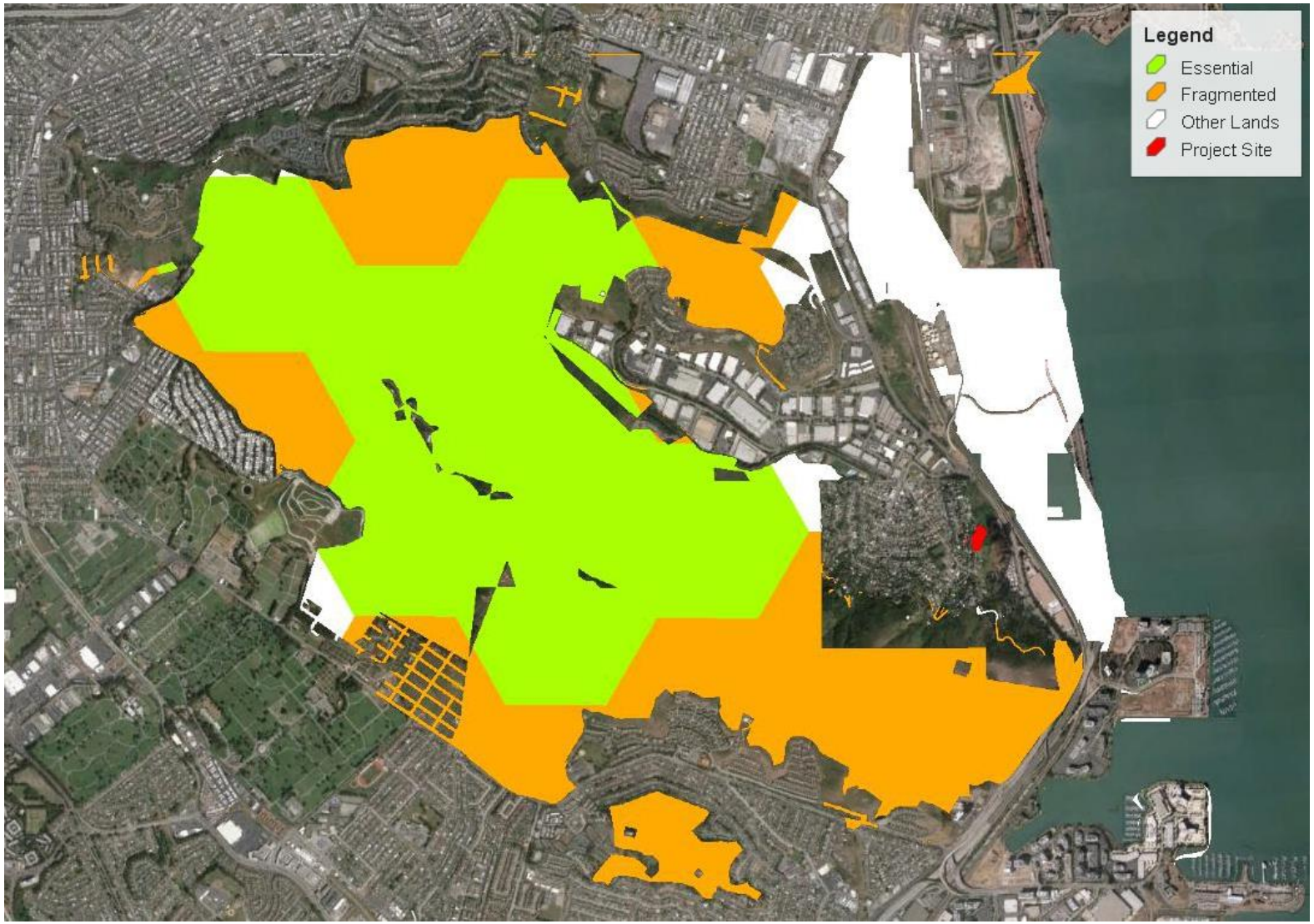
2. Reclamation Provisions: Given the one-time funding obligation 1.a, as detailed above, on-site reclamation provisions are not applicable to this project.

3. Invasive Species Control: In order to reduce the potential for invasive plant species to propagate and spread, the site shall be maintained free of French broom, Striatus broom, Fennel, Oxalis, Bristly ox-tongue, Italian thistle, weedy grasses, Eucalyptus seedlings and saplings, and other invasive plants that pose a threat to butterfly habitat.

4. Pesticide Control: The Landowner cannot perform aerial or large-scale spraying of pesticides without the approval of the Plan Operator.

5. Buffer Area: The Landowner must establish and maintain a fire buffer around the residence to protect it from fire. The buffer area must be approved by the City.

Essential Conservation Areas in the Vicinity of the Project Site



*The project site is not located within any delineated Essential Conservation Areas.

Essential Habitat Connectivity Areas in the Vicinity of the Project Site

*The project site is not located within any delineated Essential Habitat Connectivity Areas.

Natural Landscape Blocks in the Vicinity of the Project Site

* The project site is not separated from San Bruno Mountain by any delineated Natural Landscape Blocks.

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

RECEIVED
JUN 12 2017
Brisbane Dev Dept

June 6, 2017
J5016A

TO: Kenneth Johnson
Senior Planner
CITY OF BRISBANE
50 Park Lane
Brisbane, California 94005-1310

SUBJECT: **Supplemental Geologic and Geotechnical Peer Review**
RE: Kom Residence
99 Thomas Avenue

At your request, we have completed a supplemental geologic and geotechnical peer review of the permit application for proposed site development using:

- Additional Response to Peer Review Comments (letter) prepared by BAGG Engineers, dated May 24, 2017;
- Response to Peer Review Comments (letter) prepared by BAGG Engineers, dated March 29, 2017;
- Geotechnical Engineering Investigation (report) prepared by BAGG Engineers, dated March 16, 2015;
- Supplemental Information (letter) prepared by BAGG Engineers, dated August 2, 2016; and
- Civil Plans (6 sheets) prepared by Kevin O'Connor, Inc., dated March 4, 2016.

In addition, we have reviewed pertinent technical documents from our office files, evaluated aerial photographs covering the site, completed a previous site inspection, and met with members of the Project Design Team.

DISCUSSION

The applicant proposes to construct a residence and detached garage within the central portion of the subject property. Thomas Avenue approaches the southern side of the property but does not have full pavement width at the start of the proposed driveway. We understand that street improvements and possibly a retaining wall (along the eastern side of the street) may be needed as part of the proposed site development. An existing abandoned building in the southern portion of the property will be

demolished. In our previous formal geotechnical peer review (dated September 15, 2016), we recommended that the Project Geotechnical Consultant perform additional work to develop recommended setbacks of proposed site improvements from precipitous slopes. Recommended additional work included examination and consideration of bedrock discontinuities evident in the face of the precipitous slope to the east of the proposed house site.

In subsequent discussions with the Project Geotechnical Consultant, we suggested that cantilevered structures extending towards the precipitous slopes be minimized/reduced and that supplemental consideration be given to relocating or securing the proposed driveway turnaround located near the precipitous slope.

CONCLUSIONS AND RECOMMENDED ACTION

Proposed site development is constrained by the close proximity of precipitous rocks slopes (partially man made) that have not been tested/impacted by a major earthquake. The Project Geotechnical Consultant and Engineering Geologist have completed additional site investigation and analysis including measurement of site bedrock discontinuities. The Consultants have recommended that the residence foundation respect a minimum 18-foot setback from the top of slope and that the residence utilize a pier and grade beam foundation. For the driveway turnaround, the Consultants have recommended that the turnaround be supported by a stitch pier wall with piers extending below an imaginary 45-degree line projected up from the toe of slope. We do not have geotechnical objections to the currently proposed project geotechnical design recommendations or the layout of site improvements illustrated on Plates 1 and 2 of the referenced May 24, 2017, letter by BAGG Engineers. We recommend that the following conditions be attached to future building permit applications:

1. **Geotechnical Plan Review** - The applicant's geotechnical consultant should review and approve all geotechnical aspects of the project building and grading plans (i.e., site preparation and grading, site drainage improvements and design parameters for foundations, retaining walls and driveway) to ensure that their recommendations have been properly incorporated.

   The results of the plan review should be summarized by the geotechnical consultant in a letter and submitted to the City Engineer for review and approval prior to issuance of building permits.

2. **Geotechnical Construction Inspections** - The geotechnical consultant should inspect, test (as needed), and approve all geotechnical aspects of the project construction. The inspections should include, but not necessarily be limited to: site preparation

and grading, site surface and subsurface drainage improvements, and excavations for foundations and retaining walls prior to the placement of steel and concrete.

The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a letter and submitted to the City Engineer for review prior to final (granting of occupancy) project approval.

LIMITATIONS

This supplemental geologic and geotechnical peer review has been performed to provide technical advice to assist the City with its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

Respectfully submitted,

COTTON, SHIRES & ASSOCIATES, INC.
CITY GEOTECHNICAL CONSULTANT

Ted Sayre
Principal Engineering Geologist
CEG 1795

David T. Schrier
Principal Geotechnical Engineer
GE 2334

TS:DTS:kc

BAGG ENGINEERS
Geotechnical Geoenvironmental Special Inspection

May 24, 2017
BAGG Job No. KOMAN-01-01

Mr. Andrew Kom
59 Lois Lane
San Francisco, CA 94134

Additional Response to Peer Review Comments
Proposed Kom Residence
99 Thomas Road
Brisbane, California

Dear Mr. Kom:

This letter follows the meeting held at the City of Brisbane offices on April 28, 2017. The purpose of the meeting was to attain consensus on mutually acceptable minimum setbacks of the residence and of the fire truck turnaround from the top / apex of the adjacent slope to the east. In particular, the meeting followed an email response dated April 5, 2017 from Ted Sayre, the City's geologic and geotechnical consultant, to BAGG's March 29, 2017 letter.

Attending the meeting were the following:

Mark English, Mark English Architects
David Hoexter, Hoexter Consulting, Inc. (consultant to BAGG Engineers)
Kenneth Johnson, City of Brisbane
Andrew Kom, owner
Tony Lusich, BAGG Engineers
Helen Ruan, owner
Ted Sayre, Cotton, Shires & Associates (consultant to City of Brisbane)

Discussion

The following were agreed to at the meeting, and thus consist of our setback recommendations.

Driveway Turnaround: Mr. Sayre stated that a minimal setback of 10 feet from the slope apex would be appropriate, but that an engineering solution to decrease the setback would be acceptable. The turnaround will be located as shown on the attached figure prepared by Mark English Architects, which also indicates the turnaround area will be cut about 5 feet. Our exploration pits on the site indicate this will place the pavement directly on the weathered, moderately soft sandstone bedrock. We therefore recommend the turnaround should be supported by a below-grade stich pier wall consisting of minimum

12-inch diameter, reinforced drilled piers. The piers should extend to a minimum depth of 3 feet below a 45-degree line as shown on the attached Plate 2, Site Section, and spaced at two diameters, center to center. The piers should also be reinforced with a minimum of four #5 bars for their full length (less 3-inch cover at each end).

Residence: Mr. Sayre stated that our prior recommendation of a minimum foundation setback of 18 feet at grade from the slope apex would be appropriate, and further, that the residence (first floor) should not cantilever more than 3 feet from the foundation. The residence plans have thus been revised to reflect these distances, as shown on the attached figure prepared by Mark English Architects.

Conclusions

In our opinion, the setback distances described above are suitable from a geotechnical and geologic viewpoint, and we thus recommend that they be incorporated into the final project design.

Supplemental Geotechnical Recommendations

Our report for the project presented recommendations for only conventional spread footings, based on the assumption that all foundations would be founed within similar materials, i.e., weathered bedrock. Our report also stated that "Should recommendations for other foundations be needed, they will be prepared when a building location and floor elevations have been set." The latest plans, Plan Key & Site Secttion, Plate 1, indicate that portions of the house will be supported above at least 7 feet of fill on one side and firm bedrock on the other. To maintain uniform support and minimize differential settlements, we are therefore recommending the house be supported on drilled piers founded within the underlying weathered bedrock.

Foundation piers should be a minimum of 16 inches in diameter and reinforced with at least four #5 reinforcing bars, or as specified by the Structural Engineer. As the underlying bedrock is expected to be quite firm, all piers should extend at least 5 feet into the weathered bedrock as determined by this office during the pier drilling operations. For estimating purposes, the weathered bedrock can be assumed to be about 2 feet below existing site grades. The piers may be designed to obtain vertical support from skin friction on the pier shaft within weathered bedrock at a rate of 800 pounds per square foot (psf).

