APPENDIX A

Biological Resources Report

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Regnart Creek Trail Project
Biological Resources Report

Project #4268-01

Prepared for:

Demetri Loukas
David J. Powers and Associates
1871 The Alameda, Suite 200
San Jose, CA 95126

Prepared by:

H. T. Harvey & Associates

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Section 1. Introduction

This report describes the biological resources present in and adjacent to the proposed Regnart Creek Trail Project (Project), as well as the potential impacts of the proposed Project and measures necessary to reduce impacts to less-than-significant levels under the California Environmental Quality Act (CEQA). This report was prepared to facilitate CEQA review of the Project by David J. Powers & Associates and the City of Cupertino.

1.1 Project Description

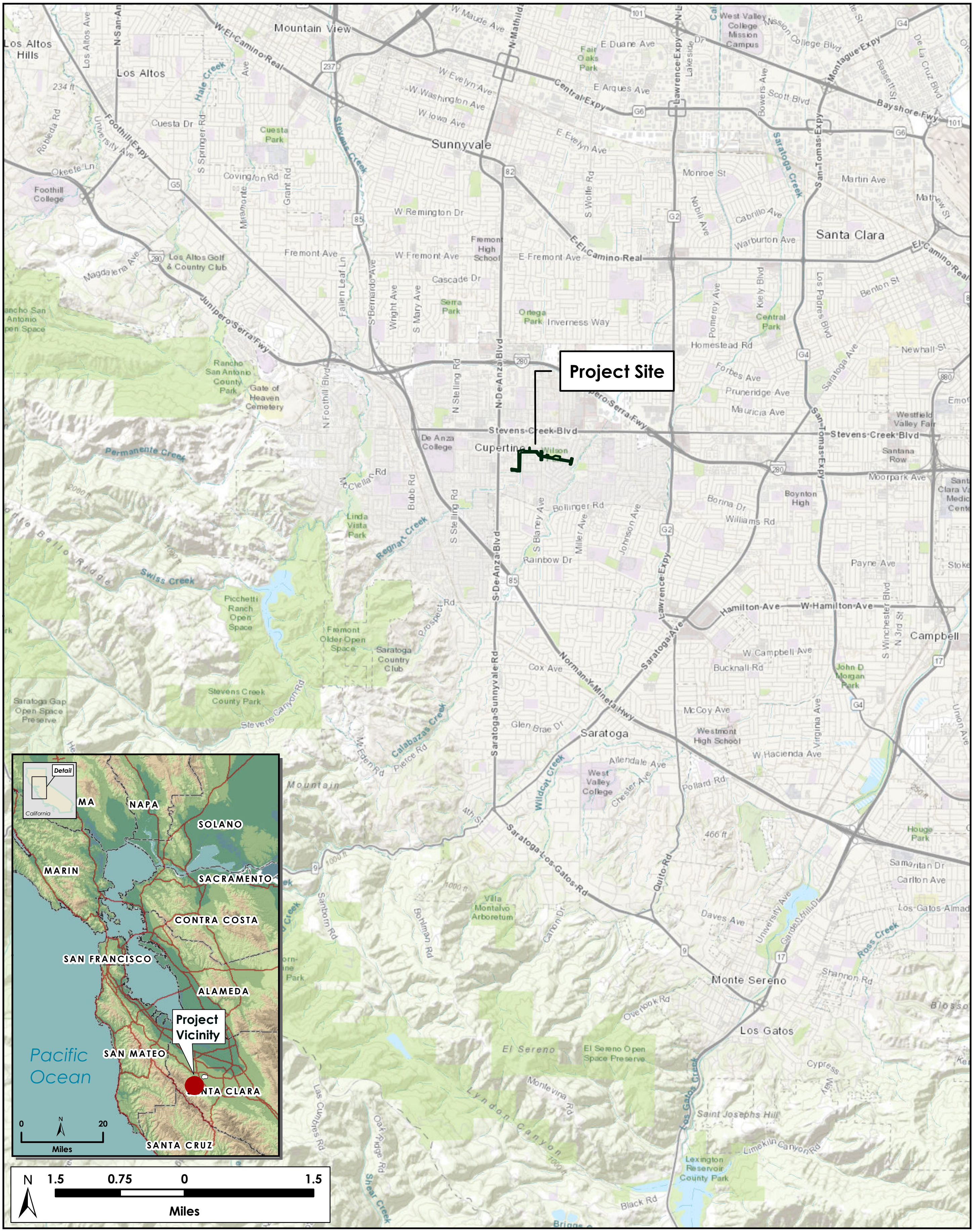
The proposed Project will construct a shared-use trail along Regnart Creek between Torre Avenue and East Estates Drive in Cupertino, Santa Clara County, California (Figure 1). The purpose of the Project is to construct a paved bicycle and pedestrian trail that connects the Cupertino Library, Civic Center, and City Hall to the west with Wilson Park and Creekside Park to the east. The Project site includes the limits of the Project footprint as well as all potential access and staging areas within adjacent public parks and roadways (Figure 2).

For most of its length, the trail will be constructed on the existing Santa Clara Valley Water District (Valley Water) maintenance road located along Regnart Creek. The proposed trail widths were determined based upon available space and Valley Water creek maintenance needs. The Project will also include curb and gutter improvements, railings, and fence replacements, as necessary, along the length of the trail. No outfalls are proposed as part of the Project and no trees will be removed within the creek corridor.

The Project will also construct pedestrian and road improvements in the vicinity of the trail. Raised, signalized pedestrian crossings will be constructed at South Blaney Avenue and East Estates Drive. The Project includes Americans with Disabilities Act ramp and curb improvements at the South Blaney Avenue/La Mar Drive, East Estates Avenue/Vicksburg Drive, and East Estates Avenue/La Mar Drive intersections.

Between Torre Avenue and Regnart Creek, the existing sidewalk along the north side of Pacifica Drive would be widened and trailheads would be installed at Torre Avenue/Pacifica Drive and Regnart Creek/Pacifica Drive. (Figure 3). No trees will be removed at Cupertino Library Park to accommodate the widened sidewalk.

The proposed north-south trail reach between Pacifica Drive and Rodrigues Avenue will be 10 feet wide and located to the west of the Regnart Creek bank along an existing Valley Water dirt-surfaced maintenance road (Figure 3). Railings will be constructed along the east side of the trail, adjacent to Regnart Creek. Trailheads will connect to Cupertino City Hall and Rodrigues Avenue.



N:\Projects4200\4268-01\Reports\BRR\Fig 1 Vicinity Map.mxd mlagarde

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Figure 1. Project Vicinity Map
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N:\Projects4200\4268-01\Reports\BRR\Fig 2 Project Site.mxd

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Figure 2. Project Site
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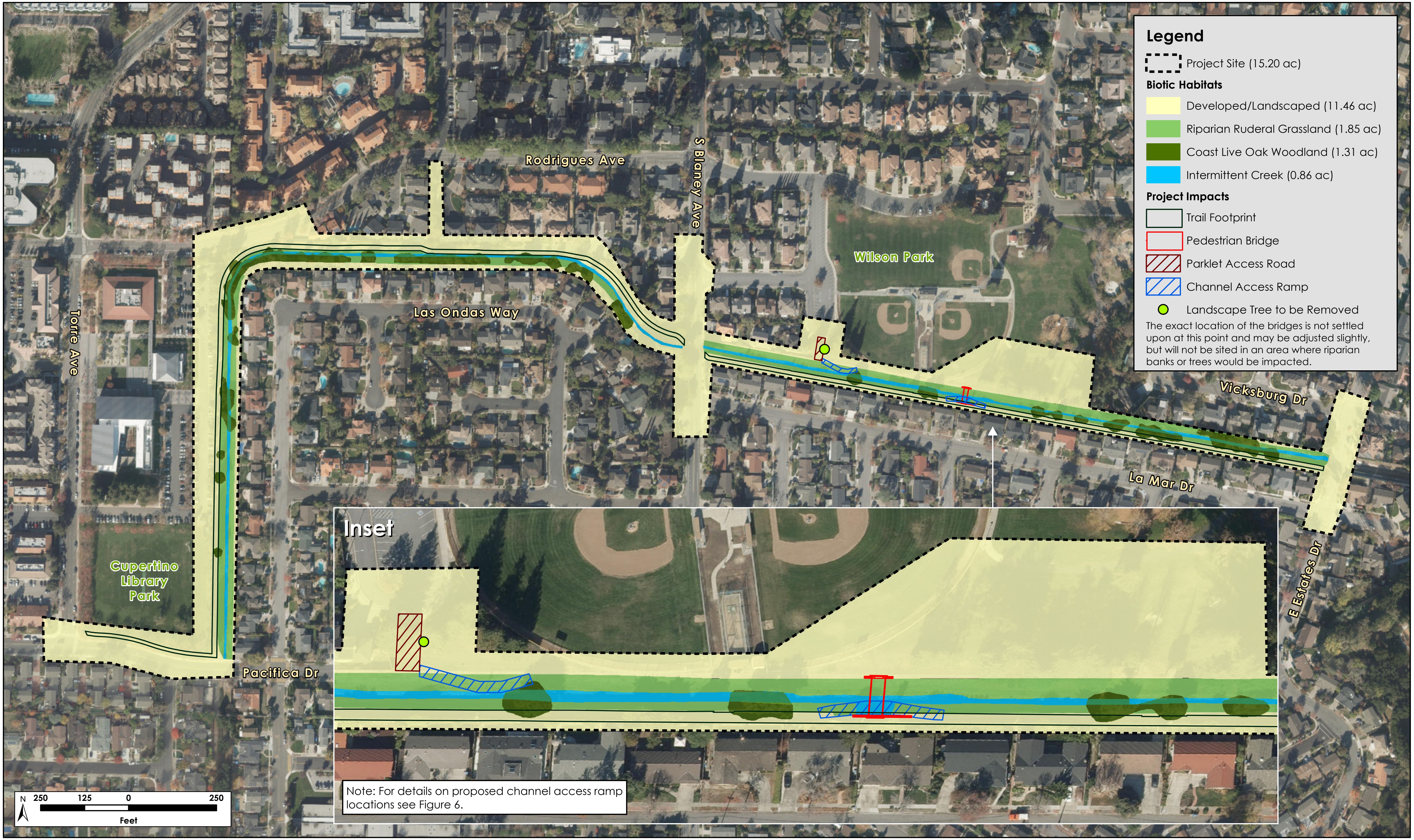

The exact location of the bridges is not settled upon at this point and may be adjusted slightly, but will not be sited in an area where riparian banks or trees would be impacted.

Note: For details on proposed channel access ramp locations see Figure 6.

N:\Projects4200\4268-01\Reports\BRR\Fig 3 Habitats and Impacts Map.mxd

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Figure 3. Biotic Habitats and Impacts Map

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From Rodrigues Avenue to South Blaney Avenue, a trail will be constructed along the north side of Regnart Creek (Figure 3). Railings will be constructed along the south side of the trail, adjacent to Regnart Creek. Trail widths will range from 8 to 10 feet. The trail will utilize the existing De Palma Lane and Valley Water gravel-surfaced maintenance road. Trailheads will be constructed on the east and west sides of South Blaney Avenue. The Project includes a raised pedestrian crossing across South Blaney Avenue, with a ramped speed table, crosswalk markings, and rectangular rapid flash beacon signals.

Between South Blaney Avenue and East Estates Drive, an 8-to-12-foot-wide trail will be constructed along the existing Valley Water maintenance road south of Regnart Creek (Figure 3). Railings will be constructed along the north side of the trail, adjacent to Regnart Creek. The Project will include a raised pedestrian crossing across East Estates Drive, with a ramped speed table, crosswalk markings, and rectangular rapid flash beacon signals. One removable truss bridge will be constructed across Regnart Creek to provide access to Wilson Park (Figure 3). While the exact location of the bridge has not been determined, it is likely to be in the location of the existing Valley Water concrete vehicle ramp. The Project will include a trailhead in Wilson Park.

The new pedestrian bridge will be a single-span structure supported on concrete abutments to be located at the top of the creek banks. No impacts within the bed and banks of Regnart Creek will occur as part of the bridge installation, and no trees within the creek corridor will be removed. The bridge will have timber decks and safety rails. A crane will lift the bridge structure onto the abutments from a location at the top of the creek bank. After construction, the bridge may be temporarily removed, as required, to provide creek access for Valley Water.

The existing Valley Water concrete vehicle ramp on the south side of Regnart Creek between South Blaney Avenue and East Estates Drive would be relocated to the north side of the creek and further west, and would have vehicle access for Valley Water maintenance vehicles from the terminus of Parkside Lane just west of Wilson Park. As part of the grading for the ramp relocation, the northern bank will be laid back. A land swap area would be designated between the Parkside Drive terminus and the new ramp location to provide a staging area for construction equipment. The slope where the relocated ramp existed on the south side of the creek would be reconstructed and the trail would continue past the prior ramp site to its intersection with East Estates Drive to the east. Construction work on the existing and proposed ramps would occur in summer months when the channel bed of Regnart Creek is dry.

Section 2. Methods

2.1 Background Review

Prior to conducting fieldwork, H. T. Harvey & Associates ecologists reviewed the Project plans and description provided by David J. Powers & Associates on November 12, 2018, aerial images (Google Inc. 2019), a U.S. Geological Survey topographic map, the California Department of Fish and Wildlife's (CDFW's) California Natural Diversity Database (CNDDB) (2019), and other relevant scientific literature and technical databases that might provide information on biological resources present in the Project vicinity. In addition, for plants we reviewed all species on the current California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) 1A, 1B, 2A, and 2B lists occurring in the Cupertino, California 7.5-minute U.S. Geological Survey quadrangle in which the Project is located, as well as the surrounding eight quadrangles (Mindego Hill, Palo Alto, Mountain View, Milpitas, San Jose West, Los Gatos, Castle Rock Ridge, and Big Basin). Quadrangle-level results are not maintained for CRPR 3 and 4 species, so we also conducted a search of CNPS Inventory records for these species occurring in Santa Clara County (CNPS 2019). In addition, we queried the CNDDB for natural communities of special concern that occur in the Project vicinity. For the purposes of this report, the "Project vicinity" encompasses a 5-mile radius surrounding the Project site.

2.2 Site Visit

H. T. Harvey & Associates plant ecologist Mark Bibbo, M.S., and wildlife ecologist Emily Malkauskas, B.S., conducted a reconnaissance-level field survey of the Project site on January 8, 2019. The purpose of this survey was to provide a project-specific impact assessment for the proposed Project as described above. Specifically, the survey was conducted to (1) assess existing biotic habitats and general plant and wildlife communities on the Project site, (2) assess the potential for the Project to impact special-status species and/or their habitats, and (3) identify potential jurisdictional habitats, such as waters of the U.S./state and riparian habitat. In addition, Ms. Malkauskas conducted a focused survey for evidence of previous raptor nesting activity (i.e., large stick nests); nests of the San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), a California species of special concern; and potential bat roosting habitat. On November 26, 2019, Mr. Bibbo conducted a field survey of the stretch of Regnart Creek between South Blaney Avenue and East Estates Drive where the existing and proposed Valley Water access ramps are located. The purpose of this site visit was to delineate the jurisdictional boundaries of the Regnart Creek channel and its banks, and to survey the area for potential jurisdictional wetlands.

Section 3. Environmental Setting

3.1 General Project Area Description

The 15.20-acre Project site includes the limits of the proposed trail footprint, pedestrian bridge, and access ramp relocation, as well as all potential access and staging areas within adjacent public parks and roadways (Figure 2). A review of limited historical aerial photographs indicates that land use on the Project site since 1991 has been similar to current conditions (i.e., residential neighborhoods and developed roadways, public parks, an intermittent creek and associated riparian habitat). The Project site is currently surrounded by residential land uses, private development, the Cupertino City Hall and Library, as well as various public parks. For most of its length, the proposed trail runs parallel to Regnart Creek, a modified earthen and partially concrete-lined channel managed and maintained by Valley Water. Currently fencing separates a majority of this stretch of the channel from surrounding land uses. Regnart Creek drains into Calabazas Creek approximately 320 feet east of the Project site. From this confluence, Calabazas Creek (an intermittent drainage) flows to the north, emptying into the South San Francisco Bay approximately seven air miles to the north.

Elevations within the Project site range from approximately 205 to 235 feet above sea level (Google Inc. 2019). The site is underlain by three soil types: Urban land-Stevenscreek complex, 0–2% slopes, Urban land-Flaskan complex, 0–2% slopes, and Urban land-Botella complex, 0–2% slopes (Natural Resource Conservation Service [NRCS] 2019a). All three of these soil types are mixes of "Urban land" soils with some other soil type. Urban land soil map units consist primarily of disturbed or human-transported materials into the area. All three of these soil map units are classified as "well-drained" and none are listed as hydric in Santa Clara County on the National Hydric Soils List (NRCS 2019b).

3.2 Biotic Habitats

A reconnaissance-level biological survey identified four habitat/land use types on the Project site: coast live oak woodland (1.31 acres), riparian ruderal grassland (1.85 acres), intermittent creek (0.86 acre), and developed/landscaped (11.46 acres) (Figure 3). The individual habitat acreages add up to more than the total Project site acreage (15.20 acres) because the acreage total for coast live oak woodland includes areas where oak trees overhang the intermittent creek habitat. These habitats are described in detail below.

3.2.1 Riparian Ruderal Grassland

Photo 1. Riparian ruderal grassland habitat on the Project site.

Vegetation. The riparian ruderal grassland habitat on the Project site is found entirely on the banks of Regnart Creek in those areas where the banks are not composed of concrete slopes or wall, or in openings of the coast live oak woodland (Photo 1). The vegetation in this habitat type is dominated by non-native annual grass species, predominantly bromes (*Bromus* spp.), oats (*Avena* spp.), and mustards (*Hirschfeldia incana* and *Brassica nigra*). Other common ruderal species include mallows (*Malva* spp.), Bermuda buttercup (*Oxalis pes-caprae*), fennel (*Foeniculum vulgare*), and smooth cat's ear (*Hypochaeris glabra*). The native forb California poppy (*Eschscholzia californica*) is also present. The "ruderal" qualifier is used to distinguish the degraded quality of the grassland within the Project site, due to regular disturbance from mowing, versus other California annual grasslands in Santa Clara County that support a higher diversity of native plant species. The "riparian" qualifier is used because this habitat type occurs entirely below the top of the bank of Regnart Creek. The vegetation on the banks of the creek is subject to routine maintenance by Valley Water as part of its Stream Maintenance Program (SMP).

Wildlife. Wildlife use of the riparian ruderal grassland habitat on the Project site is limited by the narrow nature of this habitat, its isolation from more extensive grasslands in the region, and interspersion of concrete and sakrete (i.e., concrete-filled sacks) lined sections of the channel banks within this habitat. As a result, wildlife species associated with more extensive areas of grasslands, such as the grasshopper sparrow (*Ammodramus savannarum*) and western meadowlark (*Sturnella neglecta*), are absent from the Project site. Common ground-nesting bird species that are associated with urbanized areas and can potentially nest in grasslands on the site, especially in areas where this vegetation is at least 6–12 inches tall or taller, include the dark-eyed junco (*Junco hyemalis*), mallard (*Anas platyrhynchos*), and song sparrow (*Melospiza melodia*). However, the majority of the bird species using the ruderal grassland habitat on the site during the breeding season nest in adjacent/overhanging coast live oak woodland or adjacent developed/landscaped areas and use the grassland habitat on the site only for foraging. Such species include the mourning dove (*Zenaida macroura*), lesser goldfinch (*Spinus psaltria*), house finch (*Haemorhous mexicanus*), Brewer's blackbird (*Euphagus cyanocephalus*), barn swallow (*Hirundo rustica*), and black phoebe (*Sayornis nigricans*). Several other species of birds, including the golden-crowned sparrow (*Zonotrichia atricapilla*) and white-crowned sparrow (*Zonotrichia leucophrys*), may forage in the ruderal grassland habitat on the site during migration and winter.

Reptiles such as the western fence lizard (*Sceloporus occidentalis*) and gopher snake (*Pituophis melanoleucus*), as well as amphibians such as the Pacific treefrog (*Hyliola regilla*), may occur in this habitat. Small mammals expected to be present include the native western harvest mouse (*Reithrodontomys megalotis*) and nonnative house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), and roof rat (*Rattus rattus*). Medium-sized mammals, such as the native striped skunk (*Mephitis mephitis*) and raccoon (*Procyon lotor*) as well as the nonnative Virginia opossum (*Didelphis virginiana*), likely occur here as well.

3.2.2 Coast Live Oak Woodland

Photo 2. Coast live oak woodland habitat on the Project site.

Vegetation. Coast live oak woodland biotic habitat occurs along the creek where individual or linear clumps of coast live oak (*Quercus agrifolia*) are rooted on the banks of Regnart Creek below the top of bank (Photo 2). Where they occur, the coast live oaks form a dense and continuous canopy. The understory vegetation consists of either the grassland habitat described above, or other understory species such as English ivy (*Hedera helix*) or passionflower vine (*Passiflora edulis*) growing as a dense ground cover. Coast live oak woodland within the Project site is considered a riparian habitat as the individual trees constituting this habitat are either rooted below the top of the bank of Regnart Creek or just at the top of bank and have a tree canopy that overhangs the channel. Coast live oaks along the creek and at the top of the banks are regularly pruned by Valley Water crews to maintain clearance along the access road and for maintenance activities.

Wildlife. Despite the linear and fragmented nature of the coast live oak woodland habitat on the site, it supports many of common woodland-associated species that occur in the urbanized Project region. Such species include the California scrub-jay (*Aphelocoma californica*), bushtit (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*), chestnut-backed chickadee (*Poecile rufescens*), and white-breasted nuthatch (*Sitta carolinensis*). Deer mice (*Peromyscus maniculatus*), California mice (*Peromyscus californicus*), and eastern gray squirrels (*Sciurus carolinensis*) nest and forage in this habitat as well, and the reptiles and amphibians found in the riparian ruderal grassland habitat also forage here. A few of the mature trees within this habitat provide potential nesting sites for raptors such as the Cooper's hawk (*Accipiter cooperii*) and red-shouldered hawk (*Buteo lineatus*). However, no old, existing nests of raptors were observed on the site during the reconnaissance survey, indicating that raptors have likely not nested on the site in recent years. Small numbers of individual bats may roost in cavities or crevices in trees on the Project site, but an examination of the trees on the site did not detect any large cavities that might provide suitable habitat for a large roosting or maternity colony of bats.

3.2.3 Developed/Landscaped

Vegetation. The developed/landscaped habitat on the Project site consists of paved and hardscaped areas associated with city streets and residential lots, as well as landscaped areas consisting of commonly planted ornamental trees, shrubs, and lawns associated with the adjacent city parks and residences (Photo 3). Commonly planted ornamental trees include species such as blackwood acacia (*Acacia melanoxylon*), American sweetgum (*Liquidambar styraciflua*), deodar cedar (*Cedrus deodora*), coast redwood (*Sequoia sempervirens*), and Chinese pistache (*Pistacia chinensis*). The dirt and graveled maintenance road on the top of the levee (maintained to be free of vegetation) is contained within this land cover type.

Photo 3. Developed/landscaped habitat on the Project site.

Wildlife. The developed/landscaped habitat on the Project site is of relatively low value to wildlife, but provides nesting and foraging opportunities for some urban-adapted species of birds. Native bird species that nest and forage in these areas include the Anna's hummingbird (*Calypte anna*), house finch, black phoebe, dark-eyed junco, Bewick's wren (*Thryomanes bewickii*), and American crow (*Corvus brachyrhynchos*). The Project site provides nesting habitat for up to several pairs of each of these species along the length of the trail alignment.

No signs of the presence of roosting bats (e.g., guano, urine staining, or visual or auditory detections of bats) were observed on the existing buildings on the site. These buildings are unlikely to support roosting bats due to frequent human disturbance and a lack of crevices through which bats could potentially enter, and no suitable roosting habitat for bats (e.g., cavities, crevices or exfoliating bark) was observed in the trees in developed/landscaped areas on the site.

Common urban-adapted mammal species that may occur on the Project site include the native raccoon and nonnative house mouse, Norway rat, black rat, and eastern gray squirrel. The western fence lizard, a common native reptile, may also occur within developed/landscaped areas of the Project site.

3.2.4 Intermittent Creek

Vegetation. The channel bottom of Regnart Creek below the ordinary high water marks was mapped as intermittent creek on the biotic habitat map (Figure 3). Regnart Creek is an engineered, straightened, and trapezoidal (i.e., with steep, engineered banks) channel that is maintained to convey stormwater flows (Photo 4). The channel bottom is predominantly sand and gravel, with short sections that have a concrete bottom or vegetated bottom. Overall, although some reaches support areas meeting the technical definition of vegetated wetlands, the channel bottom is largely lacking perennial, permanent wetland vegetation. There are discontinuous narrow patches of facultative wetland species such as dock (*Rumex pulcher* and *Rumex crispus*), Bermuda grass (*Cynodon dactylon*), and smilo grass (*Stipa miliacea*) occurring on the fringe of the channel bed (mostly at the ordinary high water mark of the channel). The channel bottom is routinely cleared of vegetation by Valley Water. In addition, the channel is scoured by high flow during storm events in the winter.

Wildlife. The disturbed nature of the creek, coupled with the intermittent and seasonal flow, on the Project site limits its value to wildlife species. When it contains water, the creek provides foraging habitat for some urban-adapted species associated with aquatic habitats, such as mallards (*Anas platyrhynchos*). In addition, small mammals such as raccoons may forage for aquatic invertebrate prey and larvae along this creek during the winter and spring, and aerial foragers such as black phoebes and barn swallows may forage for insects over the creek. Amphibians such as Pacific treefrogs may utilize the creek habitat for foraging, and several pools along the stream likely hold water into the spring and provide opportunities for breeding by this species. During the dry months, this creek provides minimal foraging opportunities for wildlife species due to its dry condition and the presence of limited vegetation in the channel.

Photo 4. Intermittent creek habitat on the Project site.

Section 4. Special-Status Species and Sensitive Habitats

CEQA requires assessment of the effects of a project on species that are protected by state, federal, or local governments as "threatened, rare, or endangered"; such species are typically described as "special-status species". For the purpose of the environmental review of the Project, special-status species have been defined as described below.

For purposes of this analysis, "special-status" plants are considered plant species that are:

- Listed under the Federal Endangered Species Act (FESA) as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under the California Endangered Species Act (CESA) as threatened, endangered, rare, or a candidate species.
- Listed by the CNPS as CRPR 1A, 1B, 2, 3, or 4.

For purposes of this analysis, "special-status" animals are considered animal species that are:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, or a candidate threatened or endangered species.
- Designated by the CDFW as a California species of special concern.
- Listed in the California Fish and Game Code as fully protected species (fully protected birds are provided in Section 3511, mammals in Section 4700, reptiles and amphibians in Section 5050, and fish in Section 5515).

Information concerning threatened, endangered, and other special-status species that potentially occur on the Project site was collected from several sources and reviewed by H. T. Harvey & Associates biologists as described in Section 2.1 above. Figure 4 depicts CNDDB records of special-status plant species in the general vicinity of the Project site and Figure 5 depicts CNDDB records of special-status animal species. These generalized maps show areas where special-status species are known to occur or have occurred historically.

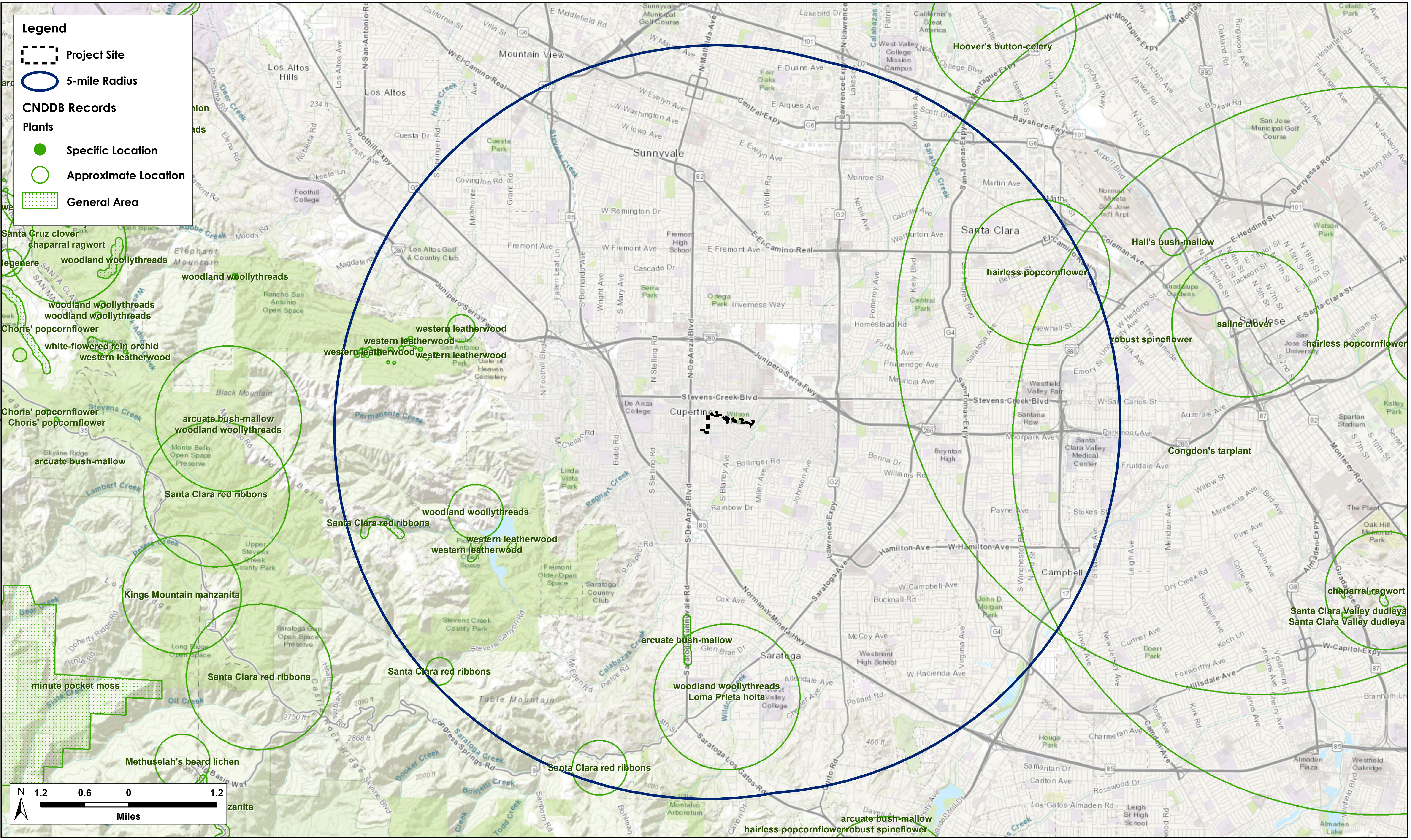

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Figure 4. Special-Status Plant Species