Grade beams should be designed with the assumption that they gain no vertical support from the soil beneath them. The piers and grade beams should be structurally tied together to enable them to act as a unified system.

Lateral loads may be resisted by passive earth pressures against the foundation members which have been placed in neat excavations without the use of any forms. The allowable passive resistance may be taken as an equivalent fluid pressure of 300 pcf (triangular) within engineered fill material and/or native soils. Within firm bedrock (an average of 2 feet below original site grades), passive resistance may be taken as 500 pcf. The upper 12 inches of the passive resistance in any case should be ignored, unless the

footing is laterally confined by an AC pavement or concrete slab. Passive resistance may also be assumed to act over 1½ times the pier diameter.

Closing

Opinions, conclusions, and recommendations presented in this letter are subject to the limitations presented in our report dated March 15, 2016.

Thank you for the opportunity to perform these services. Please do not hesitate to contact us, should you have any questions or comments.

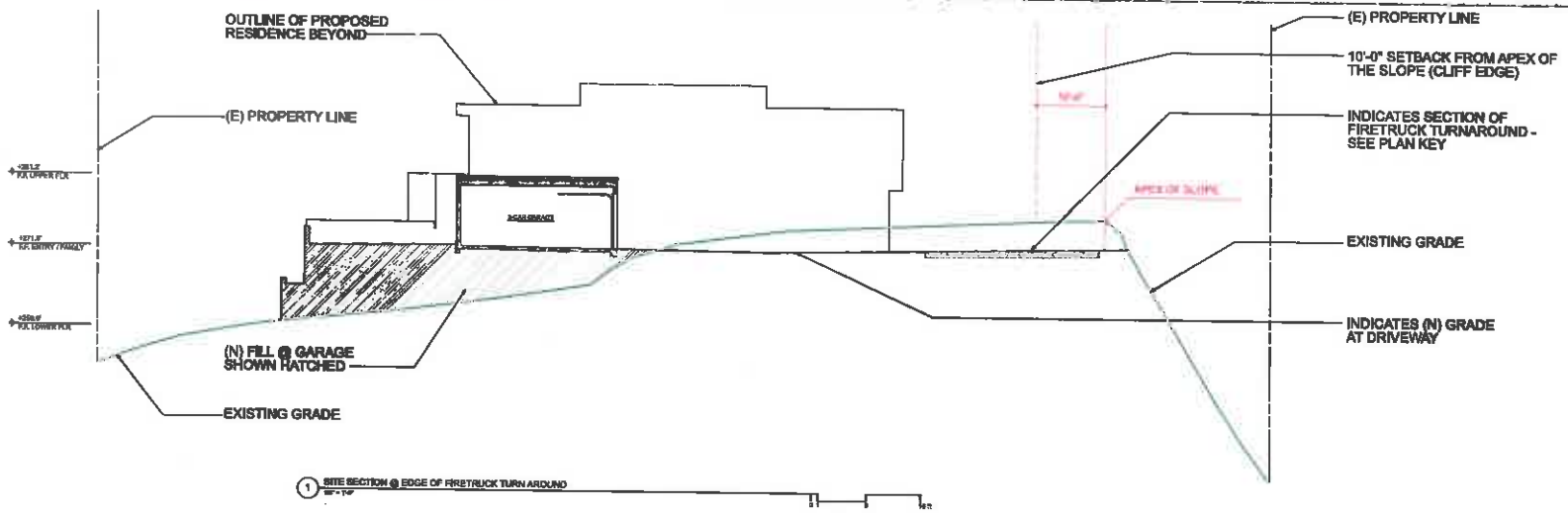
Very truly yours,
BAGG Engineers

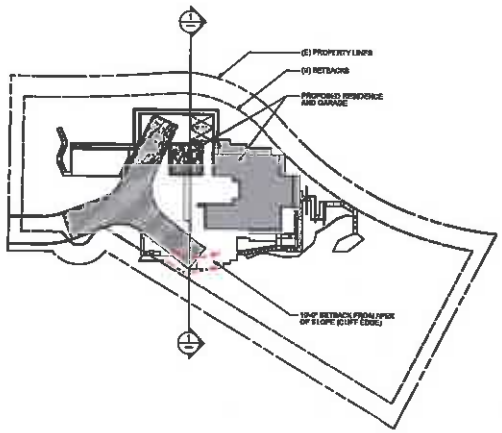
Jason Van Zwol
VP/Chief Engineer
GE 854 Exp. 6/30/17

David F. Hoexter
Consulting Engineering Geologist
EG 1158, Exp. 11/30/17

Attached:

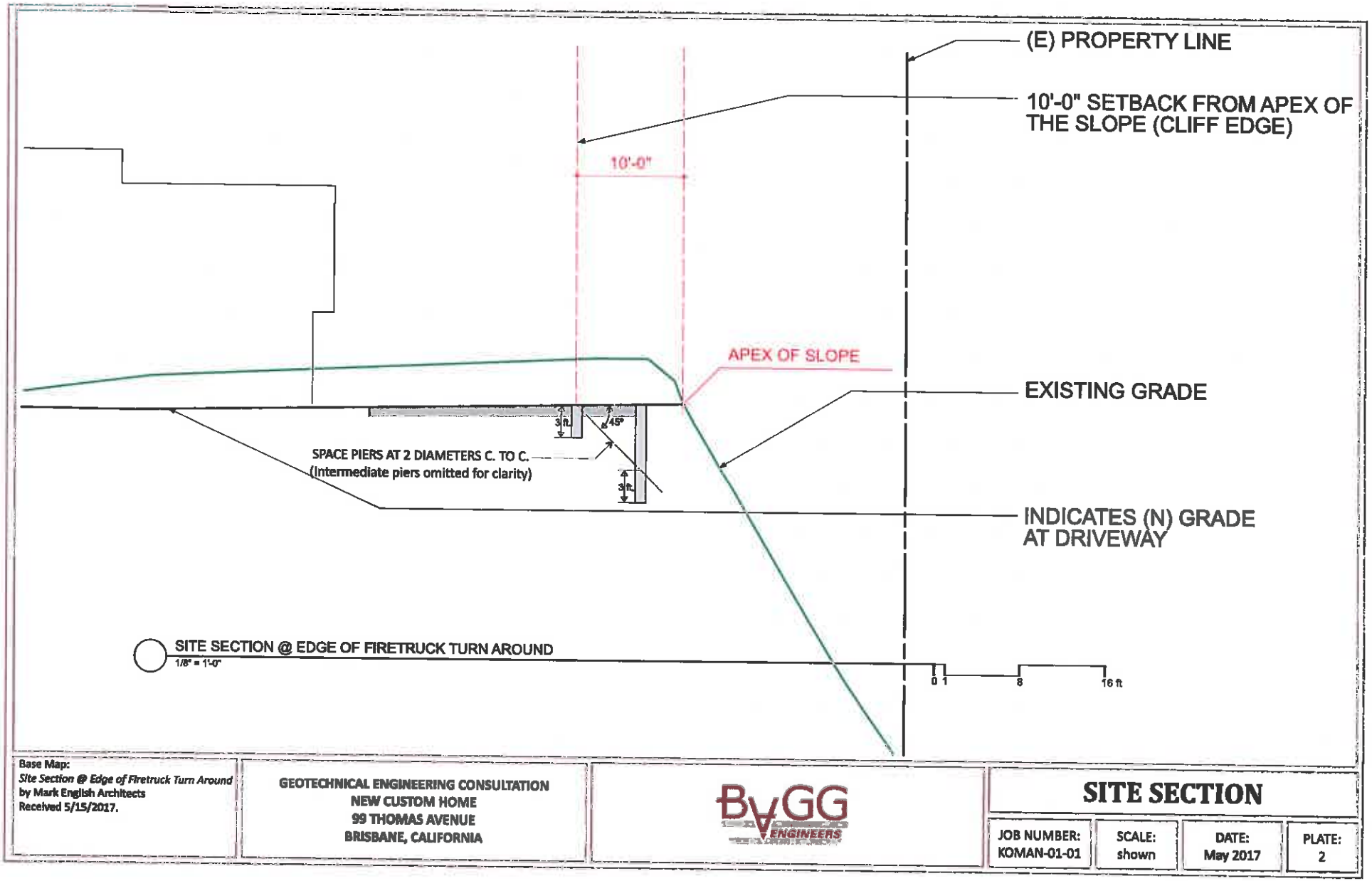
Plate 1: Plan Key & Site Section
Plate 2: Site Section





Base Map: *Site Key and Site Section @ Edge of Firetruck Turn Around* by Mark English Architects Received 5/15/2017.	GEOTECHNICAL ENGINEERING CONSULTATION NEW CUSTOM HOME 99 THOMAS AVENUE BRISBANE, CALIFORNIA	BAYGG ENGINEERS	**PLAN KEY & SITE SECTION**	JOB NUMBER: KOMAN-01-01	SCALE: shown	DATE: May 2017	PLATE: 1

G.1.130



Base Map:
Site Section @ Edge of Firetruck Turn Around
by Mark English Architects
Received 5/15/2017.

GEOTECHNICAL ENGINEERING CONSULTATION
NEW CUSTOM HOME
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

BvGG ENGINEERS

SITE SECTION

JOB NUMBER:	SCALE:	DATE:	PLATE:
KOMAN-01-01	shown	May 2017	2

March 29, 2017
BAGG Job No. KOMAN-01-01

Mr. Andrew Kom
59 Lois Lane
San Francisco, CA 94134

Response to Peer Review Comments
Proposed Kom Residence
99 Thomas Road
Brisbane, California

Dear Mr. Kom:

This letter is intended to provide additional information as requested in Comment 6 of the CEQA Potential Areas of Significance letter prepared by the City of Brisbane and dated April 29, 2016, and a subsequent September 15, 2016 peer review letter by the City's consultant, Cotton, Shires & Associates. The site location is shown on Plate 1. Reference is made to the following three documents:

Report "Geotechnical Engineering Investigation, Kom Residence, 99 Thomas Road, Brisbane, California" (Job No. KOMAN-01-01) prepared by this office and dated March 16, 2016.

Letter "Geotechnical Engineering Investigation, Kom Residence, 99 Thomas Road, Brisbane, California" (Job No. KOMAN-01-01) prepared by this office and dated August 2, 2016.

Letter "Geologic and Geotechnical Peer Review, Kom Residence, 99 Thomas Avenue", prepared by Cotton, Shires and Associates, Inc (CSA), and dated September 15, 2016.

The CSA letter requests a rationalization for the proposed setback of the planned new residence from the nearby rock slope (reportedly the headwall of a former quarry), based "on a characterization of bedrock discontinuity orientations and clarification of which precipitous slopes are a result of natural processes versus quarry activity".The slope is a maximum of approximately 60 feet high and inclined at maximum of approximately 0.5 : 1.0 (horizontal to vertical), being approximately equivalent to 210 percent and 64 degrees from the horizontal. The letter notes that the slope has never been subjected to a major earthquake (such as the 1906 San Francisco Earthquake) in its present configuration. Subsequent discussion with Ted Sayre, CEG, a prime

author of the letter, indicates that although the slope may be relatively stable under static conditions, its response to a major earthquake has not been evaluated.

This letter further addresses the feasibility of the revised project layout, updating any geotechnical recommendations based on the revised project, particularly those pertainingto the potential for slope instability, to the use of shallow foundation footings in close proximity to very steep slopes, and to the recommended foundation type.

Subsurface Conditions and Initial Recommendations

The referenced geotechnical engineering investigation report states that the earth materials that comprise the steep slopes are as follows:

> The geology of the site area has been mapped by Knudsen et al. (1997), Bonilla (1998), and Witter et al. (2006). Bonilla (1998) shows the site to be underlain by Cretaceous and Jurassic Franciscan Complex sandstone and shale bedrock, which concurs with our field observations conducted by our consulting Certified Engineering Geologist (CEG) and the findings of the test pits excavated at the site. A portion of that map including the site area is presented as the Regional Geology Map, Plate 3, in our March 16, 2016.
>
> The sandstone at the site is generally yellowish to grayish in color, hard, durable, strong, and intact where fresh because the site is situated atop a topographic knob that has been cut slightly to accommodate the previous residential structure that occupied a portion of the site area. The sandstone appeared to be moderately strong and fractured forming steep and relatively high cliffs along the eastern site boundary facing the Bay.
>
> Some isolated wedge-shaped rockfalls were observed along the eastern steep side of the site. A relatively large rockfall failure was observed along the extension of the eastern rocky cliff immediately to the south of the property line beyond the site limit. No significant recent slope instabilities were observed along the eastern steep side of the site, which could impact the planned development. The site slopes appeared to be stable in their current configuration under the existing environment and topography.