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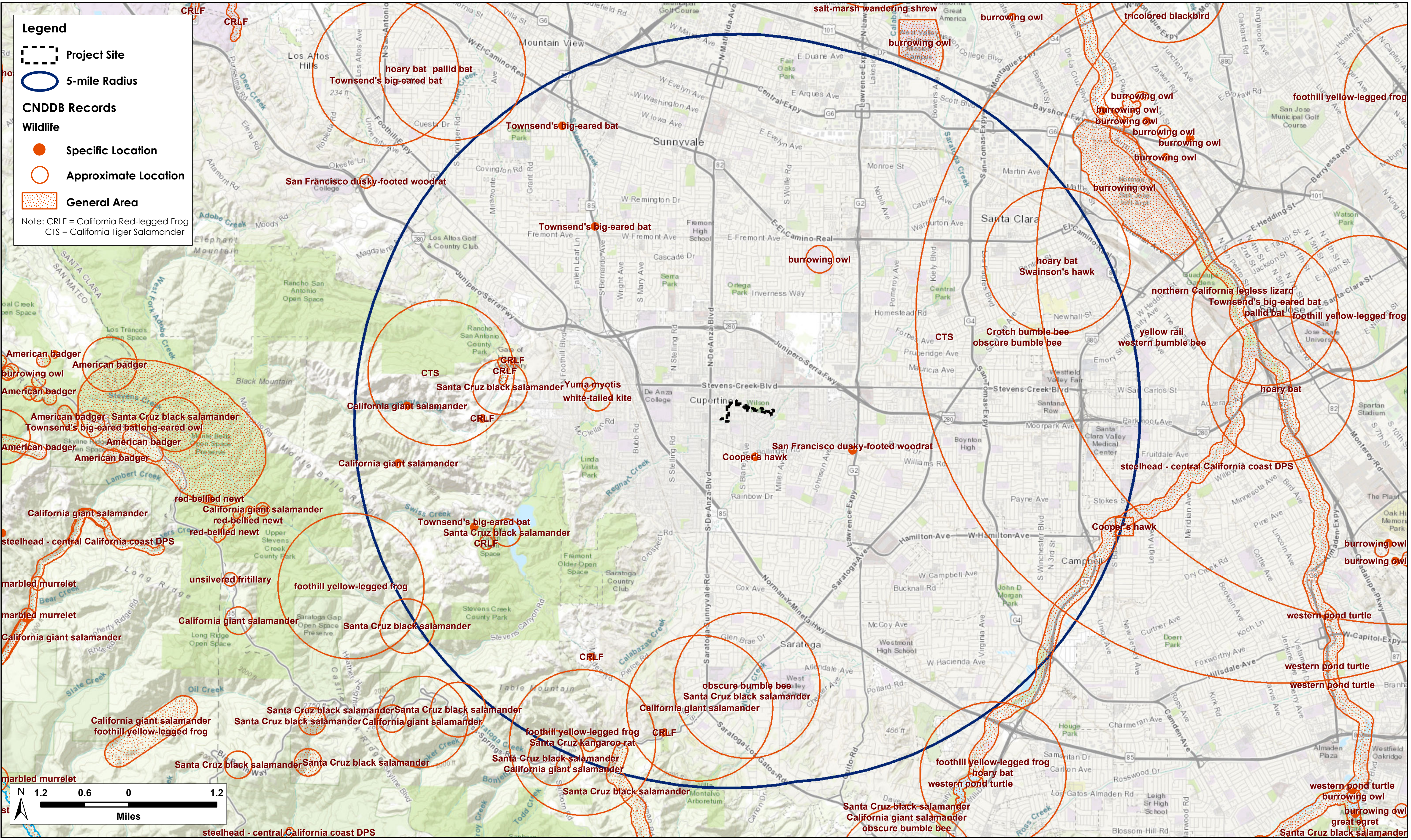

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Figure 5. Special-Status Animal Species

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4.1 Special-Status Plant Species

A list of 75 special-status plants with some potential for occurrence in the Project vicinity was compiled using CNPS lists (CNPS 2019) and CNDDB records (CNDDB 2019) and reviewed for each species potential to occur on the Project site. Of these 75 species, the CNDDB includes records for seven CNPS-ranked species—western leatherwood (*Dirca occidentalis*), woodland woollythreads (*Monolopia gracilens*), Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*), Loma Prieta hoita (*Hoita strobilina*), arcuate bush mallow (*Malacothamnus arcuatus*), hairless popcorn flower (*Plagiobothrys glaber*), and Congdon's tarplant (*Centromadia parryi ssp. congdonii*)—occurring within a 5-mile radius of the Project site (Figure 4). However, based on an analysis of the documented habitat requirements and occurrence records associated with these species, all of these 75 species, including the seven species recorded within the Project vicinity, were determined to be absent from the Project site due to at least one of the following reasons: (1) lack of suitable habitat types; (2) absence of specific microhabitat or edaphic requirements, such as serpentine soils; (3) the species is presumed extirpated or is not expected to occur in the Project vicinity due to range; and/or (4) the site is too disturbed to be expected to support the species.

4.2 Special-Status Animal Species

A number of special-status animal species are known to occur in the Project vicinity (CNDDB 2019; Figure 5). However, these species are determined to be absent from the Project site because it lacks suitable habitat, is outside the known range of the species, and/or is isolated from the nearest known extant populations by development or otherwise unsuitable habitat. Animal species considered for occurrence but rejected, as well as the reasons for their rejection, include the following (among others):

- The federally threatened Central California Coast steelhead (*Oncorhynchus mykiss*), and Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha*) are known to occur in some South Bay streams. Regnart Creek is tributary to Calabazas Creek, which connects downstream to the San Francisco Bay, and the two creeks intersect approximately 320 feet east of the Project site. However, sampling of Calabazas Creek conducted in 1981 and 1987 found no native fish, and habitat in the creek was determined to be unsuitable for steelhead due to channelization (Leidy et al. 2005). Thus, steelhead and Chinook salmon are determined to be absent from Regnart Creek within the Project site.

- The California red-legged frog (*Rana draytonii*), federally listed as threatened and a California species of concern, is known to occur along Permanente Creek and within the Gate of Heaven Cemetery approximately 3.0 miles west of the Project site (CNDDB 2019). However, the species has been extirpated from the urbanized Santa Clara Valley floor due to intensive human development, the alteration of hydrology of its aquatic habitats, and the introduction of nonnative predators such as nonnative fishes and bullfrogs (Lithobates catesbeianus) (H. T. Harvey & Associates 1997 and Valley Water 2011). Further, the Project site is isolated from occurrences of the species to the west and south by several miles of high-intensity urban development including State Route 85 and dense residential and commercial areas (Google Inc. 2019). Thus, California red-legged frogs are determined to be absent from the site.

- No burrows of California ground squirrels (*Otospermophilus beecheyi*) are present on the Project site to provide suitable nesting or roosting habitat for burrowing owls (*Athene cunicularia*), a California species of special concern. The closest occurrence of this species is a 1983 record located adjacent to Peterson High School in Sunnyvale approximately 2 miles northeast of the Project site (CNDDB 2019). However, burrowing owls no longer occur at this location, which was formerly agricultural but has been intensively developed since 1983, and there are no additional occurrences of burrowing owls in the site vicinity (CNDDB 2019, Cornell Lab of Ornithology 2019, Google Inc. 2019). The lack of suitable burrows on the Project site as well as the site's developed surroundings precludes the presence of suitable habitat for burrowing owls on or near the site, and thus no suitable nesting, roosting, or foraging habitat for burrowing owls is present on or adjacent to the Project site.

- Populations of the California tiger salamander (*Ambystoma californiense*), a state and federally threatened species, have been extirpated from the Santa Clara Valley Floor due to habitat loss, and the species is now considered absent from the majority of the Valley floor, including the Project site (H. T. Harvey & Associates 1999, 2012; Valley Water 2011). No recent records of California tiger salamanders are located in the Project vicinity (CNDDB 2019). Therefore, California tiger salamanders are determined to be absent from the Project site.

- Low-quality dispersal habitat for the western pond turtle (*Actinemys marmorata*), a California species of special concern, is present on the Project site within Regnart Creek when it contains water. No basking structures (such as logs) are present along this section of the creek, and the creek does not pond sufficient water to provide foraging habitat for this species. Pond turtles are not known to occur in Regnart Creek or in the site vicinity, and the nearest record of the species is approximately 6.0 miles southeast of the site at Vasona Reservoir. Pond turtles have been observed infrequently along Stevens Creek by City Staff (Seeds 2020). Thus, pond turtles are not expected to occur on the site due to the 6.0-mile distance separating the site from the nearest recorded occurrence of the species, 1.3-mile distance separating the site from Stevens Creek, and the intervening high-intensity development and multi-lane roadways that individuals would have to cross from these locations to access the site. However, there is a remote possibility that an individual could occasionally disperse from Stevens Creek upstream to the Project site.

- The San Francisco dusky-footed woodrat, a California species of special concern, occurs in a variety of woodland and scrub habitats throughout the South Bay and the adjacent Central Coast Range, south to the Pajaro River in Monterey County (Hall 1981, Zeiner et al. 1990b). It prefers riparian and oak woodland forests with dense understory cover, or thick chaparral habitat (Lee and Tietje 2005). Woodrats also are very adept at making use of human-made structures, and can nest in electrical boxes, pipes, wooden pallets, and even portable storage containers. Although suitable habitat for this species is present within the coast live oak woodland areas on the Project site, a focused survey of the site found that no San Francisco dusky-footed woodrat nests are currently present within the Project boundary. Therefore, this species is not expected to occur on the Project site. However, based on the presence of ostensibly suitable habitat, there is a remote possibility that woodrats may occasionally disperse to the site between the January 2019 site visit and project construction.

- Historically, the pallid bat (*Antrozous pallidus*), a California species of special concern, was likely present in a number of locations throughout the Project region, but its populations have declined in recent decades. This species has been extirpated as a breeder from urban areas on the Santa Clara Valley floor. No high-quality roosting habitat (e.g., caves, rock outcrops, vacant buildings, or hollow trees) are present on or adjacent to the Project site, and no known maternity colonies of this species are present within or adjacent to the Project site. There is a low probability that the species occurs in the site vicinity at all due to urbanization; however, individuals from more remote colonies could potentially forage on the Project site over the creek habitat on rare occasions.

- The white-tailed kite (*Elanus leucurus*), a state fully protected species, is known to nest along the periphery of the urbanized Valley floor in eastern Cupertino (e.g., at Rancho San Antonio Open Space Preserve, along Stevens Creek, and at Fremont Older Open Space Preserve). However, the Project site is separated from these areas by several miles of high-intensity urbanization, and no large, open grassland areas are present within or near the Project site to provide foraging opportunities for this species. Although potentially suitable nesting habitat for white-tailed kites is present on the Project site in the form of mature trees (e.g., oaks and redwoods), the species is not expected to nest on the site due to the lack of foraging opportunities in the vicinity. Further, no old, existing raptor nests were detected on the site during the reconnaissance survey, indicating that raptors have not nested on the site in recent years. Individual white-tailed kites may fly over the site occasionally, but are not expected to make regular use of the site for perching or foraging.

- The yellow warbler (*Setophaga petechia*), a California species of special concern, breeds in certain riparian habitats in Santa Clara County. However, breeding yellow warblers are typically associated with cottonwoods (*Populus* spp.), willows (*Salix* spp.), or western sycamore (*Platanus racemosa*), rather than with coast live oaks or any of the other vegetation present on the Project site. Yellow warblers are common migrants throughout the South Bay in spring and fall, and the species may occur on the site during migration. However, because the yellow warbler is a species of special concern only when breeding, those occurring as migrants are not considered a special-status species.

In conclusion, special-status animal species are unlikely to occur the Project site, and we do not expect any special-status animal species to be affected by the proposed Project. However, due to the remote possibility that an individual western pond turtle and/or San Francisco dusky-footed woodrats may disperse to the site prior to the start of construction, these species are addressed in Section 5 below.

4.3 Sensitive Natural Communities, Habitats, and Vegetation Alliances

The CDFW ranks certain rare or threatened plant communities, such as wetlands, meadows, and riparian forest and scrub, as 'threatened' or 'very threatened'. These communities are tracked in the CNDDB. Impacts on CDFW sensitive plant communities, or any such community identified in local or regional plans, policies, and regulations, must be considered and evaluated under CEQA (California Code of Regulations: Title 14, Div. 6, Chap. 3, Appendix G). In addition to tracking sensitive natural communities, the CDFW also ranks vegetation alliances, defined by repeating patterns of plants across a landscape that reflect climate, soil, water, disturbance, and other environmental factors (Sawyer et al. 2009). If an alliance is marked G1–G3, all of the vegetation associations within it will also be of high priority (CDFW 2019). The CDFW provides the Vegetation Classification and Mapping Program's currently accepted list of vegetation alliances and associations (CDFW 2010).

Furthermore, aquatic, wetland and riparian habitats are also afforded protection under applicable federal, state, or local regulations, and are generally subject to regulation, protection, or consideration by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (waters of the U.S.), the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act (waters of the state), the CDFW under Sections 1601–1603 of the Fish and Game Code, and/or the USFWS.

4.3.1 Sensitive Habitats (Waters of the U.S./State and Riparian)

Waters of the U.S./State. Based on its direct hydrologic connectivity with Calabazas Creek approximately 320 feet east of the Project site boundary, the intermittent stream channel of Regnart Creek would be considered waters of the U.S./state. Additionally, the RWQCB considers riparian habitat below top of bank to be an important buffer to waters in the creek channel and can regulate impacts to these areas. Any impacts on verified waters of the U.S./state within the Project site would require a Section 404 permit from the USACE and Section 401 Water Quality Certification from the San Francisco RWQCB.

Sensitive Habitats and Alliances. No CDFW-sensitive habitats or alliances were identified within the Project site in the CNDDB Rarefind query (CNDDB 2019).

Riparian. The banks of Regnart Creek between ordinary high water marks and the top of bank, consisting of riparian ruderal grassland and coast live oak woodland habitats rooted within or at top of bank, would be considered jurisdictional riparian habitat by the CDFW. As discussed above, the RWQCB also considers these areas important buffers that are regulated. Riparian habitat extends to the outer edge of the canopy of trees rooted below top of bank of the channel. Any impacts to this habitat would require a Section 401 Water Quality Certification/Waste Discharge Requirement from RWQCB and a Lake and Streambed Alteration Agreement from CDFW.