The Report includes the following general recommendations:

> Based on the subsurface exploration conducted at the subject site, it is our opinion that the proposed project is feasible from a geotechnical engineering standpoint, provided the recommendations presented in this report are incorporated into the project design and implemented during construction.
>
> The site is underlain by very hard sandstone bedrock that is expected to be very resistant to construction excavation. The construction should include provisions for any excavations in this material.

Foundations for the new residence should consist of conventional spread footings, piers and grade beams or structural mats. The existing bedrock is very hard and excavation put in subsurface section would be expected to be very difficult, only recommendations for conventional spread footings are presented in this report. Should recommendations for other foundations be needed, they will be prepared when a building location and floor elevations have been set.

As the sandstone bedrock is expected to be very strong in localized areas and may become non-rippable with heavy construction equipment requiring specialized drilling rigs and hoe rams/hydraulic hammers to excavate it.

Weincluded the following specific recommendations in the report:

Foundations: *The new residence may be supported on conventional spread footings.* We recommend that the footings should be established at a minimum of 24 inches in depth with a minimum width of 12 inches. With these dimensions, footing may be designed using allowable bearing pressures of 2000 pounds per square foot (psf) for dead plus live loads, and 3000 psf for total design loads including wind or seismic loads.

Settlement: We estimate that total post-construction static settlement of the new structure would be less than one inch, with differential settlement expected to be less than half that.

Building Code Requirements

Figure 1808.7.2 requires the face of the footing to be at least that smaller of H/3 and 40 feet,

Section 1808.7.2 of 2013 CBC states, in part:

Where the slope is steeper than 1 unit vertical in 1 unit horizontal (100-percent slope), the required setback shall be measured from an imaginary plane 45 degrees (0.79 rad) to the horizontal, projected upward from the toe of the slope.

Subsequent Recommendations

Our subsequent letter presented the following recommendations:

Utilize conventional spread footings. Place the near-point of the exterior edge of the foundations to the top of the slope below a plane of 1:3 (horizontal to vertical) extending up from the toe of slope.

Supplemental Evaluation

We conducted supplemental geologic mapping on January 26, 2017. As the bedrock lithology is relatively consistent and there are no significant fill masses, we did not modify or re-evaluate the previous geologic mapping. We concentrated on identifying bedrock fractures/joints/discontinuities (henceforth referred to as "discontinuities") which might result in weak zones or planes likely to fail

on or adjacent to the current steep slope located east of the proposed residence. The existing slope is in excess of 1:1 (horizontal to vertical).

The sandstone underlying the site is generally massive, with few indications of bedding. We did not observe any bedding planes which we could consider to be reliable and representative of the site. We confirmed the initial geotechnical investigation observations, and concentrated on conducting a more detailed evaluation of discontinuities which might result in weakening the exposed slope. The primary concern was to identify conditions, if any, which would result in relatively large scale slope failures which could impact the proposed residence, particularly during a large earthquake.

We observed all accessible locations within the property which presented exposures of the sandstone bedrock. Exposures were identified southwest, northwest, southeast and east of the proposed residence. Representative discontinuities were measured and plotted on the topographic site plan (Plate 2). The measurements are depicted on the site plan as close as possible to their actual locations, however space limitations on the plan required slight relocations as necessary to accommodate all readings.

The measured discontinuities were subsequently transferred to Plates 3A and 3B, which each also identify and display representative cross sections A1 and A2 (both sections also shown on Plate 2). The cross sections were digitally plotted by the project architect. The discontinuities were plotted on the cross sections, converted from true to apparent dip to reflect any divergence of the cross section azimuths from the discontinuity strike.

The measurements identify a highly variable occurrence of discontinuities, with representative planes inclined vertically as well as in all compass directions. A prominent occurrence is planar surfaces which are inclined sub-parallel to the face of the existing excavated slope, generally approximately parallel to or steeper than the open face, with occasional (although not depicted on the cross sections) inclinations into the slope. Whereas there are some out of slope inclinations which can be projected from the opposite side of the site, no apparent out of slope inclinations were observed directly on the slope face. This overall distribution of discontinuities has resulted in localized spalling of slabs or rock from the open face.

We also observed the condition of the slope face from below. Although reportedly excavated in the 1930s, or earlier, there is surprisingly little accumulation of talus (fallen debris) at the toe of the slope, which does not appear to have been disturbed in many decades. Visually, slope retreat appears to result from periodic spalling of discrete rock slabs, either as localized wedges resulting from intersecting discontinuities, or by localized undercutting of a planar discontinuity by an adverse (dipping into the slope) discontinuity.

Conclusions

In our opinion, there are no indications of extensive through-going planar conditions which would result in large-scale failure of the slope in the event of a major earthquake. Continued relatively limited slab failures are likely to occur in the future, and in particular as a result of strong ground shaking from a major earthquake. In our opinion, a larger mass failure of the slope immediately adjacent to the proposed residence is unlikely.

Recommendations

Our recommendations are shown graphically on Plates 2, 3A and 3B.In our opinion, the following recommendation should be incorporated into the design and construction of the project:

> The required setback for the face of the footing shall be at least H/3 and be below an imaginary plane 45 degrees (0.79 rad) to the horizontal, projected upward from the toe of the slope.

Opinions, conclusions, and recommendations presented in this letter are subject to the limitations presented in our report dated March 15, 2016.

Thank you for the opportunity to perform these services. Please do not hesitate to contact us, should you have any questions or comments.

Very truly yours,
BAGG Engineers

REGISTERED PROFESSIONAL ENGINEER ANTHONY NICHOLAS LUSICH NO. 29416 CIVIL STATE OF CALIFORNIA

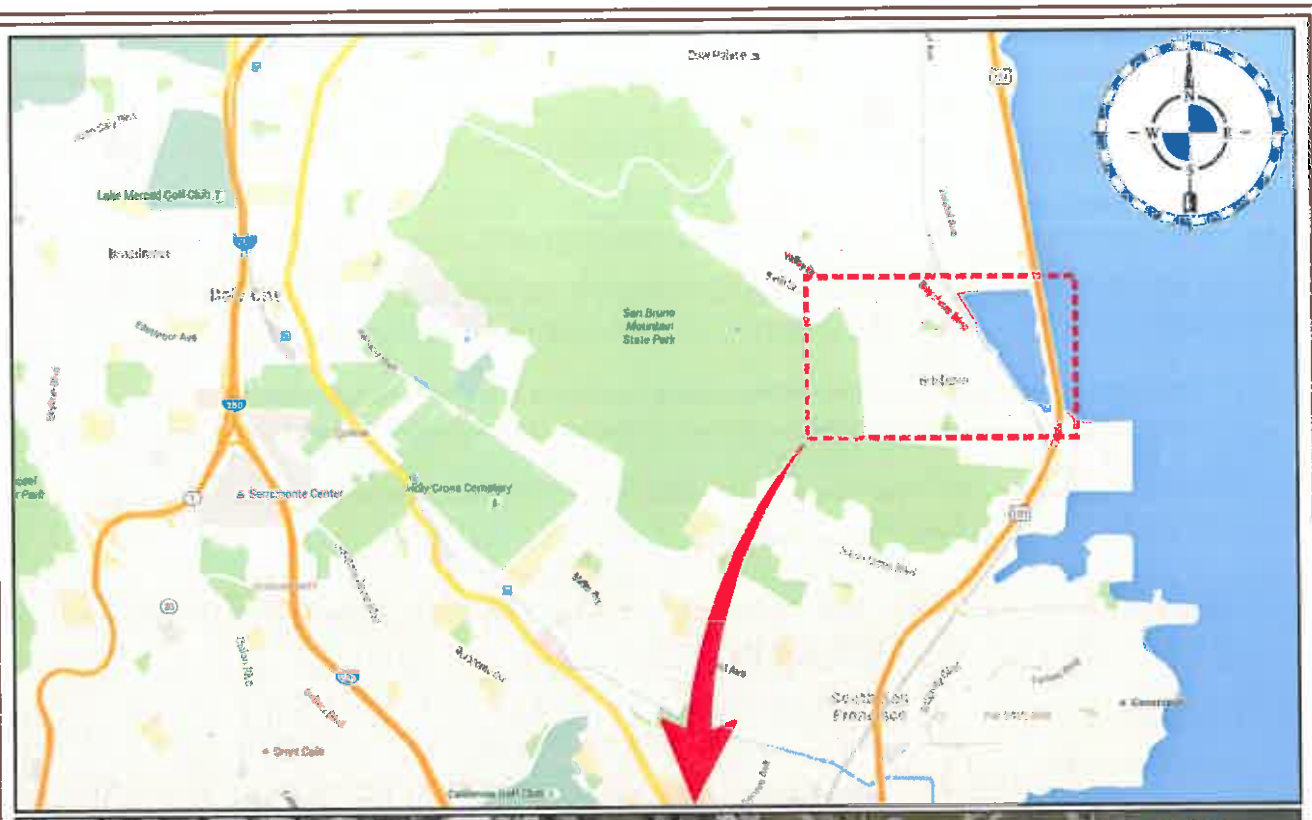
PROFESSIONAL GEOLOGIST DAVID F. HOEXTER No. 1158 CERTIFIED ENGINEERING Exp. 11/30/17 GEOLOGIST STATE OF CALIFORNIA

Anthony N. Lusich, PE
Supervisorial Geotechnical Engineer

David F. Hoexter, CEG
Consulting Engineering Geologist

Attached:

Plate 1: Vicinity Map from 3/16/2016 report
Plate 2: Site Plan
Plate 3A: Cross Section A1
Plate 3B: Cross Section A2



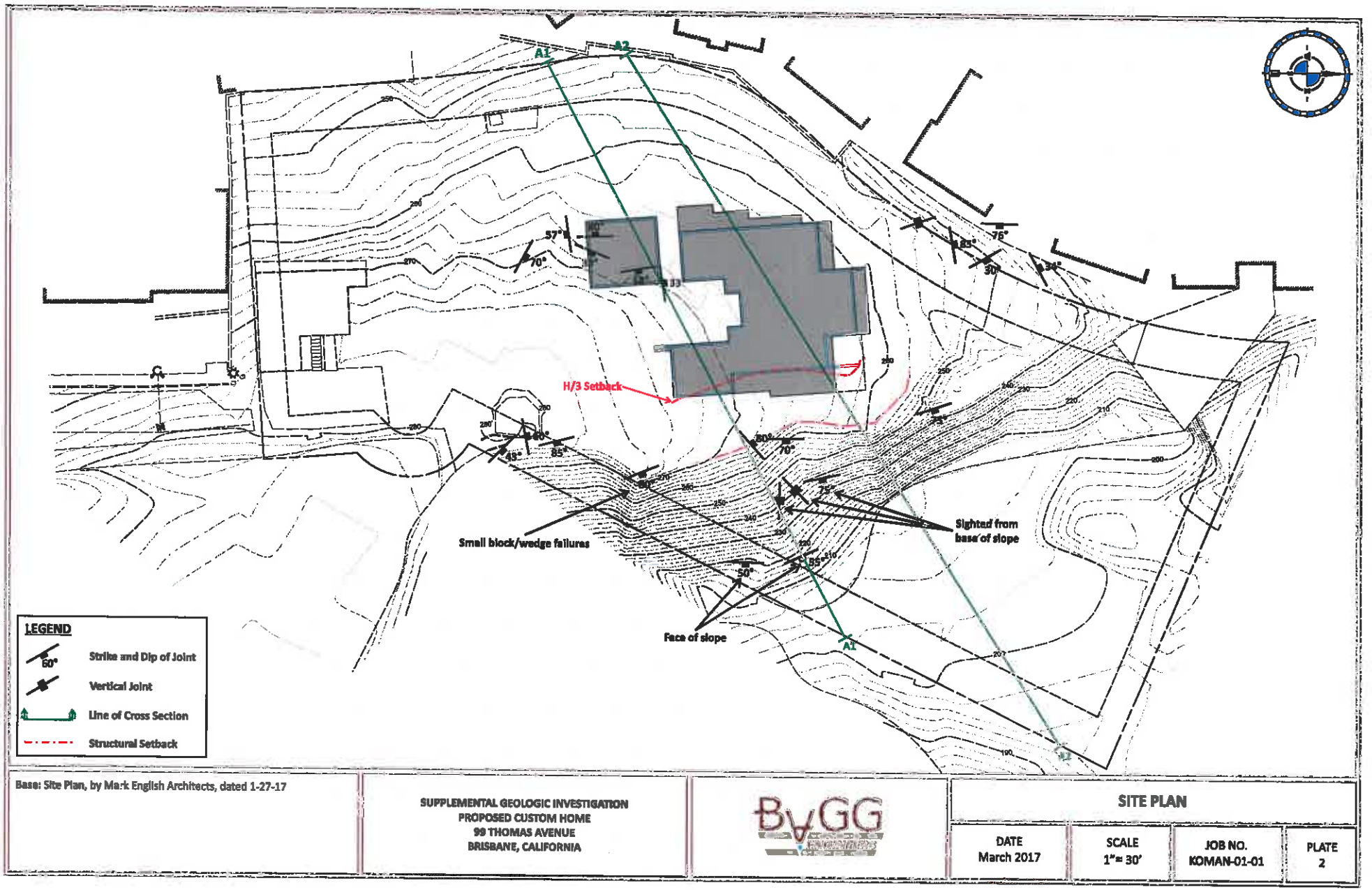
Source: Google Maps

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED CUSTOM HOMES
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