Section 5. Impacts and Mitigation Measures

CEQA and the State CEQA Guidelines provide direction for evaluating impacts of projects on biological resources and determining which impacts will be significant. CEQA defines a "significant effect on the environment" as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project." Under State CEQA Guidelines Section 15065, a project's impacts on biological resources are deemed significant if the project would:

- "substantially reduce the habitat of a fish or wildlife species"
- "cause a fish or wildlife population to drop below self-sustaining levels"
- "threaten to eliminate a plant or animal community"
- "reduce the number or restrict the range of a rare or endangered plant or animal"

In addition to the Section 15065 criteria that trigger mandatory findings of significance, Appendix G of State CEQA Guidelines provides a checklist of other potential impacts to consider when analyzing the significance of project effects. The impacts listed in Appendix G may or may not be significant, depending on the level of the impact. For biological resources, these impacts include whether the project would:

A. "have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service"

B. "have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service"

C. "Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means"

D. "interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites"

E. "conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance"

F. "conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan"

Following is a brief assessment of potential Project impacts on biological resources. The impact assessment below is structured based on the six significance criteria (A–F) listed above.

5.1 Impacts on Special-Status Species: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service (Less than Significant with Mitigation)

5.1.1 Impacts on Special-Status Plant Species (No Impact)

As described above, no special-status plant species are considered to have potential to occur on or adjacent to the Project site. As a result, the proposed Project will have no impact on special-status plant species.

5.1.2 Impacts on the Western Pond Turtle (Less than Significant with Mitigation)

The Project site does not provide important or extensive habitat that is used regularly or by large numbers of western pond turtles, and is not relied upon by breeding individuals of this species. Thus, the Project would not result in impacts to any habitat that is useful to western pond turtles as nesting, foraging, or dispersal habitat. However, there is at least a remote possibility that an individual could disperse to the site from more suitable habitat in Stevens Creek far downstream. In the unlikely event that a western pond turtle is present on the Project site during construction, Project activities could potentially result in the injury or mortality of the individual due to worker foot traffic, equipment use, or vehicle traffic. Petrochemicals, hydraulic fluids, and solvents that are spilled or leaked from construction vehicles or equipment may kill individuals. Additionally, increases in human presence and activity in the vicinity of suitable habitat during construction may result in an increase in native and non-native predators that would be attracted to trash left at the work site. For example, raccoons, American crows (*Corvus brachyrhynchos*), and common ravens (*Corvus corax*) are attracted to trash and may prey opportunistically on western pond turtles.

Due to the regional rarity of this species, project impacts on individual western pond turtles would be considered significant under CEQA. The implementation of Mitigation Measure 1 will reduce potential impacts on western pond turtles to less-than-significant levels.

Mitigation Measure BIO-1. Preconstruction Surveys for Western Pond Turtles. A qualified biologist will conduct a preconstruction survey of the work area for pond turtles within 48 hours prior to the start of work activities. If a western pond turtle is observed within the work area at any time before or during proposed construction activities, all activities will cease until such time that either (1) the pond turtle leaves the area or (2) the qualified biologist can capture and relocate the animal to suitable habitat away from Project activities.

5.1.3 Impacts on the San Francisco Dusky-Footed Woodrat (Less than Significant with Mitigation)

Habitat on the Project site is unsuitable for maintenance of a viable woodrat population, but there is a very remote possibility that an individual could disperse to the site from more suitable habitat elsewhere. If one or more nests of San Francisco dusky-footed woodrats becomes established on the Project site prior to the start of construction, Project implementation could result in the injury or mortality of individual dusky-footed woodrats as a result of clearing and grading, Project vehicle traffic, equipment use, and worker foot traffic, particularly if disturbance occurs when woodrats are taking refuge in their stick nests. San Francisco dusky-footed woodrat movements within individual home ranges could be temporarily affected during work activities as a result of disturbance of habitat, and Project-related disturbances may cause woodrats to flee their nests, exposing them to a greater risk of predation. Additionally, displacement of woodrats into adjacent habitats as a result of Project-related disturbance could result in indirect impacts as a result of increased intraspecific competition (resulting from individuals in disturbed habitat moving to areas that are already occupied) and pressure on available resources. However, Project impacts are expected to result in only minimal indirect disturbance of this species, as dusky-footed woodrats are tolerant of proximate activities (especially diurnal activities) that do not directly disturb their nest structures.

Project construction could also result in the temporary disturbance of suitable breeding and foraging habitat for woodrats. However, given the extent of suitable habitat available in the Project region, disturbance to and loss of regionally common natural habitats as a result of Project implementation is considered a less-than-significant impact on habitat for the San Francisco dusky-footed woodrat.

San Francisco dusky-footed woodrats are ecologically important because they serve as prey for a variety of predatory birds and mammals, and because their nests may provide structure and refugia for other animals. Therefore, impacts on woodrat nests would be significant. Implementation of Mitigation Measures 2, 3, and 4 below to avoid and minimize direct impacts on woodrats and their nests will reduce impacts on this species to less-than-significant levels.

Mitigation Measure BIO-2. Preconstruction Surveys for San Francisco Dusky-Footed Woodrats. A qualified wildlife ecologist will conduct a preconstruction survey for active nests of San Francisco dusky-footed woodrats within the Project work area within 30 days prior to the start of construction within non-developed habitats on the Project site. If active woodrat nests are determined to be present in, or within 10 feet of, Project impact areas, Measures BIO-3 and BIO-4 below will be implemented, as appropriate.

Mitigation Measure BIO-3. Avoidance of Active Woodrat Nests. Active woodrat nests that are detected within Project work areas will be avoided to the extent feasible. Ideally, a minimum 10-foot buffer will be maintained between Project activities and woodrat nests to avoid disturbance. In some situations, a smaller buffer may be allowed if, in the opinion of a qualified biologist, nest relocation (Measure BIO-4 below) would represent a greater disturbance to the woodrats than the adjacent work activities.

Mitigation Measure BIO-4. Woodrat Nest Relocation. If avoidance of active woodrat nests within and immediately adjacent to (within 10 feet of) the work areas is not feasible, then nest materials will be relocated to suitable habitat as close to the Project site as possible (ideally, within or immediately adjacent to the site). One or both of the following two relocation measures will be implemented, depending on whether existing woodrat nest sites are connected by suitable dispersal habitat to the nest relocation sites.

A. If the woodrat nest site and the proposed relocation area are connected by suitable dispersal habitat for the woodrat, as determined by a qualified biologist, the following relocation methodology will be used. Prior to the start of construction activities, a qualified biologist will disturb the woodrat nest to the degree that all woodrats leave the nest and seek refuge outside of the construction area. Relocation efforts will avoid the peak nesting season (February–July) to the maximum extent feasible. Disturbance of the woodrat nest will be initiated no earlier than one hour before dusk to minimize the exposure of woodrats to diurnal predators. Subsequently, the biologist will dismantle and relocate the nest material by hand. During the deconstruction process, the biologist will attempt to assess if there are juveniles in the nest. If immobile juveniles are observed, the deconstruction process will be discontinued until a time when the biologist believes the juveniles will be capable of independent survival (typically after 2 to 3 weeks). A no-disturbance buffer will be established around the nest until the juveniles are mobile. The nest may be dismantled once the biologist has determined that adverse impacts on the juveniles would not occur.

B. If a qualified biologist determines that the woodrat relocation area is separated from the nest site by major impediments, or a complete barrier, to woodrat movement, trapping for woodrats will be conducted prior to relocation of nest material. Prior to the start of nest relocation activities, artificial pine box shelters will be placed at each of the sites selected for relocation of nest materials. The dimensions of the artificial shelters will be approximately 8-inch long by 8-inch wide by 6-inch high. Each shelter will include two interior chambers connected by an opening. At the relocation sites, the artificial pine box shelters will provide basement structures for the relocated woodrat nest materials, allowing woodrats to enter, use, and modify the relocated nests.

   A qualified biologist will set two traps around each of the woodrat nests to be relocated. Traps will be set within one hour prior to sunset, and baited with a mixture of peanut butter, oats, and apples. Traps will also be equipped with cotton bedding and covered with cardboard. The traps will be checked the following morning, within one-and-a-half hours of sunrise. If a woodrat is captured it will be placed in a quiet area while its nest material is relocated; the animal will then be released at the relocated nest. If no woodrats are captured after the first night, the biologist will set the traps for one additional evening to increase the probability of capturing an animal and ensuring a safe relocation. If no woodrats are captured at a given location after two nights, it will be assumed that the nest is not currently occupied.

   Trapping will only be conducted outside the peak breeding season, which for woodrats is from February through the end of July. If a litter of young is found or suspected while dismantling a nest for relocation, the nest material will be replaced, any trapped woodrats will be returned to the nest, and the nest will be left alone for 2 to 3 weeks, after which time the nest would be rechecked to verify that the young are capable of independent survival, as determined by the biologist, before proceeding with nest dismantling.

5.2 Impacts on Sensitive Communities: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California

Department of Fish and Wildlife or U.S. Fish and Wildlife Service (Less than Significant with Mitigation)

Though limited in acreage throughout the county, riparian communities serve important ecological function in the landscape given their position as a linkage between terrestrial and aquatic communities, and the various ecological functions they serve for many species providing foraging opportunities, and diverse habitat structure for cover and nesting opportunities. Statewide, riparian communities are particularly threatened by development activities given their limited distribution and sensitivity to disturbance.

The Project site contains a single waterway, Regnart Creek, which meets the physical criteria of waters of the U.S./state (i.e., jurisdictional waters). The ordinary high water mark of Regnart Creek was mapped in the field with a submeter GPS unit based on field observations and is shown on Figure 3 and Figure 6 corresponding with the boundary of the intermittent creek habitat. Due to its connectivity to Calabazas Creek, this intermittent drainage would likely be claimed as waters of the U.S. by the USACE and as waters of the state by the RWQCB. In addition, it is expected this channel would be subject to jurisdiction by CDFW under Section 1600 of the California Fish and Game Code. The top of bank of Regnart Creek corresponds to the outer edge of the riparian ruderal grassland as shown on Figure 3 or the outer edge of the coast live oak woodland where it extends beyond that edge and was mapped in the field based on the distinct break (i.e. change) in slope.

Because riparian habitats are limited in extent in the state, are considered sensitive habitats, and provide a wide range of biological functions for wildlife, such as nesting habitat for birds, and provide important water quality buffering functions, any loss in riparian habitat may be considered significant (Significance Criterion B). The Project has been designed to avoid all impacts to riparian habitats including the coast live oak habitat and riparian ruderal grassland habitat occurring on the banks of Regnart Creek to the greatest extent possible. The pedestrian bridge over Regnart Creek will be installed so that all disturbance for bridge footings is situated outside the top of bank of the creek, and no in channel access will be required to place the clear-span bridge decks on the abutments. No coast live oak trees will be removed as part of the Project implementation, and abutments would not be placed within the driplines of any riparian trees. Where the proposed trail alignment is close to the top of bank, particularly in the stretch of trail alignment east of South Blaney Avenue, the jurisdictional habitat will be shown clearly and marked for avoidance on plan sets, and temporary Environmental Sensitive Area (ESA) fencing (i.e. a temporary fencing erected during construction work activities to clearly define work area and prevent encroachment of construction vehicles or workers into environmentally sensitive areas) will be used during construction to protect adjacent bank areas that are not proposed to be disturbed as part of the project. In addition, the Project will comply with comply with state requirements to control the discharge of stormwater pollutants under the National Pollutant Discharge Elimination System (NPDES)/Construction General Permit (described in more detail in Section 5.3). The Project will implement all measures outlined in Chapter 9.18 "Stormwater Pollution Prevention and Watershed Protection" of the City of Cupertino Municipal Code, as applicable, and the most current Municipal Regional Stormwater NPDES permit. Finally, construction plans will include the City of Cupertino, Public Works Department "Construction Best Management Practices" plan sheet.

The proposed Valley Water channel maintenance access ramp components of the Project (as detailed on Figure 6) will involve reconfiguration of an existing access ramp that is currently largely situated below the top of bank and within the ordinary water mark of Regnart Creek, as well as the establishment of a new channel maintenance access ramp on the opposite (north) side of the channel and approximately 400 feet to the west. As shown on Figure 6 and in Tables 1 and 2, the replacement access ramp has been designed so that there will be no net loss of jurisdictional area (either area below top of bank and subject to jurisdiction by the RWQCB and CDFW, or area below the OHWM and subject to jurisdiction by the USACE). There will be an increase in area below OHWM and subject to jurisdiction by the USACE (an increase of approximately 0.001 acres below OHWM), as well as an increase in riparian grassland habitat as a result of laying back the north bank, with approximately 0.014 acres of additional riparian bank habitat created between OHWM and the top of bank over the existing condition.

Table 1 lists the acreage of jurisdictional areas within the footprint of the two ramp locations in the existing conditions versus the post construction condition. Table 2 shows the amount of concrete below the OHWM or within riparian ruderal grassland habitat in the existing condition versus the amount that will be present within those jurisdiction following construction. As shown in Table 1, due to the design of the new ramp and the way the existing ramp will be reconstructed, there will be a slight increase of 0.014 acre in the area of riparian bank jurisdiction in the channel between OHWM and top of bank. There will also be a reduction in hardscape (concrete lining or ramp surface) within riparian habitats, with 149 square feet less hardscape covering riparian banks after the ramp relocation compared to the current condition (Table 2). Figure 6 shows the location and extent of the proposed and existing ramp with respect to the channel banks and intermittent creek channel bottom. The amount of concrete in the proposed access ramp configuration will not be any greater than that shown in Figure 6 and conveyed in Table 2.