VICINITY MAP

DATE	JOB NUMBER	PLATE
NOV. 2015	KOMAN-01-01	1

BvGG ENGINEERS



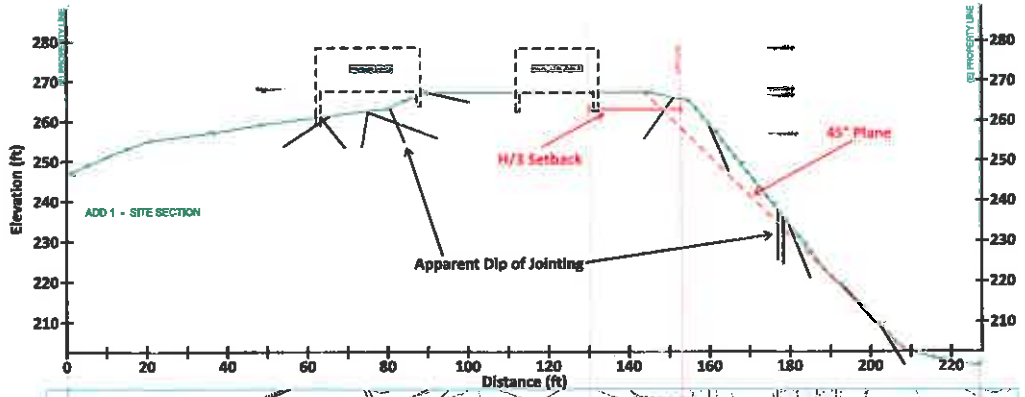
Base: Site Plan, by Mark English Architects, dated 1-27-17

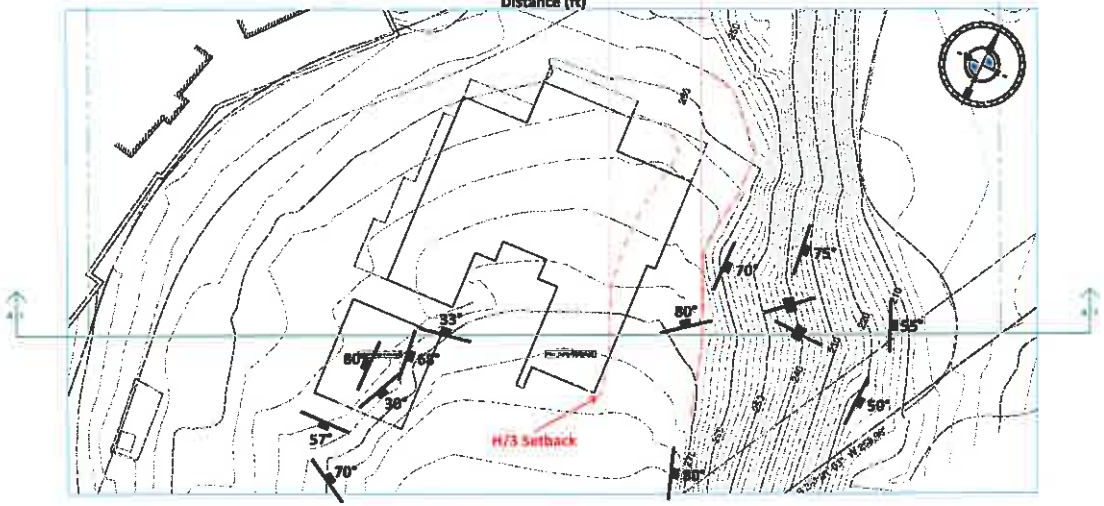
SUPPLEMENTAL GEOLOGIC INVESTIGATION
PROPOSED CUSTOM HOME
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

BAYGG

SITE PLAN

DATE	SCALE	JOB NO.	PLATE
March 2017	1"= 30'	KOMAN-01-01	2





LEGEND

- 60° — Strike and Dip of Joint
- Vertical Joint
- Line of Cross Section
- Structural Setback

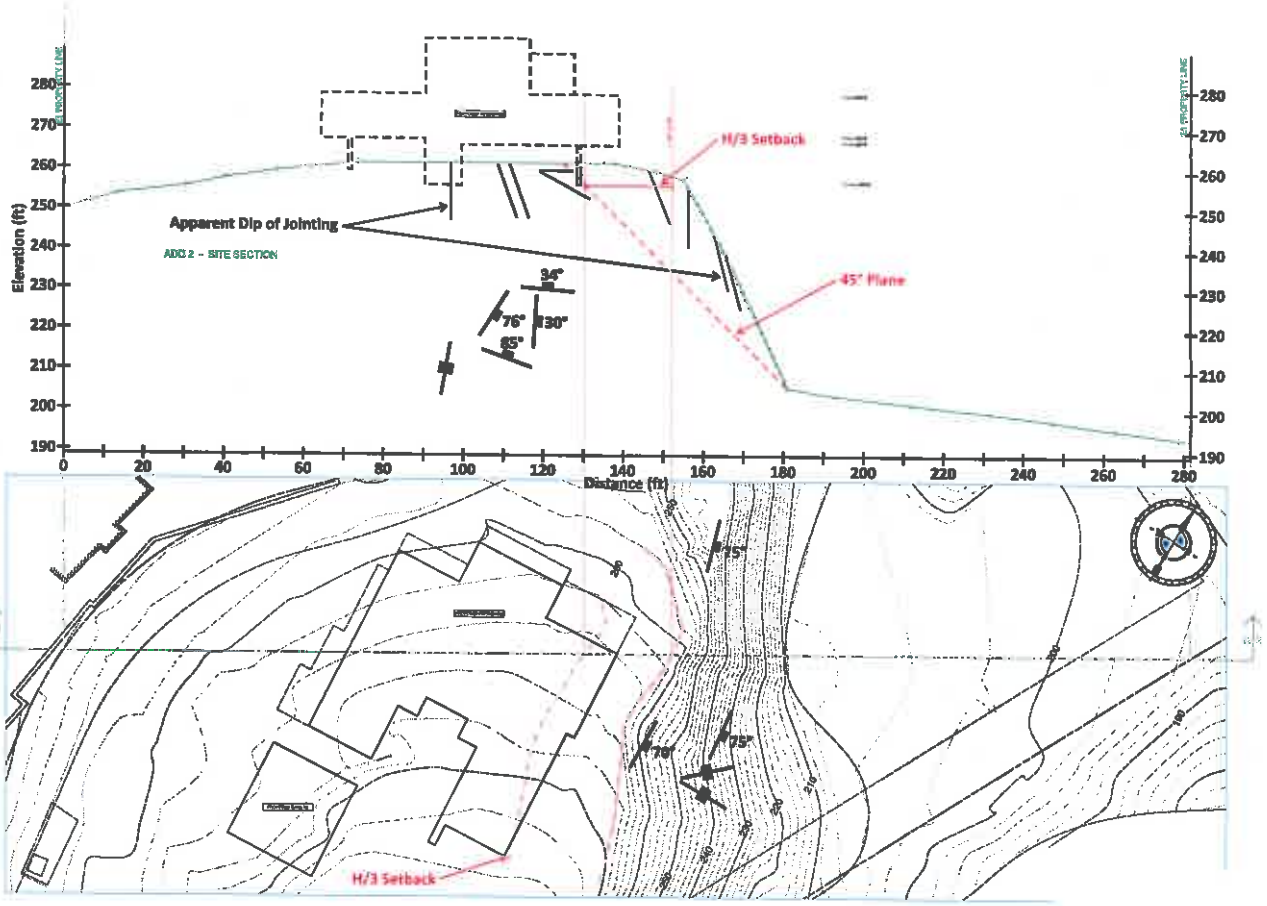
Base: ADD 1 Partial Site Plan, by Mark English Architects, dated 2-02-17

SUPPLEMENTAL GEOLOGIC INVESTIGATION
PROPOSED CUSTOM HOME
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

BvGG ENGINEERS

CROSS SECTION A1

DATE	SCALE	JOB NO.	PLATE
March 2017	1"= 30'	KOMAN-01-01	3A



LEGEND

- 60° — Strike and Dip of Joint
- Vertical Joint
- A — B — Line of Cross Section
- Structural Setback

Base: ADD 2 Partial Site Plan, by Mark English Architects, dated 2-02-17

SUPPLEMENTAL GEOLOGIC INVESTIGATION
PROPOSED CUSTOM HOME
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

BvGG

CROSS SECTION A2

DATE	SCALE	JOB NO.	PLATE
March 2017	1"= 30'	KOMAN-01-01	3B

March 16, 2015
BAGG Job No. KOMAN-01-01

Mr. Andrew Kom
59 Lois Lane
San Francisco, CA 94134

Geotechnical Engineering Investigation
Kom Residence
99 Thomas Road
Brisbane, California

Dear Mr. Kom:

Transmitted herewith is our geotechnical engineering investigation report for the proposed residence located 99 Thomas Road in Brisbane, California. The report includes the results of our literature review, site reconnaissance, subsurface exploration and laboratory testing, which formed the basis of our conclusions, and presents recommendations related to the geotechnical engineering aspects of the proposed construction on the subject property.

Thank you for the opportunity to perform these services. Please do not hesitate to contact us, should you have any questions or comments.

Very truly yours,
BAGG Engineers

Jeanie Tran
Staff Engineer

Anthony N. Lusich, PE
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
ANTHONY NICHOLAS LUSICH
NO. 546
GEOTECHNICAL
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Jason Van Zwol, PE
VP/Chief Engineer

Sadek Derrega, CEG
Consulting Engineering Geologist

PROFESSIONAL GEOLOGIST
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NO. 2175
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REPORT
GEOTECHNCIAL ENGINEERING INVESTIGATION
PROPOSED KOM RESIDENCE
99 THOMAS ROAD
BRISBANE, CALIFORNIA

TABLE OF CONTENTS

Attached Plates:

Plate 1	Vicinity Map
Plate 2	Site Plan
Plate 3	Regional Geologic Map
Plate 4	Regional Fault Map
Plate 5	Liquefaction Hazard
Plate 6	Unified Soil Classification System
Plate 7	Soil Terminology
Plate 8	Test Pit Log Notes
Plate 9	Key to Symbols
Plate 10-17	Test Pit Logs

ASFE document titled "Important Information about Your Geotechnical Engineering Report"

REPORT
GEOTECHNCIAL ENGINEERING INVESTIGATION
PROPOSED KOM RESIDENCE
99 THOMAS ROAD
BRISBANE, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering investigation performed for the proposed planned at 99 Thomas Road in Brisbane, California. The attached Plate 1, Vicinity Map, shows the general location of the site, and Plate 2, Site Plan, shows the approximate locations of the exploratory test pits excavated at the site as part of this investigation. This report was prepared in accordance with the scope of services outlined in our Proposal Number 15-221 dated April 10, 2015.

2.0 SITE AND PROJECT DESCRIPTION

2.1 Site Description

The subject irregularly-shaped site is located at 99 Thomas Road in Brisbane, California. The irregularly shaped property has an overall length in the north – south direction of about 350 feet and an overall width in the east – west direction of about 150 feet.

The site is readily accessible from its southern limit via the south from Thomas Road. The site sits atop a bedrock knob those trends roughly north/south. The sandstone knob appears to have been graded level near the southern portion of the site to gain access from Thomas Road. The top of the knob is currently at an approximate 280-foot elevation above sea level but it descends northward to an approximate elevation of 240 feet near the north end of the site. The eastern side of the knob slopes steeply to near-vertical eastward dropping to an approximate elevation of 205 feet along the base of the steeply sloping portion while the western side of the knob slopes moderately westward to an approximate 250-foot elevation along the west side of the site. A rectangular-shaped concrete slab is present at the entryway

while an existing residential structure abuts the concrete slab along its western side. The abandon residence has two levels that conform to the hilly topography to avoid extensive grading.

The upper near-level area, extends approximately 100 feet north beyond the northern terminice of Thomas Road. The site is surrounded by residential developments along all sides except its eastern side where the east-facing steep slope leads to level area with large mature trees.

The site appears to have been partially graded and occupied in the past and very hard sandstone outcrops along the sites elevated portions and its eastern side.

2.2 Project Description

A site grading plan was not available when this report was prepared. However, site grading is expected to consist of cuts and fills of 10 feet or less and removal of all undocumented fill.

Structure location I size

3.0 PURPOSE

The purpose of our services was to obtain geotechnical information regarding soil and groundwater conditions at the site as needed to develop recommendations for design and construction of the proposed single family residence. The required information was obtained from eight backhoe pits to approximately 4 feet below ground surface (bgs). Representative soil/rock samples collected from the points of exploration were then tested in the laboratory to evaluate their engineering characteristics. Information obtained from these tasks was used to develop conclusions, opinions, and recommendations regarding:

- Geologic site conditions and seismicity of the project site, including distance to the active faults in the region, magnitude of the scenario earthquake on each fault, as well as the related shaking intensities,
- Seismic parameters for the site per the 2013 edition of the California Building Code,

- Specific soil conditions encountered at our points of exploration, such as expansive, loose, saturated, collapsible, or soft surface and subsurface soils that may require special mitigation measures or impose restrictions on the project, including the thickness and consistency of any existing fill soils, and depth to groundwater as encountered,

- Criteria for site grading, earthwork, suitability of the existing soil for use as compacted fill, import fill criteria, preparation of the building pad and pavement subgrade, placement of fills and backfills, and trench backfill requirements, including the suitability of the excavated soils from the site for use as fill and backfill material,

- Criteria for the support of the proposed buildings, including allowable bearing pressures and lateral resistance (passive resistance and coefficient of friction) for both static and seismic conditions,

- Basement walls with earth pressures, foundation support, back-drainage, etc.,

- Support requirement for concrete slabs-on-grade floors and exterior concrete patios/walkways/flatwork,

- General provisions for the control of surface drainage in areas surrounding the existing and proposed structures,

- Soil corrosivity screening on a preliminary basis pertaining to the selection of appropriate concrete type and protection of reinforcing steel and underground utilities.

4.0 SCOPE OF SERVICES

Information required to fulfill the above purposes was obtained from eight 2 to 4-foot deep backhoe pits as shown on Plate 2, Site Plan. The backhoe test pits were excavated on September 17, 2015 to determine preliminary information about the site. Soil samples were obtained from the test pits, and a laboratory testing program was performed on selected samples in order to evaluate the engineering characteristics of the soils at the site. Information obtained from these tasks was used to develop conclusions, opinions, and recommendations oriented toward the above-stated purpose of our services. Accordingly, the scope of our services consisted of the following specific tasks:

1. Visited the site, marked the test pit and boring locations at least 72 hours in advance of the planned explorations, and notified Underground Service Alert to mark the known utilities entering to and/or within the site.

2. Conducted a review of published geologic and fault maps and reports pertinent to the site area regarding the geology and seismic history of the site and the immediate vicinity.

3. A Certified Engineering Geologist (CEG) and Registered Geotechnical Engineer (GE) visited the site area and performed a reconnaissance to assess the potential geologic and seismic hazards that could impact the planned development.

4. Advanced, logged, and sampled eight backhoe pits that were excavated to depths of about to 4 feet deep. Backfill the backhoe pits with tamped excavation spoils.

5. Performed a laboratory testing program consisting of soil classification on the collected soil samples to evaluate the engineering characteristics of the subsurface materials.

6. Using the information obtained from our review, the backhoe test pits and laboratory tests performed engineering analyses to develop recommendations oriented towards the above-noted purpose of the investigation.

7. Prepared a final report summarizing our findings and recommendations, and including a vicinity map, a site plan, a regional geology map, a regional fault map, the test pit logs, and laboratory test results.

5.0 FIELD EXPLORATION

Subsurface conditions at the site were explored by eight 2 to 4-foot deep backhoe pits at the approximate locations shown on the attached Plate 2, Site Plan. The test pits were excavated with a backhoe equipped with a 24-inch wide bucket. The test pits were technically directed by one of our engineers who maintained a continuous log of the soil/rock conditions encountered in each test pit, and obtained relatively undisturbed samples for laboratory testing and visual examination.

The graphical representation of the materials encountered, and the results of our laboratory tests, as well as explanatory/illustrative data are attached, as follows:

- Plate 6, Unified Soil Classification System, illustrates the general features of the soil classification system used on the logs
- Plate 7, Soil Terminology, lists and describes the soil engineering terms used on the logs.
- Plate 8, Notes, describes general and specific conditions that apply to the logs.

- Plate 9, Key to Symbols, describes various symbols used on the logs.
- Plate 10 through 17, Backhoe Test Pit Logs describe the subsurface materials encountered, show the depths and blow counts for the samples, and summarize results of the strength tests, and moisture density data.

Samples were tested to classify the soil and as an indicator of the expansion potential of the near-surface soils encountered in the test pits. The results of our laboratory tests are summarized on the test pit logs.

6.0 GEOLOGY AND SEISMICITY

6.1 Regional Geology

The site is located along the central eastern portion of the San Francisco peninsula approximately 3,000 feet to the west of the San Francisco Bay and about 5 miles to the east of the Pacific Ocean shoreline in northern San Mateo County. The site is located within the Coast Ranges geomorphic province of Northern California. This province is generally characterized by northwest trending mountain ranges and intervening valleys, which are a reflection of the dominant northwest structural trend of the bedrock formations and earthquake faults in the region.

The regional geologic setting of the general area has been mapped by several mappers including Lawson (1908), Jennings and Burnett (1961), Goldman (1969), Schlocker (1970), Nielsen et al. (1979), Helley et al. (1979), Wagner et al. (1990), Ellen and Wentworth (1995), Knudsen et al. (1997), Witter et al. (2006), and Graymer (2006).

The San Francisco Peninsula is located on the boundary between two of the Earth's prominent tectonic plates, the North American and Pacific Plates. This plate boundary is represented by a transform fault where the tectonic plates are sliding past each other, the San Andreas Fault zone. In the San Francisco Bay Area, the current mountains of the California Coast Ranges, the Santa Cruz Mountains and the Diablo Range, started to uplift only about 3 to 4 million years ago, when pressure increased across the

plate boundary due to slight shift in relative plate motions. The Santa Cruz Mountains formed where the San Andreas Fault makes a slight westward bend. This bend produces compression, folding and thrust faulting at the plate boundary, as the Pacific Plate tries to slide northward past the North American Plate. In contrast, Valleys between the ranges, such as the San Francisco Bay and Santa Clara Valley, lie in stable or slowly down-dropping extensional areas formed between major faults, in this case, the San Andreas, Hayward and Calaveras faults.

In the Bay Area, rocks of the Franciscan Complex form the basement for the Coast Ranges east of the San Andreas Fault. The Franciscan Complex primarily consists of greywacke sandstone and argillite, but also contains lesser amounts of greenstone (altered submarine basalt), radiolarian chert, limestone, serpentinite (altered ultrabasic mantle rocks), and a variety of high grade metamorphic rocks such as blueschist and eclogite (high pressure and high temperature rocks, respectively). These rocks are typically highly fractured and disrupted and may be mixed together on a local scale to create what is called a mélange (French for "mixture" or "blend"). Franciscan Complex rocks in the Bay Area range in age from about 200 to 300 million years. They represent an accretionary wedge, a complex body of semi-coherent blocks, called tectonostratigraphic terranes, that were episodically scraped from the subducting oceanic plate, thrust eastward, and shingled against the western margin of North America. This process formed a stacking sequence in which the structurally highest rocks (on the east) are the oldest, and in which each major thrust wedge to the west becomes younger. However, within each of the individual terrane blocks, the rocks become younger up-section. The San Francisco Peninsula and Marin Headlands contain three of these Franciscan Complex terranes, from oldest to youngest, Alcatraz (easternmost), Marin Headlands, and San Bruno Mountain (westernmost). Separating the noted terranes are the Hunters Point and City College mélange zones, which are primarily composed of sheared serpentinite and shale with scattered blocks of greenstone, chert, greywacke, and high-grade metamorphic rocks (Elder, 2001). The site is situated within the Marin Headlands Franciscan Terrane. Tropical fossils and paleomagnetic evidence indicate that the terrane originated in the central pacific near the equator. It then moved northeastward with the oceanic plate towards the North American plate, finally colliding with North America at the latitude of today's Mexico Murchey (1984).

6.2 Site Geology

The geology of the site area has been mapped by Knudsen et al. (1997), Knudsen et al. (2000), Bonilla (1964 and 1998), and Witter et al. (2006). Bonilla (1998) shows the site to be underlain by Cretaceous and Jurassic Franciscan Complex sandstone and shale bedrock, which concurs with our field observations conducted by our consulting CEG and the findings of the test pits excavated at the site. A portion of that map including the site area is presented herein as the Regional Geology Map, Plate 3.

The sandstone at the site is generally yellowish to grayish in color, hard, durable, strong, and intact where fresh because the site is situated atop a topographic knob that has been cut slightly to accommodate the previous residential structure and associated improvements that occupied a portion of the site area. The sandstone appeared to be moderately strong and fractured forming steep and relatively high cliffs along the eastern site boundary facing the Bay.

Some isolated wedge-shaped rockfalls were observed along the eastern steep side of the site. A relatively large rockfall failure was observed along the extension of the eastern rocky cliff immediately to the south of the property line beyond the site limit. No significant recent slope instabilities were observed along the eastern steep side of the site, which could impact the planned development. The site slopes appeared to be stable in their current configuration under the existing environment and topography.

6.3 Faulting, Seismicity, and Liquefaction

The site is located within the seismically active North Bay/North Coast region of California, and is subject to seismically-induced ground shaking from nearby and distant faults.

The site, however, is not located within a state-mandated Earthquake Fault Zone as defined by the Division of Mines and Geology (DMG, 2000) in accordance with the Alquist-Priolo Earthquake Fault Zone Act of 1972. No known active faults are located at or near the site. The nearest active and zoned earthquake fault is the San Andreas fault which is located more than 4 miles to the southwest. Two additional, northwest-trending inactive faults that are not zoned by the State have been mapped in the

general area of the site. The City College fault is mapped about 1.5 miles to the northeast and the Hillside fault is mapped more than a mile to the south.

Moderate to major earthquakes generated on the San Andreas or other active faults along the east side of the Bay such as the Hayward and Calaveras faults can be expected to cause strong ground shaking at the site.

Based on our literature review, we have found that the site is not in an area subject to liquefaction. A portion of that map including the site area is presented herein as the Liquefaction Hazard Map, Plate 5.

6.4 CBC 2013 Seismic Design Parameters

Based on the soil and rock information obtained from the exploratory borings drilled at the site, the soil profile is classified as a Class "C", defined as a "rock" with an average shear wave velocity between 600 to 1,200 feet per second, average Standard Penetration Test (N) values between 15 to 50 blows per foot, and/or average undrained shear strength between 1,000 to 2,000 psf or greater in the top 100 feet of the site.

Using the site coordinates of 37.6602° North Latitude and 122.0770° West Longitude, and the U.S. Seismic Design Maps by USGS (http://earthquake.usgs.gov/designmaps/us/application.php), earthquake ground motion parameters were computed in accordance with the 2013 California Building Code and are listed in the following table.

Table 2
Parameters for Seismic Design

2013 CBC Site Parameter	Value
Site Latitude	37.6602° N
Site Longitude	122.0770° W
Site Class, Chapter 20 of ASCE 7	Class D, Stiff Soil
Risk Category	I
Mapped Spectral Acceleration for Short Periods S_s	2.44g
Mapped Spectral Acceleration for 1-second Period S_1	1.01g

2013 CBC Site Parameter	Value
Site Coefficient F_a	1.0
Site Coefficient F_v	1.5
Site-Modified Spectral Acceleration for short Periods S_{Ms}	2.44g
Site-Modified Spectral Acceleration for 1-second Period S_{M1}	1.52g
Design Spectral Acceleration for short Periods S_{Ds}	1.62g
Design Spectral Acceleration for 1-second Periods S_{D1}	1.01g

7.0 SITE CONDITIONS

7.1 Subsurface Conditions

Earth materials exposed at the surface consisted of non-plastic silty sand with gravel in a loose to medium dense condition overlying the previously described very hard sandstone. The fill materials, consisting of that are located along the southwest edge of the previously mentioned trail are on the order of 2 feet thick. Fill soil consisted of non-plastic silty sands.