Table 1. Jurisdictional Area in the Pre- and Post-Construction Conditions[1]

Jurisdictional area	Pre-Construction (ac)	Post-Construction (ac)
USACE 404 (Below OHWM)	0.152	0.153
RWQCB 401/CDFW (Below Top of Bank)	0.312	0.326
Non-jurisdictional Area	0.466	0.451
Total	0.930	0.930

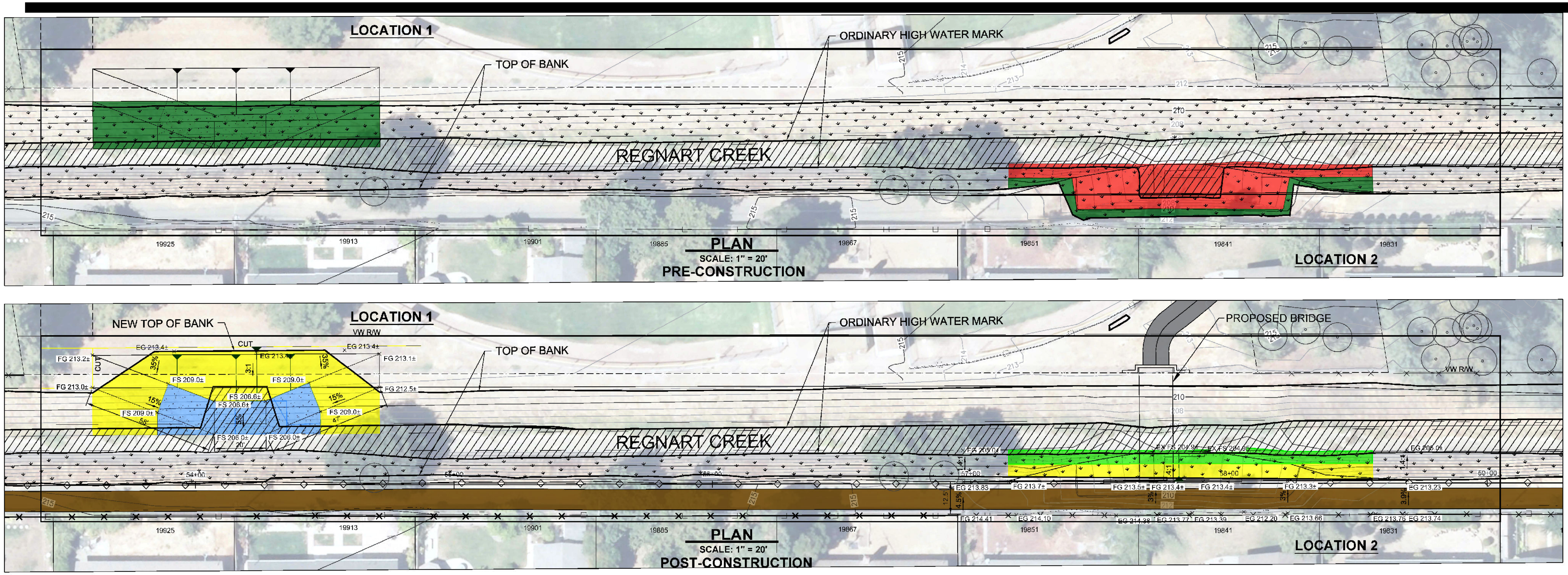
[1] The area evaluated in these calculations include the work area encompassing the existing and proposed ramps as shown on Figure 6.

Table 2. Area of Concrete and Native Soil in Jurisdictional Areas in the Pre- and Post-Construction Condition[1]

Jurisdictional area	Pre-Construction (sq. ft.)	Post-Construction (sq. ft.)
Area of concrete within USACE jurisdiction	599	674
Area of concrete within RWQCB 401/CDFW jurisdiction	1166	1017
Area of native soil within USACE jurisdiction	312	256
Area of native soil within RWQCB 401/CDFW jurisdiction	2006	2800

[1] The area of groundcover type in these calculations only includes the work areas as shown on Figure 6.

REGNART CREEK TRAIL
City of Cupertino



- 🟩 DISTURBED NATIVE SOIL
- 🟥 EXISTING CONCRETE
- ▨ USACE 404 (BELOW OHWM)
- ⁘ RWQCB 401/CDFW (BELOW TOB)
- 🟨 PROPOSED NATIVE SOIL
- 🟦 PROPOSED CONCRETE*
- 🟩 PROPOSED CONCRETE TO BE REPLACED

*CONCRETE CAN BE REPLACED WITH DIFFERENT SLOPE STABILIZATION MATERIAL

TABLE 1

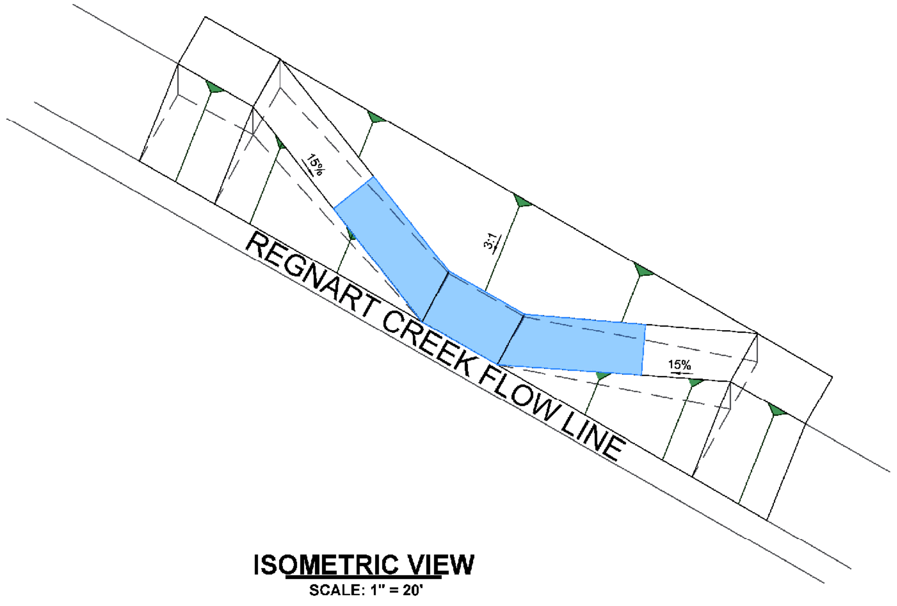
JURISDICTIONAL AREA	PRE-CONSTRUCTION CONDITION (AC)	POST-CONSTRUCTION CONDITION (AC)
USACE 404 (BELOW OHWM)	0.152	0.153
RWQCB 401/CDFW (BELOW TOB)	0.312	0.326
NON-JURISDICTIONAL AREA	0.466	0.451
TOTAL	0.930	0.930

NOTE: THE AREA EVALUATED IN THESE CALCULATIONS INCLUDES THE WORK AREA ENCOMPASSING THE EXISTING AND PROPOSED RAMPS AS SHOWN ABOVE

TABLE 2: AREA OF CONCRETE AND NATIVE SOIL IN JURISDICTIONAL AREAS IN THE PRE- AND POST-CONSTRUCTION

	PRE-CONSTRUCTION (SF)	POST-CONSTRUCTION (SF)
AREA OF CONCRETE BELOW OHWM	599	674
AREA OF CONCRETE BELOW TOB	1166	1017
AREA OF NATIVE SOIL BELOW OHWM	312	256
AREA OF NATIVE SOIL BELOW TOB	2006	2800

NOTE: THE AREA OF GROUNDCOVER TYPE IN THESE CALCULATIONS ONLY INCLUDES THE WORK AREA



0 10 20 40
1 INCH = 20 FEET

N:\Projects4200\4268-01\Reports\BRR\Fig 6 Ramp Relocation Impacts.mxd

Figure 6. Ramp Relocation Impacts

In the location of the existing access ramp, some amount of the existing concrete will be removed, the existing ramp area will be back-filled with native soil, and the bank will be re-contoured to match the existing slope upstream and downstream of the ramp. The existing concrete skirt that is present along the south edge of the channel bed and bank on either side of the existing ramp will be tied together in the same configuration. In the process of abandoning and re-contouring the existing ramp and constructing the proposed ramp on the opposite side of Regnart Creek, although ultimately the amount of jurisdictional riparian habitat will be permanently increased by 0.014 acre, there will be temporary impacts to the riparian ruderal grassland habitat from the ramp re-configuration work. With implementation of Mitigation Measures BIO-5 through BIO-9, the significance of these temporary impacts would be reduced to a less than significant level. In addition the Project will comply with all regulatory permitting requirements, which are expected to include seeking and obtaining the following permits; a Section 404 permit from the USACE, a Section 401 Water Quality Certification/Waste Discharge Requirement from RWQCB and a Lake and Streambed Alteration Agreement from CDFW.

Mitigation Measure BIO-5: Minimize the Area of Disturbance - To minimize impacts to riparian habitat, soil disturbance will be kept to the minimum footprint necessary to abandon the existing ramp and install the proposed ramp. The ramp relocation has been designed to minimize the area of disturbance to riparian ruderal grassland habitat in the existing ramp location. In addition, the proposed ramp location has been designed to have as minimal a footprint as possible. As explained above, and shown on Figure 6, the ultimate square footage of jurisdictional area following construction of the proposed ramp will be greater than the existing condition. In addition, due to the revegetation of this area with native grasses (see Mitigation Measure BIO-5 below), the ecological function of the riparian ruderal grassland habitat will be greater following completion of the project.

Mitigation Measure BIO-6: In-Channel Work Window. The proposed access ramp relocation work will occur between May 15 and October 31 when the channel bed is dry. This will prevent unintended run-off of sediment into creek waters, and will ensure that there are no adverse effects to any aquatic life that may be seasonally present in the intermittent creek. Work will not proceed if there is an out-of-season storm that deposits more than 0.5 inches of rain in 24 hours until the site has dried down again.

Mitigation Measure BIO-7: Staging and Stockpiling of Materials: To protect on-site vegetation and water quality, the staging area for the ramp relocation will be located on the access road to the north of the channel in Wilson Park, at least 100 feet outside the top of bank, in an area that currently supports either hardscape, landscaping or ruderal vegetation. Similarly, all equipment and materials (e.g., road rock and project spoil) will be contained within existing disturbed areas outside of the riparian zone in a pre-determined staging area. Erosion control measures will be installed around the staging area to prevent runoff from the staging areas to enter the Regnart Creek channel. Any landscape areas that are affected by staging shall be restored. No staging shall occur within driplines of trees to remain.

Mitigation Measure BIO-8: Bank Stabilization Design to Prevent Erosion Downstream – The ramp relocation will be fully designed to prevent bank failure. Following construction and to further prevent potential downstream erosion impacts, the site design will provide proactive protection of vulnerable areas within the reach of the worksite. Such measures could include, but are not limited to, appropriately keyed-in coir logs, strategic placement of rock, and flow deflectors. Bank stabilization will include appropriate transition designs upstream and downstream of the work site to prevent potential erosion impacts.

Mitigation Measure BIO-9: Revegetation with Native Seed Mix – Following ramp relocation all non-hardscaped areas that have exposed soil will be stabilized to prevent erosion. These areas shall be seeded with native species seed down to the OHWM as soon as is appropriate following completion of the Project. Grassland revegetation will be most effective if the seed is applied in the fall (after September 1 and before December 1), so until that time the area will achieve erosion control via use of temporary BMPs such as jute netting or fiber rolls, etc. These BMPs must be removed prior to seeding. The seed mix will be broadcast seeded onto prepared (decompacted and scarified) soil surface and then lightly raked to maximize seed/soil contact. The seed mix should consist of the California native grasses and forbs and application rates as shown below in Table 3.

Table 3. Native Grass and Forb Mix to be used in Revegetation of Disturbed Soils[1]

Scientific Name[1]	Common Name	Seeding Rate (pounds PLS/acre)[2]
Elymus glaucus	Blue wildrye	4.0
Eschscholzia californica	California poppy	1.0
Festuca microstachys	Small fescue	6.0
Hordeum brachyantherum	Meadow barley	10.0
Lupinus bicolor	Annual lupine	1.0

[1] Names derived from *The Jepson Manual* (Baldwin et al. 2012).

[2] PLS (pure live seed) = the proportion of total seed that is pure and viable. To find the total weight of raw seed needed to achieve the application rate in the table, find %PLS as follows: [(% purity of seed lot) (% germination rate of species)/100]. Then divide the application rate in the table (pounds) by the %PLS (expressed as a decimal) to find total weight of raw seed applied per acre for each species.

The City will monitor the reseeded riparian bank areas annually for two years to ensure that the percent vegetation cover reaches at least 75 percent of the cover in the adjacent undisturbed reaches, and will control any infestations of Cal-IPC rated moderate or high weeds comprising greater than 5 percent of the total cover in the recovering areas. If after two years, these success criteria have not been met, the City will implement remedial measures, such as re-seeding the area, and monitoring for another two years

With the implementation of the above avoidance and minimization measures, temporary impacts on riparian habitat from the relocation of the Valley Water channel maintenance access ramp will be less than significant.

5.3 **Impacts on Wetlands**: Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (Less than Significant)

As stated above Regnart Creek would be considered a waters of the U.S./state based on its intermittent flow and its direct hydrologic connectivity to Calabazas Creek. The OHWM of Regnart Creek was mapped in the field with a sub-meter Trimble unit based on observations of the following indicators of high flow; water staining on the concrete, erosional shelving, change in vegetation, and sediment deposits. The Regnart Creek channel in this stretch of the Project is a straightened, trapezoidal channel, so the OHWMs are relatively straight line features bounding an aquatic channel approximately seven feet wide. No wetlands were observed within this stretch of the channel bed. This is likely due to the straightened nature of the channel and the fact that majority of the flow in the channel consists of high velocity, scouring, flows following storm events in the winter months. The Project has been largely designed to avoid direct impacts to the bed or banks of Regnart Creek. However, in the same manner as was described above under the discussion related to riparian habitat, the relocation of the Valley Water channel maintenance access ramp will result in temporary impacts to waters of the U.S. In the location of the existing access ramp the OHWM "bends" out to include a portion of the access ramp that is at a lower elevation (see Figure 6). This area will be temporarily removed when the existing ramp is abandoned and the bank is re-configured. However, an equivalent area will be gained in the location of the proposed access ramp on the opposite side of the channel.

Wetlands and waters serve a variety of important functions, such as sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, and aquatic and terrestrial wildlife species habitat. If these functions were to be impacted as a result of Project activities, this would be considered a significant impact. With implementation of Mitigation Measures BIO-5 through BIO-9 described above in Section 5.2, temporary impacts on waters of the U.S. will be less than significant.

Reductions in ambient light levels in wetland habitat can lead to a decrease in the amount of aquatic vegetation present, which results in a reduction in primary production, as well as the amount of cover and herbaceous food available in the wetland habitat. The proposed pedestrian bridge over Regnart Creek would result in a new source of shading in the form of a 12-foot wide span across the creek. Thus, the Project has the potential to affect vegetation directly under the span or within its shadow due to changes in ambient lighting (i.e., shading). However, there is presently no wetland vegetation within the intermittent channel bed of Regnart Creek underneath the proposed pedestrian bridge location. Therefore, this impact would not be considered significant.

As shown above in Figure 6 and summarized in Table 2, the project will result in an increase of 75 square feet of hardscape (i.e. concrete) within the OHWM of Regnart Creek due to the relocation and reconfiguration of the Valley Water channel maintenance access ramp. The design of the proposed access ramp on the north side of the channel matches what currently exists on the south side. On the south side in the location of the existing ramp, the banks will be re-configured so that the existing slope upstream and downstream of the ramp will match. Due to more gradual slope on the north side of channel, with re-configuration of the bank to accommodate the new ramp, there will be a slight increase in area that will ultimately be "below OHWM"[1]. Therefore there will be an increase of concrete below the OHWM in the channel under the proposed ramp configuration as compared to the existing ramp configuration. Although there is functionally an increase of hardscape within waters of the U.S., because the area of waters of U.S. is increasing, the minor increase in concrete below OHWM in this case does not represent a net loss of waters of the U.S. or waters of the state. In addition, the overall amount of hardscape within the channel below top of bank will be reduced by 74 square feet, meaning a slight increase in native soil banks above the channel. Overall, with the small increase in riparian habitat area below top of bank as discussed above, an overall net increase of jurisdictional area below the OHWMs of 0.001 acre (Table 1), and an overall decrease in hardscape within the complete creek channel, the small increase in hardscape below OHWMs is considered less than significant.