7.2 Groundwater

Groundwater was not encountered in the depths explored for this investigation.

As the site is located at the top of a hill, ground water is not expected to affect the proposed structure. However, groundwater levels would generally be subject to seasonal fluctuations and the amount of yearly rainfall.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 General

Based on the subsurface exploration conducted at the subject site and the results obtained from our laboratory testing program, it is our opinion that the proposed project is feasible from a geotechnical engineering standpoint, provided the recommendations presented in this report are incorporated into the project design and implemented during construction. Foundations for the new residence should

consist of conventional spread footings, piers and grade beams or structural mats. The existing bedrock is very hard and excavation put in subsurface section would be expected to be very difficult, only recommendations for conventional spread footings are presented in this report. Should recommendations for other foundations be needed, they will be prepared when a building location and floor elevations have been set.

As the sandstone bedrock is expected to be very strong in localized areas and may become non-rippable with heavy construction equipment requiring specialized drilling rigs and hoe rams/hydraulic hammers to excavate it.

The site could experience very strong ground shaking from future earthquakes during the anticipated lifetime of the project. The intensity of ground shaking will depend on the magnitude of earthquake, distance to epicenter, and response characteristics of the on-site soils. While it is not possible to totally prelude damage to structures during major earthquakes, strict adherence to good engineering design and construction practices will help reduce the risk to damage. The 2013 California Building Code defines the minimum standards of good engineering practice.

When the final development plans are available, they should be reviewed by this office prior to construction to confirm that the intent of our recommendations is reflected in the plans, and to confirm that our recommendations properly address the proposed project in its final form.

Specific recommendations are presented that are intended to mitigate the effects of expansive soil, including: moisture control during grading, (Section 8.2), imported soil criteria (Section 8.2), foundation depth (Section 8.3) and slabs on grade (Section 8.6).

8.2 Site Grading

A site grading plan was not available when this report was prepared. However, site grading is expected to consist of cuts and fills of 10 feet or less and removal of all undocumented fill.

As used in this report, the term "compact" and its derivatives mean that all native site soils should be compacted to a minimum of 90 percent of the maximum dry density, at a moisture content of at least 3 percent over optimum, as determined by ASTM Test Method D1557.

The following grading procedures should be followed for preparation of the areas to receive concrete slabs:

- Demolition of the existing structure and associated basement, strip and remove all vegetation, roots larger than 1-inch in diameter, topsoils that contain significant amounts of organics or debris, abandoned underground utilities, and other debris from the site surface. Stockpile the stripping for disposal at an off-site location.

- Remove the undocumented fill that was spread on the site from the stockpiles and replace this material as compacted fill.

- Scarify the over-excavated surfaces within the exposed subgrades to depth of at least 8 inches.

- Thoroughly moisture condition the scarified surfaces to a moisture content that is at least 3 percent over optimum, and re-compact as specified above. Further excavate as necessary any area still containing weak and/or yielding (pumping) soils, as determined in the field by the Geotechnical Engineer.

- Replace fill on the over-excavated surfaces and in the holes/depressions created by the above actions in uniformly moisture conditioned and compacted lifts not exceeding 8 inches in loose thickness. Rocks or cobbles larger than 4 inches in maximum dimensions should not be allowed to remain within the foundation areas, unless they can be crushed in-place by the construction equipment.

The native soils are suitable for use as structural fill. Imported, non-expansive fill soils, if necessary, should be predominately granular in nature and should be free of organics, debris, or rocks over 3 inches in size, and should be approved by the Geotechnical Engineer before importing to the site. As a general guide to acceptance, imported soils should have a Plasticity Index less than 15, and an R-value of at least 20, and fines content between 15 and 60 percent. All aspects of site grading including clearing/stripping, demolition, pad preparation, and placement of fills or backfills should be performed under the observation of BAGG's field representatives.

It must be the Contractor's responsibility to select equipment and procedures that will accomplish the grading as described above. The Contractor must also organize his work in such a manner that one of

our field representatives can observe and test the grading operations, including clearing, excavation, compaction of fill and backfill, and compaction of subgrades.

8.3 Foundations

The new residence may be supported on conventional spread footings. We recommend that the footings should be established at a minimum of 24 inches in depth with a minimum width of 12 inches. With these dimensions, footing may be designed using allowable bearing pressures of 2000 pounds per square foot (psf) for dead plus live loads, and 3000 psf for total design loads including wind or seismic loads.

8.4 Lateral Design

Lateral loads may be resisted by passive earth pressures against the foundation members which have been placed in neat excavations without the use of any forms, and by friction between the bottom of spread footings and soil. The allowable passive resistance may be taken as an equivalent fluid pressure of 300 pcf (triangular). The upper 12 inches of the passive resistance should be ignored, unless the footing is laterally confined by AC pavement or concrete slab. A coefficient of 0.30 may be used between the native clayey soils and the bottom of the concrete footing.

Retaining walls should be designed to resist an equivalent fluid pressure of 60 pcf (triangular).

8.5 Settlements

We estimate that total post-construction static settlement of the new structure would be less than one inch, with differential settlement expected to be less than half that.

8.6 Slabs-on-Grade and Exterior Flatwork

All concrete slabs and flatwork should be constructed on a well compacted and moisture conditioned soil subgrade. The slab should be reinforced as per the project Structural Engineer's recommendations. The subgrade should be approved by the Geotechnical Engineer immediately before the slab is poured.

In floor slab areas, the top 12-inches of the soil subgrade should consist of compacted non-expansive fill. A minimum of 6 inches of compacted non-expansive fill should be placed below exterior flatwork.

In areas where moisture on the slab would be undesirable, 4 inches of approved clean, free draining, angular gravel should be placed beneath the concrete slab. The base course is intended to serve as a capillary break; however, moisture may accumulate in the base course zone. Therefore, a minimum 15-mil thick vapor barrier should be placed and sealed at all seams and penetrations in accordance with the manufacture's recommendations and ASTM E1643 requirements.

8.7 Drainage

Site drainage should be considered an integral part of the proposed project. The ground surface of the adjacent areas should be graded to facilitate runoff drainage into catch basins or area drains. In landscaped areas the ground should slope at 5 percent for a distance of at least 5 feet. Any area where surface run-off becomes concentrated should be provided with a catch basin. The collected runoff from the catch basins should be discharged in a manner that will not cause erosion or saturation of soils in the vicinity of the foundation.

8.8 Utility Trench Backfill

Vertical trenches deeper than 5 feet will likely require temporary shoring. Where shoring is not used, the sides should be sloped or benched, with a maximum slope of 1:1 (horizontal: vertical). The trench spoils should not be placed closer than 3 feet or one-half of the trench depth (whichever is greater) from the trench sidewalls. All work associated with trenching must conform to the State of California, Division of Industrial Safety requirements. In our opinion, the soils in the upper 50 feet of the site should be classified as "Type B Soil."

Trench backfill materials and compaction should conform to the requirements of the local agency; however, we recommend the following as a minimum:

- In general, soils used for trench backfill shall be free of debris, roots and other organic matter, debris, and rocks or lumps exceeding 3 inches in greatest dimension. The on-site soils can be used for trench backfill, but not for pipe bedding or shading.

- Compaction shall be performed to a minimum of 90% relative compaction in accordance with ASTM D1557, at a moisture content recommended previously. Jetting shall not be allowed.

8.9 On-Site Flexible Pavements

We assumed an R-value of 5 based on soil subgrade to develop pavement section thickness recommendations for various traffic index values which are presented in the table below.

The Traffic Index is a measure of the frequency and magnitude of traffic loading the flexible pavement is expected to experience during its life time. A Traffic Index (TI) of 4.5 is frequently used for areas subject to light automobile parking only. A TI of 6.0 is usually appropriate where the pavement will be subject to frequent use by vans or light delivery trucks with only occasional heavy truck traffic, such as from weekly garbage trucks. A TI of 7.0 is used for roadways subjected to more frequent use by heavy trucks. The calculated pavement section thicknesses for various traffic index values are listed below.

Table 3
Summary of Asphalt Pavement Sections
(Subgrade R-value =5)

Pavement Component	TI=4.5	
Asphaltic Concrete (AC) in Inches	3	3
Class II Aggregate Base (R_{MIn}=78) in Inches	8	5
Class II Aggregate Subbase or Recycled AC/AB (R_{Min}=50)	--	5
Total Thickness in Inches	11	13

The soil subgrade should be compacted as per the recommendations included in the "Site Grading" section of this report. All pavement components should conform to and be placed in accordance with the latest edition of CalTrans Standard Specifications, except that compaction should be measured by ASTM Test Method D1557.

8.10 Plan Review

It is recommended that the Geotechnical Engineer (BAGG Engineers) be retained to review the final grading, foundation, and drainage plans. This review is to assess general suitability of the earthwork, foundation, and drainage recommendations contained in this report and to verify the appropriate implementation of our recommendations into the project plans and specifications.

8.11 Observation and Testing

It is recommended that the Geotechnical Engineer (BAGG Engineers) be retained to provide observation and testing services during site grading, excavation, backfilling, and foundation construction phases of work. This is intended to verify that the work in the field is performed as recommended and in accordance with the approved plans and specifications, as well as verify that subsurface conditions encountered during construction are similar to those anticipated during the design phase. Changed or unanticipated soil conditions may warrant revised recommendations. For this reason, BAGG cannot accept responsibility or liability for the recommendations in this report if we are not given the opportunity to observe and test site grading and foundation construction.

9.0 CLOSURE

This report has been prepared in accordance with generally-accepted engineering practices. The recommendations presented in this report are based on our understanding of the proposed construction as described herein, and upon the soil conditions encountered in the borings performed for this investigation.

The conclusions and recommendations contained in this report are based on subsurface conditions revealed by three 5-foot deep backhoe pits, three surface samples, and three 30-foot borings, and a review of available geotechnical and geologic literature pertaining to the project site. It is not uncommon for unanticipated conditions to be encountered during site grading and/or foundation installation and it is not possible for all such variations to be found by a field exploration program appropriate for this type of project. The recommendations contained in this report are therefore contingent upon the review of the final grading, drainage, and foundation plans by this office, and upon geotechnical observation and testing by BAGG of all pertinent aspects of site grading, including demolition, placement of fills and backfills, and foundation construction.

Soil conditions and standards of practice change with time. Therefore, we should be consulted to update this report, if the construction does not commence within 18 months from the date that this report is submitted. Additionally, the recommendations of this report are only valid for the proposed development as described herein. If the proposed project is modified, our recommendations should be reviewed and approved or modified by this office in writing.