The trail creation work has the potential to cause indirect impacts on water quality within Regnart Creek based on site runoff patterns. Projects causing land disturbances that are equal to 1 acre or greater must comply with state requirements to control the discharge of stormwater pollutants under the National Pollutant Discharge Elimination System (NPDES)/Construction General Permit. Prior to the start of construction/demolition, a Notice of Intent must be filed with the RWQCB describing the Project. In complying with state requirements to control the discharge of stormwater pollutants under the NPDES/Construction General Permit, the Project will be required to develop and maintain a Storm Water Pollution Prevention Plan, which would include the use of best management practices (BMPs) to protect water quality until the site is stabilized. Standard permit conditions under the NPDES/Construction General Permit require that the applicant utilize various measures including: on-site sediment control best management practices, damp street sweeping, temporary cover of disturbed land surfaces to control erosion during construction, and utilization of stabilized construction entrances and/or wash racks, among other factors. Additionally, in many Bay Area counties, including Santa Clara County, projects must also comply with the *California Regional Water Quality Control Board, San Francisco Bay Region, Municipal Regional Stormwater NPDES Permit* (Water Board Order No. R2-2009-0074). This permit requires that all projects implement BMPs and incorporate Low Impact Development practices into the design that prevents stormwater runoff pollution, promotes infiltration, and holds/slows down the volume of water coming from a site. In order to meet these permit and policy requirements, projects must incorporate the use of green roofs, impervious surfaces, tree planters, grassy swales, bioretention and/or detention basins, among other factors. Compliance with both of these permits will prevent water quality impacts and improve stormwater runoff compared to existing conditions at the Project site, and further avoid impacts on Regnart Creek and its associated riparian habitat.

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[1] The boundary of the OHWM as shown in the location of the proposed ramp, represents a future event, and as such is a projection of a likely boundary based on the elevation in the channel of the OHWM immediately upstream of the proposed ramp, which was measured in the field as 207 feet elevation NAVD88.

BMPs implemented during Project implementation as part of the compliance with a Storm Water Pollution Prevention Plan will prevent any indirect impacts to water quality in Regnart Creek. Thus, the Project's impact on jurisdictional waters and/or wetlands would be considered less than significant.

5.4 Impacts on Wildlife Movement: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites (Less than Significant)

5.4.1 Impacts on Wildlife Movement (Less than Significant)

For many species, the landscape is a mosaic of suitable and unsuitable habitat types. Environmental corridors are segments of land that provide a link between these different habitats while also providing cover. Development that fragments natural habitats (i.e., breaks them into smaller, disjunct pieces) can have a twofold impact on wildlife: first, as habitat patches become smaller they are unable to support as many individuals (patch size), and second, the area between habitat patches may be unsuitable for wildlife species to traverse (connectivity).

The grassland, oak woodland, and intermittent creek habitat along Regnart Creek serve as a movement pathway for terrestrial species, providing vegetative cover and foraging opportunities. Common, urban-adapted species such as raccoons and striped skunks may use the vegetation along Regnart Creek to move east and west through the Cupertino area. Small mammals, such as mice and shrews, will also use this vegetation to move between habitats. The removal of a portion of this habitat during bridge construction as well as ramp construction and removal will create gaps of open, developed habitat along this corridor, which any wildlife species traveling along this corridor must cross in order to traverse the Project site. However, this habitat is already patchy within the Project site (Figure 3) and the creation of new gaps in this habitat is not expected to isolate contiguous, high-quality areas of these habitats or substantially inhibit the movement of wildlife species. Rather, terrestrial species such as mammals and reptiles that move along the creek are likely to move under the bridge. Because the many terrestrial wildlife species that use this habitat are acclimated to high levels of disturbance and existing fragmented habitats in the Cupertino area, bridge construction and ramp construction and removal are not expected to result in significant impacts on the movements of individuals, and would not rise to the level of a substantial adverse effect on habitat connectivity and wildlife movement under CEQA.

Similarly, the habitats along Regnart Creek provide a movement pathway for birds through urban areas of Cupertino. However, the oak woodland habitat on the Project site is of limited extent, as previous disturbances have reduced and fragmented this habitat. Thus, the proposed bridge crossing and ramp removal and construction will affect a segment of Regnart Creek with only limited, low-quality habitat for birds due to past disturbances. Although the Project will result in some habitat loss that will affect bird use along Regnart Creek, due to the low quality of the habitat that will be affected, the lack of tree removal within the creek corridor, and because ample riparian habitat will remain elsewhere along Regnart Creek, the overall, larger reach of creek that includes the Project site will still be valuable to breeding and migratory birds following Project construction.

This impact would not rise to the level of a substantial adverse effect on habitat connectivity and wildlife movement under CEQA.

Project construction could temporarily disrupt wildlife movement pathways through the Regnart Creek corridor. Increased human activity during construction could deter terrestrial and aquatic wildlife from moving through the construction area. However, these common wildlife species would continue to use the area during the night and other non-working hours of the day when human activity is relatively low, such as early morning and evening. In addition, the areas along the Regnart Creek corridor are already frequented daily by pedestrians, cyclists, and vehicles traveling along adjacent roadways, and wildlife species occurring in the corridor are habituated to this human presence. Thus, the addition of the proposed bridge crossing and relocation of the vehicle ramp would not result in a substantial increase in interruption of use of the creek by aquatic wildlife or upland reptiles and mammals. Thus, potential impacts on wildlife movement resulting from Project construction do not meet the CEQA standard of having a substantial adverse effect, and would not be considered significant under the CEQA.

Increased human activity along trails post-construction, including pedestrians walking dogs, could affect the movements and activities of terrestrial wildlife species and birds on the site over the long-term. However, the common terrestrial wildlife and bird species that occur on site are expected to continue to use the area during the night and other hours of the day when human activity is relatively low, such as early mornings and evenings. In addition, the areas adjacent to the Regnart Creek corridor are already frequented daily by pedestrians, cyclists, and vehicles traveling along roadways, and wildlife species that currently occur along the corridor are habituated to this disturbance. Any increase in pedestrians, dogs, and bicyclists along the trail over the long term is not expected to exceed these species' tolerance for disturbance; woodland habitats with immediately adjacent trails in the larger region are regularly used by the common terrestrial wildlife species and birds that occur on the Project site. Further, the common species of birds that nest along the creek are highly tolerant of human disturbance, and are expected to habituate to any increase in disturbance due to pedestrians, dogs, and bicycles along the trail and continue to nest and forage along the creek following Project construction. Thus, potential impacts on wildlife use of the creek due to trail use following Project construction do not meet the CEQA standard of having a substantial adverse effect, and would not be considered significant under CEQA.

5.4.2 Impacts on Nesting Birds (Less than Significant)

Construction disturbance during the avian breeding season (February 1 through August 31, for most species) could result in the incidental loss of eggs or nestlings, either directly through the destruction or disturbance of active nests or indirectly by causing the abandonment of nests on or near the Project site. However, the habitats on the Project site represent a very small proportion of the habitats that support these species regionally and are relatively degraded due to the intensity of surrounding human disturbance. In addition, all species of birds currently using the Project site are expected to continue to nest and forage on the site after Project construction is completed because this habitat will still be available. Therefore, Project impacts on nesting and foraging birds currently using the site, due to habitat impacts or disturbance of nesting birds, would not rise to the CEQA standard of having a *substantial* adverse effect, and these impacts would not constitute a significant impact on these species or their habitats under CEQA. However, all native bird species are protected from direct take by federal and state statutes. Therefore, we recommend that the following measures be implemented (at the discretion of the applicant and the lead agency) to ensure that Project activities comply with the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code:

> **Measure 1. Avoidance.** To the extent feasible, construction activities (or at least the commencement of such activities) should be scheduled to avoid the nesting season. If construction activities are scheduled to take place outside the nesting season, all impacts on nesting birds protected under the MBTA and California Fish and Game Code will be avoided. The nesting season for most birds in Santa Clara County extends from February 1 through August 31.
>
> **Measure 2. Preconstruction/Pre-disturbance Surveys.** If it is not possible to schedule construction activities between September 1 and January 31 then preconstruction surveys for nesting birds should be conducted by a qualified ornithologist to ensure that no nests will be disturbed during Project implementation. We recommend that these surveys be conducted no more than seven days prior to the initiation of construction activities. During this survey, the ornithologist will inspect all trees and other potential nesting habitats (e.g., trees, shrubs, grasslands, buildings) in and immediately adjacent to the impact areas for nests.
>
> **Measure 3. Buffers.** If an active nest is found sufficiently close to work areas to be disturbed by these activities, the ornithologist will determine the extent of a construction-free buffer zone to be established around the nest (typically 300 feet for raptors and 100 feet for other species), to ensure that no nests of species protected by the MBTA and California Fish and Game Code will be disturbed during Project implementation.
>
> **Measure 4. Inhibition of Nesting.** If construction activities will not be initiated until after the start of the nesting season, all potential nesting substrates (e.g., bushes, trees, grasses, and other vegetation) that are scheduled to be removed by the Project may be removed prior to the start of the nesting season (e.g., prior to February 1). This will preclude the initiation of nests in this vegetation, and prevent the potential delay of the Project due to the presence of active nests in these substrates.

5.5 Impacts due to Conflicts with Local Policies: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance (Less than Significant)

5.5.1 Impacts Related to Compliance with Municipal Code Chapter 25 (Less than Significant)

The City of Cupertino recognizes the substantial economic, environmental, and aesthetic importance of its tree population. The City finds that the preservation of “protected trees” on private and public property, and the protection of all trees during construction, is necessary for the best interests of the City and of the citizens and public (Municipal Code Chapter 14.18).

The City's Municipal Code calls for protection of "protected" trees and requires a permit prior to their removal. Pursuant to Municipal Code Chapter 14.18.050, protected trees include:

- Heritage trees in all zoning districts. Heritage trees are defined by the City as any tree or grove of trees which, because of factors including, but not limited to, its historic value, unique quality, girth, height, or species, has been found by the Architectural and Site Approval Committee to have a special significance to the community;
- Specimen trees are all trees of the following species that have a minimum single-trunk diameter of 10-inches (31-inches in circumference) or minimum multi-truck diameter of 20-inches (63-inches in circumference) measured at 4.5 feet from natural grade: oak (including coast live oak, valley oak, black oak, blue oak, and interior live oak), California buckeye, big leaf maple, deodar cedar, blue atlas cedar, bay laurel or California bay, and western sycamore;
- Any tree required to be planted or retained as part of an approved development application, building permit, tree removal permit, or code enforcement action in all zoning districts; and
- Approved privacy protection planting in R-1 zoning districts.

Any protected tree in any zoning district shall not be removed without first obtaining a tree removal permit (Municipal Code Chapter 14.18.030). Replacement trees, of a species and size as designated by the approval authority and consistent with the replacement value of each tree to be removed, shall be planted on the subject property on which the tree(s) are to be removed.

If a replacement tree for the removal of a protected tree cannot be reasonably planted on the subject property, an in-lieu tree replacement fee shall be paid to the City's tree fund to add or replace trees on public property in the vicinity of the subject property or add trees or landscaping on City property (Municipal Code Chapter 14.18.160).

The Project will require the removal of a single tree for construction of the trail and the access road in Wilson Park (see Figure 3). The one tree is a planted ornamental tree and is not located within the riparian corridor of Regnart Creek (i.e. not considered riparian trees), however, it would likely be considered "protected trees" under City municipal code due to its size. The removal or damage of trees protected by the City municipal code would be considered potentially significant under CEQA. However, the Project will comply with the City's municipal code, including obtaining a permit from the City and replacing any protected trees removed as required by the municipal code. Therefore, impacts related to conflict with local policies or ordinances would be less than significant.

5.6 Impacts due to Conflicts with an Adopted Habitat Conservation Plan: Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan (No Impact)

The Project site is not located within an area covered by an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, the Project would not conflict with any such plans.

5.7 Cumulative Impacts

Cumulative impacts arise due to the linking of impacts from past, current, and reasonably foreseeable future projects in the region. Future development activities in the City of Cupertino will result in impacts on the same habitat types and species that will be affected by the proposed Project. The proposed Project, in combination with other projects in the area and other activities that impact the species that are affected by this Project, could contribute to cumulative effects on special-status species. Other projects in the area include potential office/retail/commercial development, mixed use and/or residential projects that could adversely affect these species.

The cumulative impact on biological resources resulting from the Project in combination with other projects in the Project vicinity and larger region would be dependent on the relative magnitude of adverse effects of these projects on biological resources compared to the relative benefit of impact avoidance and minimization efforts prescribed by planning documents, CEQA mitigation measures, and permit requirements for each project, including compensatory mitigation and proactive conservation measures associated with each project. In the absence of such avoidance, minimization, compensatory mitigation, and conservation measures, cumulatively significant impacts on biological resources would occur.

However, the City of Cupertino General Plan contains conservation measures that would benefit biological resources. Further, the Project would implement a number of measures to reduce impacts on both common and special-status species, as described above. Thus, the Project would not contribute to substantial cumulative effects on biological resources.

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APPENDIX B

Foundation Report

DRAFT FOUNDATION REPORT
REGNART CREEK TRAIL BRIDGES
CITY OF CUPERTINO, CALIFORNIA

For

HMH
1570 Oakland Road
San Jose, CA 95131
(408) 944-8999

By

PARIKH CONSULTANTS, INC.
2360 Qume Drive, Suite A, San Jose, CA 95131
(408) 452-9000

June 13, 2019 Job No. 2018-151-GEO

PARIKH
Practicing in the Geosciences

MEMORANDUM

To: HMH
1570 Old Oakland Road
San Jose, CA 95131

February 11, 2020
Job No.: 2018-151-GEO

Attn: Mr. Jon Cacciotti, PE, Principal

From: Frank Y. Wang, PE, GE

Sub: Regnart Creek Trail Bridge – Draft Foundation Report, dated June 13, 2019
Cupertino, California

PARIKH Consultants, Inc. (PARIKH) prepared a draft foundation report, dated June 13, 2019, to present the foundation recommendations for the proposed two pedestrian bridges over the Regnart Creek.

According to the recent communication with the design team, Bridge 1 discussed in the foundation report has been removed from the project scope. It is our understanding that the bridge foundation and pile loads for Bridge 2 remain unchanged per discussion with the structural engineers. The recommendations presented in our June 2019 report are applicable to Bridge 2.

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DRAFT FOUNDATION REPORT
REGNART CREEK TRAIL BRIDGES
CITY OF CUPERTINO, CALIFORNIA

1.0 INTRODUCTION

This “Draft Foundation Report” presents the results of our geotechnical engineering investigation for the proposed “Regnart Creek Trail Bridges” Project for the City of Cupertino, California, hereinafter referred to as “PROJECT”. The work was performed in general accordance with the scope of work outlined in our proposal to HMH (Designer).

2.0 SCOPE OF WORK

The purpose of this report is to evaluate the general subsurface soil conditions and engineering properties at the project site and to provide foundation design for the proposed project. The approximate location of the project site is shown on the Project Location Map (Plate No. 1).