10.0 REFERENCES

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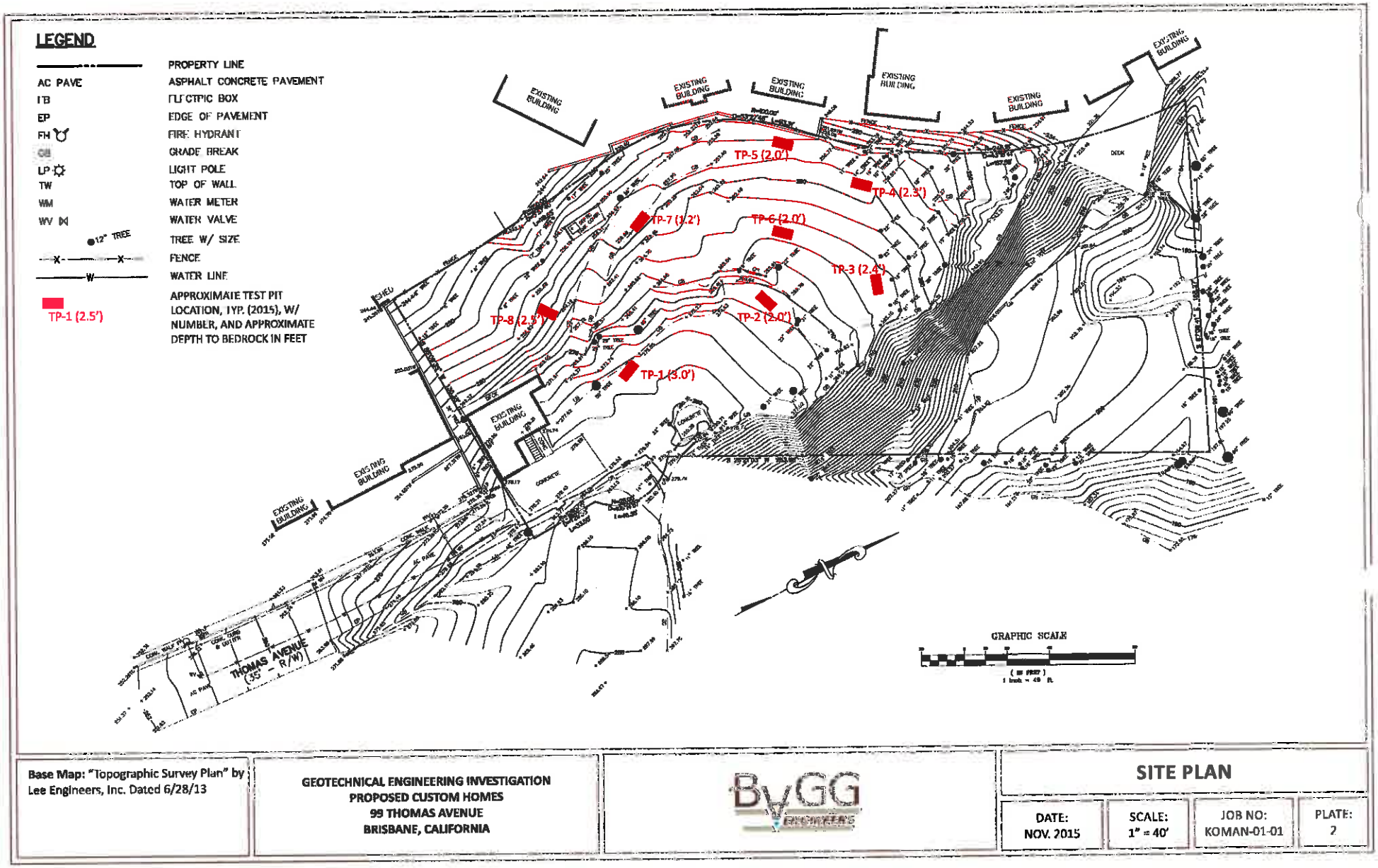
Source: Google Maps

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED CUSTOM HOMES
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

VICINITY MAP

DATE	JOB NUMBER	PLATE
NOV. 2015	KOMAN-01-01	1

BvGG ENGINEERS



Base Map: "Topographic Survey Plan" by Lee Engineers, Inc. Dated 6/28/13

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED CUSTOM HOMES
99 THOMAS AVENUE
BRISBANE, CALIFORNIA

BvGG ENGINEERS

SITE PLAN

DATE:	SCALE:	JOB NO:	PLATE:
NOV. 2015	1" = 40'	KOMAN-01-01	2

LEGEND

Qaf **Artificial Fill (Holocene)** – Clay, silt, sand, rock fragments, organic matter, and man-made debris.

Qaf/tf **Artificial Fill over tidal flat (Holocene)** – Clay, silt, sand, rock fragments, organic matter, and man-made debris placed over tidal flats.

Ql **Landslide Deposits (Holocene)** – Composition and structure depend on the geologic formation involved and type of landslide.

Qm **Bay Mud (Holocene)** – Soft (moist) to firm (dry) clay and silt; locally contains shell fragments, plant remains, and thin beds of sand.

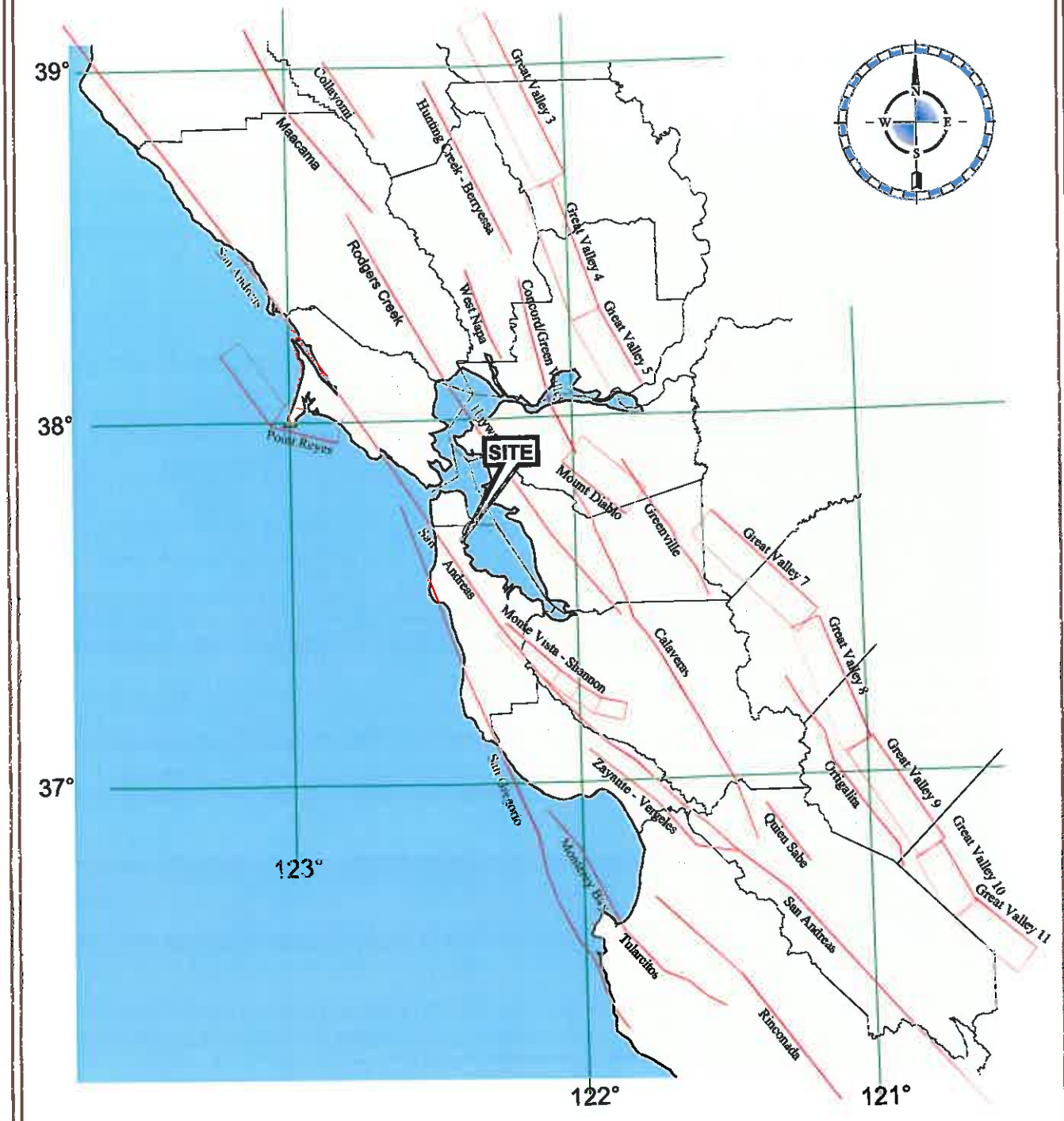
Qsr **Slope Debris and Ravine Fill (Holocene)** – Stony silty to sandy clay; locally silty to clayey sand or gravel; yellowish-orange to medium gray, unstratified or poorly stratified. Where it overlies the Merced or Colma Formation it is commonly a silty to clayey sand, or gravel.

KJsk **Sandstone and Shale (Holocene)** – Sandstone generally containing more than two percent potassium feldspar.

Reference: *Preliminary Geologic Map of the San Grancisco South 7.5' Quadrangle and Part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California*, by M. G. Bonilla, prepared by C. Wentworth, M. Lucks, H. Schoonover, S. Graham, and T. May, Derived from the USGS Digital Database Open-File Report 98-354, 1998.

GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED CUSTOM HOMES 99 THOMAS AVENUE BRISBANE, CALIFORNIA	REGIONAL GEOLOGY MAP		
	DATE NOV. 2015	JOB NUMBER KOMAN-01-01	PLATE 3

BvGG ENGINEERS

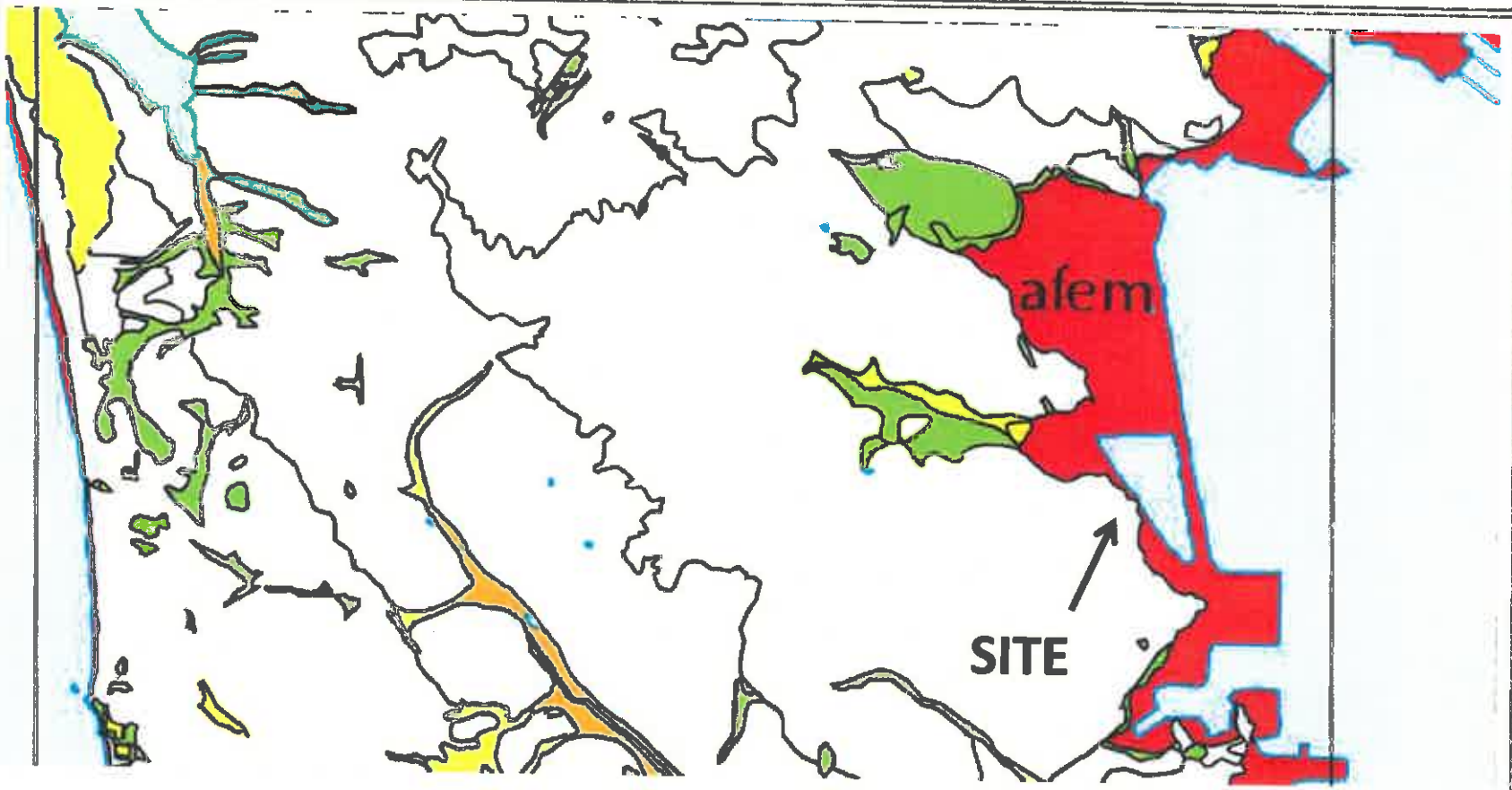


Base: 2002 USGS Fault Source Model.

SCALE: 1"≈ 55 km

GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED CUSTOM HOMES 99 THOMAS AVENUE BRISBANE, CALIFORNIA	REGIONAL FAULT MAP		
	DATE NOV. 2015	JOB NUMBER KOMAN-01-01	PLATE 4

BvGG ENGINEERS



Base Map: Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California, *U.S. Department of the Interior, U.S. Geological Survey*

GEOTECHNICAL INVESTIGTION REPORT KOM RESIDENCE 99 THOMAS AVENEUE BRISBANE, CA	BvGG ENGINEERS	LIQUEFACTION HAZARD ZONE MAP		
		DATE: DEC 2015	JOB NUMBER KOMAN-01-01	PLATE 5

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
GW	Well graded gravel Well graded gravel with sand	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size
GP	Poorly graded gravel Poorly graded gravel with sand	
GM	Silty gravel Silty gravel with sand	
GC	Clayey gravel Clayey gravel with sand	
SW	Well graded sand Well graded sand with gravel	SANDS More than half of coarse fraction is smaller than No. 4 sieve size
SP	Poorly graded sand Poorly graded sand with gravel	
SM	Silty sand Silty sand with gravel	
SC	Clayey sand Clayey sand with gravel	

NOTE: Coarse-grained soils receive dual symbols if:
(1) their fines are CL-ML (e.g. SC-SM or GC-GM) or
(2) they contain 5-12% fines (e.g. SW-SM, GP-GC, etc.)

FINE-GRAINED SOILS

MORE THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
CL	Lean clay Sandy lean clay with gravel	SILTS AND CLAYS liquid limit less than 50
ML	Silt Sandy silt with gravel	
OL	Organic clay Sandy organic clay with gravel	
CH	Fat clay Sandy fat clay with gravel	SILTS AND CLAYS liquid limit more than 50
MH	Elastic silt Sandy elastic silt with gravel	
OH	Organic clay Sandy organic clay with gravel	
PT	Peat Highly organic silt	HIGHLY ORGANIC SOIL

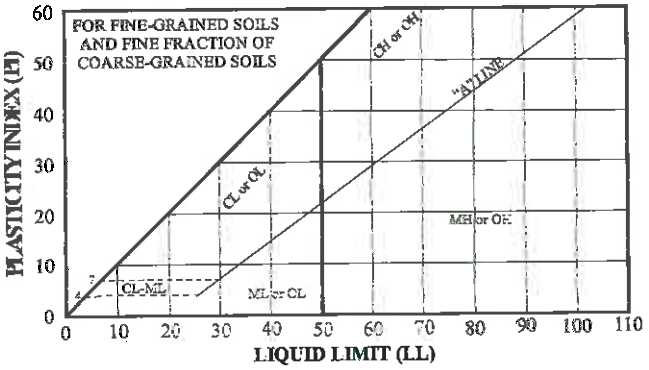
NOTE: Fine-grained soils receive dual symbols if their limits in the hatched zone on the Plasticity Chart(L-M)

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 in.
COBBLES	3 in. to 12 in.
GRAVEL	No. 4 to 3 in.
Coarse	¾ in to 3 in.
Fine	No. 4 to ¾ in.
SAND	No. 200 to No.4
Coarse	No. 10 to No. 4
Medium	No. 40 to No. 10
Fine	No. 200 to No. 40
*FINES:	BELOW No. 200

NOTE: Classification is based on the portion of a sample that passes the 3-inch sieve.

PLASTICITY CHART



Reference: ASTM D 2487-06, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

GENERAL NOTES: The tables list 30 out of a possible 110 Group Names, all of which are assigned to unique proportions of constituent soils. Flow charts in ASTM D 2487-06 aid assignment of the Group Names. Some general rules for fine grained soils are: less than 15% sand or gravel is not mentioned; 15% to 25% sand or gravel is termed "with sand" or "with gravel", and 30% to 49% sand or gravel is termed "sandy" or "gravelly". Some general rules for coarse-grained soils are: uniformly-graded or gap-graded soils are "Poorly" graded (SP or GP); 15% or more sand or gravel is termed "with sand" or "with gravel", 15% to 25% clay and silt is termed clayey and silty and any cobbles or boulders are termed "with cobbles" or "with boulders".

UNIFIED SOIL CLASSIFICATION SYSTEM

(03/08)

SOIL TYPES (Ref 1)

Boulders: particles of rock that will not pass a 12-inch screen.
Cobbles: particles of rock that will pass a 12-inch screen, but not a 3-inch sieve.
Gravel: particles of rock that will pass a 3-inch sieve, but not a #4 sieve.
Sand: particles of rock that will pass a #4 sieve, but not a #200 sieve.
Silt: soil that will pass a #200 sieve, that is non-plastic or very slightly plastic, and that exhibits little or no strength when dry.
Clay: soil that will pass a #200 sieve, that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when dry.

MOISTURE AND DENSITY

Moisture Condition: An observational term; dry, moist, wet, or saturated.
Moisture Content: The weight of water in a sample divided by the weight of dry soil in the soil sample, expressed as a percentage.
Dry Density: The pounds of dry soil in a cubic foot of soil.

DESCRIPTORS OF CONSISTENCY (Ref 3)

Liquid Limit: The water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting liquid and plastic characteristics. The consistency feels like soft butter.
Plastic Limit: The water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting plastic and semi-solid characteristics. The consistency feels like stiff putty.
Plasticity Index: The difference between the liquid limit and the plastic limit, i.e. the range in water contents over which the soil is in a plastic state.

MEASURES OF CONSISTENCY OF COHESIVE SOILS (CLAYS) (Ref's 2 & 3)

Very Soft	N=0-1*	C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000 psf	Dented slightly by a pencil point

*N=blows per foot in the Standard Penetration Test. In cohesive soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 1.2 to get N (Ref 4).

MEASURES OF RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND SILTS) (Ref's 2 & 3)

Very Loose	N=0-4**	RD=0-30	Easily push a ½-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a ½-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a ½-inch reinforcing rod
Dense	N=31-50	RD=70-90	Drive a ½-inch reinforcing rod 1 foot
Very Dense	N>50	RD=90-100	Drive a ½-inch reinforcing rod a few inches

**N=Blows per foot in the Standard Penetration Test. In granular soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 2 to get N (Ref 4).

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Ref 1: ASTM Designation: D 2487-06, **Standard Classification of Soils for Engineering Purposes** (Unified Soil Classification System).

Ref 2: Terzaghi, Karl, and Peck, Ralph B., **Soil Mechanics in Engineering Practice,** John Wiley & Sons, New York, 2nd Ed., 1967, pp. 30, 341, and 347.

Ref 3: Sowers, George F., **Introductory Soil Mechanics and Foundations: Geotechnical Engineering,** Macmillan Publishing Company, New York, 4th Ed., 1979, pp. 80, 81, and 312.

Ref 4: Lowe, John III, and Zaccheo, Phillip F., **Subsurface Explorations and Sampling,** Chapter 1 in "Foundation Engineering Handbook," Hsai-Yang Fang, Editor, Van Nostrand Reinhold Company, New York, 2nd Ed, 1991, p. 39.

SOIL TERMINOLOGY

GENERAL NOTES FOR TEST PIT LOGS:

The test pit logs are intended for use only in conjunction with the text, and for only the purposes the text outlines for our services. The Plates "Soil Terminology" and "Rock Terminology" defines common terms used on the test pit logs.

The plate "Unified Soil Classification System," illustrates the method used to classify the soils. The soils were visually classified in the field; the classifications were modified by visual examination of samples in the laboratory, supported, where indicated on the logs, by tests of liquid limit, plasticity index, and/or gradation. In addition to the interpretations for sample classification, there are interpretations of where stratum changes occur between samples, where gradational changes substantively occur, and where minor changes within a stratum are significant enough to log.

There may be variations in subsurface conditions between test pits. Soil characteristics change with variations in moisture content, with exchange of ions, with loosening and densifying, and for other reasons. Groundwater levels change with seasons, with pumping, from leaks, and for other reasons. Thus test pit logs depict interpretations of subsurface conditions only at the locations indicated, and only on the date(s) noted.

SPECIAL FIELD NOTES FOR THIS REPORT:

1. The test pits for this investigation were advanced on September 17, 2015, with a 18-inch backhoe bucket.

2. The test pit locations were approximately located with a measuring tape from the existing site features such as building walls, existing trees, concrete pads, etc. Elevations were estimated from a topographic survey plan completed by Lee Engineers, Inc, dated 6/28/13.

3. The soils' Group Names [e.g. LEAN CLAY] and Group Symbols [e.g. (CL)] were determined or estimated per ASTM D 2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System, see Plate 5). Other soil and rock engineering terms used on the boring logs are defined on Plate 6, Soil Terminology, and Plate 7, Rock Terminology.

4. Groundwater was not encountered in the test pits within the depths explored.

5. The disturbed soil samples were collected to determine the approximate soil moisture content and to evaluate the corrosivity of the soil.

TEST PIT LOG NOTES

KEY TO SYMBOLS

Symbol	Description

Strata symbols

Variable gravel and silty sand mix

Sandstone Clasts in Silty Sand Matrix

Sandstone/Siltstone

Line Types

———— Denotes a sudden, or well identified strata change

– – – Denotes a gradual, or poorly identified strata change

TEST PIT LOGS

Pit No. TP-1

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 276
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: gray-brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, up to 1-inch roots near surface, 1½-inch thick concrete slab fragments,	
						2		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange and light gray, dry to moist, intensely weathered sandstone, soft	
						3		ROCK	SANDSTONE: yellow-orange and light gray, intensely weathered, moderately soft	
						4			The test pit was terminated at approximately 4 feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						5				
						6				

BYGG ENGINEERS

TEST PIT LOGS

Pit No. TP-2

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 270
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: brown, dry to moist, loose 1o medium dense, gravels up to 3/4-inch in size, up to ½-inch roots near surface, 1.5x2-foot metal grate was encountered.	
						1		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange and light gray, dry to moist, intensely weathered sandstone, soft	
						2		ROCK	SANDSTONE: yellow-orange and light gray, intensely weathered, moderately soft	
						3			The test pit was terminated at approximately 3 feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

TEST PIT LOGS

Pit No. TP-3

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 265
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, up to 2½-inch roots near surface	
						1		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange and light gray, dry to moist, intensely weathered sandstone, soft	
						2		ROCK	SANDSTONE: yellow-orange and light gray, intensely weathered, moderately soft	
						3			The test pit was terminated at approximately 2 feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

TEST PIT LOGS

Pit No. TP-4

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 259
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, thin black plastic sheet at 6-inches, wooden bloc (6x8x12-inches) encountered at 1-foot	
						1		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange, dry to moist, intensely weathered sandstone, soft	
						2		ROCK	SANDSTONE: yellow-orange and light gray, intensely weathered, moderately soft	
						3			The test pit was terminated at approximately 2½ feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

TEST PIT LOGS

Pit No. TP-5

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 256
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: gray-brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size	
						1		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange, dry to moist, intensely weathered sandstone, soft	
						2		ROCK	SANDSTONE: yellow-orange, intensely weathered, moderately soft	
						3			The test pit was terminated at approximately 2½ feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

TEST PIT LOGS

Pit No. TP-6

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 265
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: gray-brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, roots up to ½-inch	
						1		ROCK/ SM	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange, dry to moist, intensely weathered sandstone, soft	
						2		ROCK	SANDSTONE: yellow-orange, intensely weathered, moderately soft	
						3			The test pit was terminated at approximately 2½ feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

BAGG ENGINEERS

TEST PIT LOGS

Pit No. TP-7

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 259
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: gray-brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, trace organic debris	
								ROCK	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange, dry to moist, intensely weathered sandstone, soft	
						1		ROCK	SANDSTONE: yellow-orange, intensely weathered, moderately soft	
						2				
						3			The test pit was terminated at approximately 2½ feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						4				
						5				
						6				

BYGG ENGINEERS

TEST PIT LOGS

Pit No. TP-8

JOB NAME: PROPOSED CUSTOM HOMES
CLIENT: ANDREW KOM
LOCATION: 99 THOMAS AVENUE, BRISBANE, CA
SUBCONTRACTOR: WEST VALLEY CONSTRUCTION
EXPLORATION METHOD: 18" BACKHOE BUCKET

JOB NO.: KOMAN-01-00
DATE EXCAVATED: 9/17/15
ELEVATION: 260
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		SM/ GM	SILTY SAND with GRAVEL: gray-brown, dry to moist, loose to medium dense, gravels up to 3/4-inch in size, trace organic debris	
								ROCK	SANDSTONE CLASTS IN SILTY SAND MATRIX: yellow-orange, dry to moist, intensely weathered sandstone, soft	
						1				
						2				
						3		ROCK	SANDSTONE: yellow-orange, intensely weathered, moderately soft	
						4			The test pit was terminated at approximately 4 feet bgs. After observations were made, the test pit was backfilled using excavation spoils and the material was tamped in place using the backhoe bucket.	
						5				
						6				

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

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