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the project site; site reconnaissance; obtaining representative soil samples and logging soil materials encountered in the exploratory soil borings; laboratory testing of the representative soil samples, performing engineering analyses based on the field and laboratory data, and preparation of this foundation report.

3.0 PROJECT DESCRIPTION

Envisioned as part of The Loop Cupertino and identified in the City of Cupertino 2016 Bicycle Transportation Plan and the City of Cupertino 2018 Pedestrian Plan, the Regnart Creek Trail is a planned facility which would provide a safe and convenient off-street route for bicyclists and pedestrians to access nearby destinations including Cupertino Civic Center, Cupertino Public Library, Wilson Park, Creekside Park, schools, and residential neighborhoods. Under the agreement with the Santa Clara Valley Water District (SCVWD), the project would utilize an existing maintenance road adjacent to Regnart Creek in the City of Cupertino. The project would extend along the existing creek alignment from Pacifica Drive to E Estates Drive where it would connect to the existing trail to Creekside Park.

The Regnart Creek Trail Project includes the following improvements:

- From Torre Avenue to Regnart Creek, construct a Class I shared-use path along the north side of Pacifica Drive.
- From Pacifica Drive to South Blaney Avenue, construct a Class I shared-use path along the existing SCVWD maintenance access road on the west/north side of the creek.
- From South Blaney Avenue to Wilson Park and from Wilson Park to East Estates Drive, construct a Class I shared-use path along the existing SCVWD maintenance access road on the south side of the creek.
- At approximately 700 feet and 1000 feet east of Blaney Avenue, construct two pedestrian bridges over the creek and pathway improvements within Wilson Park.
- Construct trail access points at Torre Avenue, Pacifica Drive, Rodrigues Avenue, South Blaney Avenue, Wilson Park, and East Estates Avenue
- Enhance the trail/roadway crossings at South Blaney Avenue and East Estates Drive.

4.0 FIELD EXPLORATION AND TESTING PROGRAM

The subsurface conditions at the site were studied by reviewing readily available geologic information and subsurface data from four exploratory borings drilled. Borings B-1 and B-2 were drilled in January 2019 by Access Drilling using three-inch diameter solid-stem augers to maximum depths of 26.5 and 31.5 feet, respectively. Borings B-3 and B-4 were drilled in March 2019 by Exploration Geoservices, Inc. using eight-inch diameter hollow-stem augers to maximum depths of 31.5 feet and 61 feet, respectively. The boring locations are shown in Plate 2.

Selected soil samples were obtained from either 2.5-inch inside diameter (I.D.) Modified California (MC) or 1.4-inch I.D. (at the shoe of the sampler) Standard Penetration Test (SPT) samplers at various depths. The samplers were driven into subsurface soils under the impact of a 140-pound hammer having a free fall of 30 inches. The blow counts required to drive the sampler were recorded for the last 12 inches.

A hammer efficiency of 60% is assumed for both rigs. When correlating standard penetration data, the blow counts for the MC Sampler may be converted to equivalent SPT blow counts by multiplying an additional conversion factor of 0.65. The samples were sealed and transported to our laboratory for further evaluation and testing. The field investigation was conducted under the supervision of our field engineer who logged the test boring and prepared the samples for subsequent laboratory testing and evaluation.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the soil conditions during construction nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope. Such variations, when encountered, generally require additional engineering services to attain a properly constructed project. We, therefore, recommend that a contingency fund be provided to accommodate any additional charges resulting from technical services that may be required during construction.

5.0 LABORATORY TESTING PROGRAM

Laboratory tests were performed on the selected soil sample to evaluate the physical and engineering properties for analyses required for the project such as evaluation of liquefaction potential, pile capacity, and corrosion potential.

Laboratory tests include the following:

a) Moisture (ASTM D2216-10);
b) Density (Based on mass / volume relationships) (ASTM D7263);
c) Plastic Limit, Liquid Limit & Plastic Index (ASTM D4318-17);
d) Grain Size Distribution Analysis (ASTM D6913);
e) Unconfined Compression Test (ASTM D2166);
f) Corrosion Test (Sulfate content, chloride content, resistivity and pH) (California Test Methods 417-mod, 422-mod, and 643);
g) Hydraulic Conductivity (ASTM D5084)

The laboratory test methods and laboratory test results are presented in Appendix B.

6.0 SITE GEOLOGY AND SUBSURFACE SOIL CONDITIONS

6.1 Site Geology

General geologic features pertaining to the site were evaluated by reference to the "Geologic Map of Cupertino and San Jose quadrangles, Santa Clara and Santa Cruz Counties, California" by Dibblee T.W., and Minch, J.A. dated 2007. The geologic map of the general project area is shown on Plate 3.

Based on this publication, the project site is located on the "Surficial Sediments" (Qa.1) described as "Alluvial sand, fine-grained, silt, and gravel; where differentiated represents alluvial fan deposits at the base of slopes and upper fan areas" (Holocene).

A map showing Quaternary Deposits is available by Robert C. Witter, et al., "Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California", 2006. Based on this map, the site is located on Alluvial Fan deposits (Qpf) of the latest Pleistocene period. The quaternary deposits map is shown on Plate 4.

6.2 Subsurface Soil Conditions

Borings B-1 and B-2, located north of the channel, generally encountered stiff to hard Lean/Fat Clays in the first 7 to 8 feet followed by dense to very dense sands with little to some gravel to the maximum depth explored.

Borings B-3 and B-4, located south of the channel, generally encountered about 14 to 18 feet of Lean/Fat Clays followed by dense to very dense sands with little to some gravel to the maximum depth explored. Boring B-4 also encountered a 6 feet thick gravel layer at about 30 feet.

No surface water was observed in the creek during the investigation, and groundwater was not encountered up to 60 feet, the maximum depth explored. Depth to historical high groundwater contours on "Seismic Hazard Zone Report for the Cupertino 7.5-Minute Quadrangle" by California Geological Survey dated 2002 indicated the groundwater is deeper than 50 feet (Plate 8).

The channel may be subject to flood, which is a temporary condition. The actual flood level was not known. However, please note that the existing channel is lined with concrete and the soils at the shallow depths consist of clayey soils with low permeability. The soils are not expected to be fully saturated during a temporary flood event. For the purposes of this report, the permanent groundwater level was considered at 60 feet depth.

It is anticipated to vary with the passage of time due to seasonal groundwater fluctuations, variations in yearly rainfall, water elevations in the creek, surface and subsurface flow, ground surface run-off, and other environmental factors that may not be present at the time of the investigation.

7.0 SCOUR EVALUATION

It is our understanding that the channel is partially lined with concrete and the abutments are not directly located at the edge of the creek bank. Based on our conversation with the designer, scour is not considered for design.

8.0 CORROSION EVALUATION

Chemical tests were performed on selected soil samples from the soil borings to evaluate the corrosion potential of the subsurface soil. The test results are as follows:

TABLE 1 - SUMMARY OF CORROSION TEST RESULTS

Location	Sample Depth (ft)	Minimum Resistivity (ohms-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
B-1	6	880	7.38	132.3	109.3
B-2	11	2680	6.93	19.7	9.2
B-3	6	1130	7.40	5.10	30.6
B-4	3	1310	6.66	8.50	43.8

According to Caltrans Corrosion Guidelines, March 2018 (Version 3.0), Caltrans considers a site to be corrosive to foundation elements if one of the following conditions exists for the representative soil samples taken at the site:

- Chloride concentration is greater than or equal to 500 ppm,
- Sulfate concentration is greater than or equal to 1,500 ppm,
- pH is 5.5 or less.

Based on the corrosion test results as shown in Table 1 above, the site is not considered corrosive to the structural elements.

9.0 SEISMIC RECOMMENDATIONS

9.1 Seismic Sources

The project is located in a seismically active part of northern California. Many faults exist in the regional area. These faults are capable of producing earthquakes and may cause strong ground shaking at the site.

Maximum magnitudes (M_{max}) of some of the closest faults in the area are based on Caltrans ARS Online Website. These maximum magnitudes represent the largest earthquake a fault is capable of generating and is related to the seismic moment. The earthquake data of the active faults in the project vicinity are summarized in the table below. A Caltrans ARS Online Map showing faults in the vicinity for ARS calculation purposes is shown on Plate 5.

TABLE 2 - ARS DATA

Fault (Fault ID)	Maximum Magnitude, M_{max}	Fault Type	Approx. Site-to-Fault Distance (R_{rup})*
Silver Creek (148)	6.9	Strike-Slip	11.7 km
Cascade (153)	6.7	Reverse	0.4 km
Monte Vista-Shannon (154)	6.4	Reverse	3.3 km
San Andreas (Santa Cruz Mts) (158)	8.0	Strike-Slip	9.2 km

* The approximate distances to the fault rupture plane were estimated by Caltrans ARS Online.

9.2 Seismic Design Criteria

The design spectrum shall be designed in accordance with the 2012 Caltrans Fault Database (Version 2b) and the Acceleration Response Spectrum (ARS) Online web tool (Version 2.3.09). The development of the design ARS curve is based on several input parameters, including site location (longitude/latitude), average shear wave velocity for the top 30m/100 feet (Vs_{30m}), and other site parameters, such as fault characteristics, site-to-fault distances.

The current design methods incorporate both “Deterministic and Probabilistic Seismic Hazards” to produce the “Design Response Spectrum”.

Average shear wave velocity (V_s) for the top 100 feet at the site was estimated by using established correlations and the procedure provided in the Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations (November 2012). The site location and the relevant parameters are summarized as follows, and the recommended curve for the bridge design is presented on Plate 6.

1. Site Location: 37.3183ºN/-122.0204ºW
2. Estimated V_{S30m} = 315 m/s
3. Peak Ground Acceleration = ~0.7g
4. Maximum Magnitude = 7.91 (from Probabilistic Deaggregation)
5. The governing ARS case is the Caltrans Online Probabilistic ARS
6. An adjustment factor for near-fault effects was applied to the calculated spectral acceleration values. The increase of 20% to the spectral acceleration values corresponds to periods longer than 1 second and linearly tapers to zero at a period of 0.5 second.
7. No adjustments were made for basin effect.

9.3 Seismic Hazards/Liquefaction Potential

Potential seismic hazards may arise from three sources: surface fault rupture, ground shaking, and liquefaction.

9.3.1 Seismic Ground Shaking

Based on available geological and seismic data, the possibility of the site to experience strong ground shaking is considered high. PGAs of 0.7g was estimated for the site, which is discussed in Section 9.2.

9.3.2 Surface Fault Rupture

Since no known active faults pass through the site and the site is not within a mapped Alquist-Priolo Zone, the fault rupture potential at the site does not exist.

9.3.3 Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils, which usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Field exploration encountered dense to very dense sands/gravels at the site. In addition, groundwater was not encountered in the geotechnical borings.

A map showing Liquefaction susceptibility is available by Robert C. Witter, et al., "Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California", 2006. Based on this map, the site is located on the “low” category for liquefaction susceptibility. The map is shown on Plate 7.

Based on the above, the liquefaction potential does not exist and was not considered for foundation design.

10.0 FOUNDATION RECOMMENDATIONS

10.1 General

This report was prepared specifically for the proposed project according to the plans provided to us. Our design criteria have been based upon the materials and subsurface soil conditions encountered in the soil borings at the project site. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

10.2 Axial Pile Design

Both bridges over Regnart Creek are planned as single-span structures, and they will be supported on 30-inch diameter cast-in-drilled-hole (CIDH) piles.

Pertinent foundation design information provided by the Structural Designer (Biggs Cardosa Associates, Inc.), including Foundation Design Data and Foundation Loads, are presented in Tables 4 and 5 located at the end of this report. The cut-off elevation is defined as the elevation of the top of the pile. Finish grade elevation is defined as the final ground surface elevation after construction.

The pile capacities of the CIDH piles were estimated in general accordance with the procedures outlined in Section 10.8.3.5 of AASHTO LRFD BDS 6th Edition (2012), which is quoted from the "Drilled Shafts: Construction Procedures and Design Methods" by O'Neill and Reese (1999). The procedure utilizes α factor for cohesive materials, where α is a function of the undrained shear strength of the clayey materials, and β factor for cohesionless materials, which is a function of the depths.

The pile capacity of the CIDH pile was derived only from frictional resistance along the pile shafts, and end bearing capacity was not included when estimating the pile capacity. The computer program "SHAFT" (by ENSOFT, Inc.) was used for calculation purposes. The analysis results are presented in Appendix C.

The foundation design recommendations and pile data tables are shown in Tables 4 and 5 located at the end of the report.

10.3 Lateral Pile Design

Lateral pile capacity analyses were performed by the structural engineer using the LPILE program.

The soil properties were estimated based on available boring data and laboratory test results. For fined-grained materials, the undrained shear strengths were estimated based on laboratory test results and correlated from the driving resistances of the soil samples (i.e., blow counts) based on NAVFAC DM 7.1. The internal friction angles of granular materials were correlated also based on the driving resistance of the samples per Meyerhof (1956), which is a function of relative density (Dr). The correlated soil properties are presented in Appendix C of the report.

Per discussion with the designer, the lateral pile design is expected to be governed by the extreme limit state, i.e., the seismic condition. As discussed in Section 6.2, permanent groundwater is relatively deep, and the soils are not expected to be fully saturated during the temporary flood event since the existing channel is lined with concrete and clayey soils at the shallow depths have low permeability. Therefore, it is not necessary to consider the high groundwater level, i.e., flood level, with the extreme limit state design.

The recommended geotechnical parameters used in LPILE analyses are provided in the table below. The parameters below apply to both bridges.

Due to the sloping ground surface in front of the piles, the full passive resistance should only be considered where the horizontal distance is 12.5 feet or greater between the center of the pile and the face of the slope.

TABLE 3A – RECOMMENDED LPILE PARAMETERS (ABUTMENT 1)
BASED ON BORINGS B-3 & B-4

Elevation (ft)	Generalized Soil Profile	LPILE Soil Type	c (psf)	Phi (degrees)	Total Unit Weight (pcf)
210 to 202	Stiff Lean/Fat Clay	Stiff Clay w/o Free Water	1,400	-	125
202 to 196	Hard Lean Clay	Stiff Clay w/o Free Water	3,500	-	125
196 to 150	Dense to V. Dense Sand	Sand (Reese)	-	37	125

Notes:
(1) Default values can be used for ε_{50} and K.
(2) P-multipliers of 0.79 and 1.00 for transverse and longitudinal directions, respectively for a pile center-to-center pile spacing of 4D.

**TABLE 3B – RECOMMENDED LPILE PARAMETERS (ABUTMENT 2)
BASED ON BORINGS B-1 & B-2**

Elevation (ft)	Generalized Soil Profile	LPILE Soil Type	c (psf)	Phi (degrees)	Total Unit Weight (pcf)
210 to 202	Stiff Lean/Fat Clay	Stiff Clay w/o Free Water	1,400	-	125
202 to 150	Dense to V. Dense Sand	Sand (Reese)	-	37	125

Notes:
(1) Default values can be used for ε_{50} and K.
(2) P-multipliers of 0.79 and 1.00 for transverse and longitudinal directions, respectively for center-to-center pile spacing of 4D.

10.4 Lateral Pressures on the Abutment Wall

Abutment retaining walls should be designed to resist the following Applied Lateral Earth Pressures and live load. It is our understanding that it is not permitted to provide drain outlets into the creek. Therefore, a hydrostatic pressure of 62.4 pcf may have to be considered below the flood level. These values assume compacted structural backfill behind the walls supported in native soil.

Applied Lateral Earth Pressure

Active Condition	36 pcf Equivalent Fluid Pressure (EFP) for the dry condition and 18 pcf EFP for the submerged condition for the structural backfill.
Seismic Pressure	36 pcf EFP (increment, in addition to static earth pressure) based on a seismic coefficient, kh, of 0.35
Passive Resistance	5 ksf (ultimate) for seismic design of the abutment back wall (5.5 feet high or greater); for activated height less than 5.5 feet modify proportionally, i.e. 5×(H/5.5) ksf. A minimum lateral wall movement of 2% of wall height to mobilize the full ultimate passive pressure is required.

Cantilever walls which are free to rotate at least 0.004 radian may be assumed flexible for the active condition. The effect of any surcharge (dead, live, or traffic load) should be added to the preceding lateral earth pressures. A coefficient of 0.28

may be used to determine the additional earth pressure resulting from the surcharge for active condition.

10.5 Stability of Slopes at the Abutment

The impact due to the lateral pile-soil reaction on the slope stability of the banks were evaluated. The analyses were performed on the typical section using SLOPE/W program with the following information and assumptions:

- Typical cross-section was based on the information shown in the "General Plan" provided by the designer. The top of the slope is about Elev. 215.6 feet for the west bridge and Elev. 214.3 for the east bridge after the proposed construction. Up to 1.5 feet of new fill is expected at the abutments.
- Cross-sections for both bridges are similar for slope stability analysis purposes; therefore, only Bridge 1 was evaluated. Abutment 1 (Northern) was selected and analyzed due to the steeper slope (more critical).
- Slope stability was evaluated under the service (static) and seismic (pseudo-static) cases with additional loading from the abutment piles.
- The LPILE analysis from the structural engineer at Abutment 1 was used to estimate the lateral pile pressures on the slope. This analysis was modified from the original run because the passive resistance from the upper portion (where the horizontal setback is less than 12.5 feet) was neglected. The revised model considered a sloping ground condition in front of the abutment. The additional pressures on the slope were estimated based on the mobilized soil reaction starting at the pile cap.
- A live load surcharge load of 250 psf was assumed for the service case, which was ignored for the seismic cases.
- A seismic loading coefficient (k_h) of 0.35g was assumed for the seismic case (pseudo-static analysis), which is one-half of the anticipated peak ground acceleration (PGA) at the project site.

The soil strength parameters used in the analyses are shown in Table 3A and 3B. Other input parameters, such as geometry, phreatic surfaces, and the factors of safety and possible critical sliding surfaces obtained from slope stability analyses are presented on the plates in Appendix C.

Based on the results of the slope stability analyses, the calculated factors of safety are 3.32 for the static case (greater than 1.5) and 1.77 for the seismic condition (greater than 1.1). Based on these results, the slopes are considered stable under additional pile lateral loading for all analyzed cases.

It is our opinion that the impact of the foundation piles on the slope stability of the existing embankment/levees should be negligible because:

- The extent of the soil reaction is localized and small in comparison with the overall length of the slope. The soil reaction is resisted by the shear strength of the levee soil materials.
- The construction of the proposed CIDH piles minimizes the vibration and impact on the stability of the existing banks as opposed to driven piles.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 General Considerations

To a degree, the performance of any structure is dependent upon construction procedures and quality. Hence, observation of grading operations should be carried out by the engineer-of-record or the responsible Agency. If the encountered subsurface conditions differ from those forming the basis of our recommendations, this office should be informed in order to assess the need for design changes.

11.2 Cast-In-Drilled-Hole (CIDH) Concrete Pile

a) Caltrans standard specifications and standard special provisions (SSP) for “Cast-in-Place Concrete Piling” should be used for the construction of CIDH concrete piles. Access tubes for acceptance testing should be provided in all CIDH concrete piles that are 24 inches in diameter or larger for construction quality control, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control groundwater. The acceptance test should include Gamma-Gamma Logging and may also include cross-hole sonic logging for verification. Gamma-

Gamma Logging should be performed in accordance with California Test 233 Standard (CT233) to check the homogeneity of CIDH concrete piles.

b) Due to the presence of granular material, raveling or caving is anticipated, which may require additional drilling and cleaning effort and may increase the concrete volume for the piles. It is prudent to make the contractor aware of these conditions so that appropriate steps can be taken to comply with the standards and maintain the integrity of the CIDH concrete pile.
c) The use of temporary casing should be expected during pile foundation construction.
d) It is recommended that the specifications set certain criteria for qualifications and previous work experience requirements to pre-qualify the potential contractors. The intent is to help select qualified contractors to reduce construction issues.
e) Relatively hard drilling could be expected due to the presence of very dense gravel/sands and intensely weathered/fractured rock at depth. During our geotechnical exploration, all holes were advanced by augers without coring.

12.0 PLAN REVIEW

This report is prepared for the proposed “Regnart Creek Trail Bridges” project. We recommend that final foundation plans for the proposed project to be reviewed by PARIKH prior to construction so that the intent of our recommendations is included in the project plans and specifications and to further see that no misunderstandings or misinterpretations have occurred. However, design-build elements should be reviewed only from overall compliance standpoint.

13.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions. All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed, and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Very truly yours,
PARIKH CONSULTANTS, INC.

** DRAFT **	** DRAFT **
A. Emre Ortakci, P.E., G.E. 3067 Project Engineer	Frank Wang, P.E., G.E. 2862 Senior Project Engineer

https://parikhnet.sharepoint.com/sites/projects2/Ongoing_Projects/2018/2018-151 HMH Regnart Creek Trail Bridges/Report/Draft FR_Regnart Creek Trail_20190613.docx

TABLE 4A – FOUNDATION DESIGN DATA (BRIDGE 1)

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (Bottom of Footing Elevation) (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	Number of Piles per Support	Design Tip Elev for Lateral Loading (ft)
					B	L			
Abut 1	LRFD	30" Dia CIDH Pile	215.6	209.3	3	18.67	1	2	182.0
Abut 2	LRFD	30" Dia CIDH Pile	215.6	208.9	3	18.67	1	2	182.0

TABLE 4B – FOUNDATION LOADS (BRIDGE 1)

Support No.	Service-I Limit State (kips)		Strength/Construction Limit State				Extreme Event Limit State (Controlling Group, kips)			
	Total Load per Support	Permanent Loads per Support	Compression		Tension		Compression		Tension	
			Per Support	Max. per pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	122	97	197	98	0	0	97	48	0	0
Abut 2	122	97	197	98	0	0	97	48	0	0

TABLE 4C – FOUNDATION DESIGN RECOMMENDATIONS (BRIDGE 1)

Support No.	**Pile Type**	**Cut-off Elevation (ft) (NAVD88)**	**Service-I Limit State Load (kips) per Support**		**Total Permissible Support Settlement (inches)**	**Required Factored Nominal Resistance (kips)**				**Design Tip Elev. (ft) (NAVD88)**	**Specified Tip Elev. (ft) (NAVD88)**
						Strength Limit		**Extreme Event**			
			Total	**Permanent**		**Comp. (φ=0.7)**	**Tension (φ=0.7)**	**Comp. (φ=1.0)**	**Tension (φ=1.0)**		
Abut 1	30" dia. CIDH Pile	209.3	122	97	1	98	N/A	48	N/A	193.0 (a-I) 199.0 (a-II) 182.0 (d) (iii)	182.0
Abut 2	30" dia. CIDH Pile	208.9	122	97	1	98	N/A	48	N/A	(a-I) 190.0 (a-II) 198.0 (d) 182.0(iii)	182.0

Notes:

(i) Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (d) Lateral Load.

(ii) Settlements under service loads do not govern the design.

(iii) Design tip elevations for lateral were provided by the structural designer (BCA).

TABLE 4D – PILE DATA TABLE (BRIDGE 1)

Support No.	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft) (NAVD88)	Specified Tip Elev. (ft) (NAVD88)
		Compression	Tension		
Abut 1	30" dia. CIDH Pile	140	N/A	(a) 193.0 (d) 182.0	182.0
Abut 2	30" dia. CIDH Pile	140	N/A	(a) 190.0 (d) 182.0	182.0

Notes:

(1) Design tip elevations are controlled by: (a) Compression, (d) Lateral Load

(2) Settlements under service loads do not govern the design.

(3) Design tip elevations for lateral were provided by the structural designer (BCA).

TABLE 5A – FOUNDATION DESIGN DATA (BRIDGE 2)

Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (Bottom of Footing Elevation) (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	Number of Piles per Support	Design Tip Elev for Lateral Loading (ft)
					B	L			
Abut 1	LRFD	30" Dia CIDH Pile	214.3	209.2	3	16	1	2	182.0
Abut 2	LRFD	30" Dia CIDH Pile	214.3	207.5	3	16	1	2	181.0

TABLE 5B – FOUNDATION LOADS (BRIDGE 2)

Support No.	Service-I Limit State (kips)		Strength/Construction Limit State				Extreme Event Limit State (Controlling Group, kips)			
	Total Load per Support	Permanent Loads per Support	Compression		Tension		Compression		Tension	
			Per Support	Max. per pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	118	94	190	95	0	0	94	47	0	0
Abut 2	118	94	190	95	0	0	94	47	0	0

TABLE 5C – FOUNDATION DESIGN RECOMMENDATIONS (BRIDGE 2)

Support No.	Pile Type	Cut-off Elevation (ft) (NAVD88)	Service-I Limit State Load (kips) per Support		Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elev. (ft) (NAVD88)	Specified Tip Elev. (ft) (NAVD88)
						Strength Limit		Extreme Event			
			Total	Permanent		Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1.0)	Tension (φ=1.0)		
Abut 1	30" Dia CIDH Pile	209.2	118	94	1	95	N/A	47	N/A	(a-I) 193.0 (a-II) 199.0 (d) 182.0(iii)	182.0
Abut 2	30" Dia CIDH Pile	207.5	118	94	1	95	N/A	47	N/A	(a-I) 190.0 (a-II) 198.0 (d) 181.0(iii)	181.0

Notes:
(i) Design tip elevations are controlled by (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-I) Tension (Strength Limit), (b-II) Tension (Extreme Event), (d) Lateral Load.
(ii) Settlements under service loads do not govern the design.
(iii) Design tip elevations for lateral were provided by the structural designer (BCA).

TABLE 5D – PILE DATA TABLE (BRIDGE 2)

Support No.	Pile Type	Nominal Resistance (kips)		Design Tip Elev. (ft) (NAVD88)	Specified Tip Elev. (ft) (NAVD88)
		Compression	Tension		
Abut 1	30" Dia CIDH Pile	140	N/A	(a) 193.0 (d) 182.0	182.0
Abut 2	30" Dia CIDH Pile	140	N/A	(a) 190.0 (d) 181.0	181.0

Notes:

(1) Design tip elevations are controlled by: (a) Compression, (d) Lateral Load

(2) Settlements under service loads do not govern the design.

(3) Design tip elevations for lateral were provided by the structural designer (BCA).

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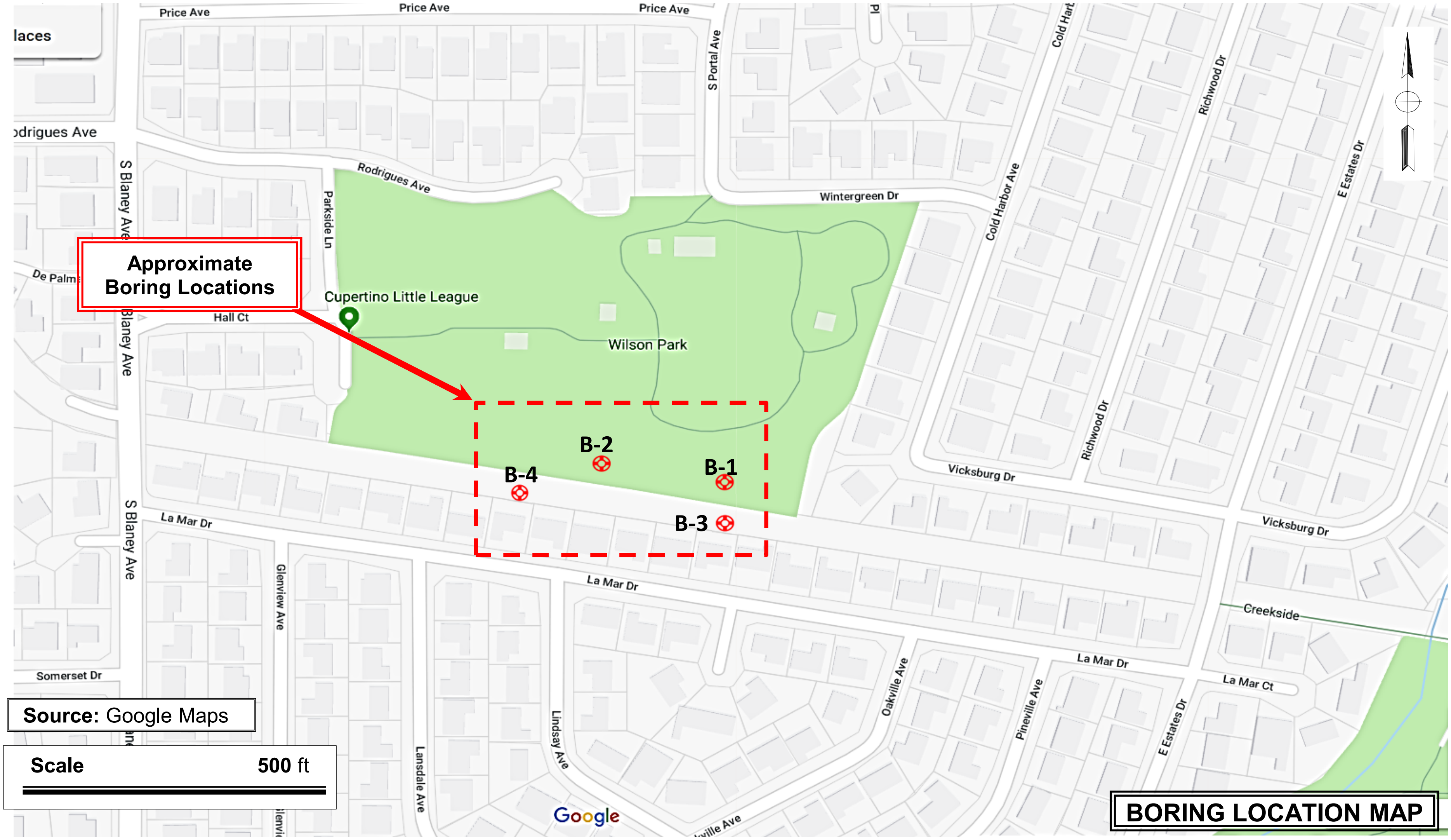
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO

PLATE NO.: 1



Source: Google Maps

BORING LOCATION MAP

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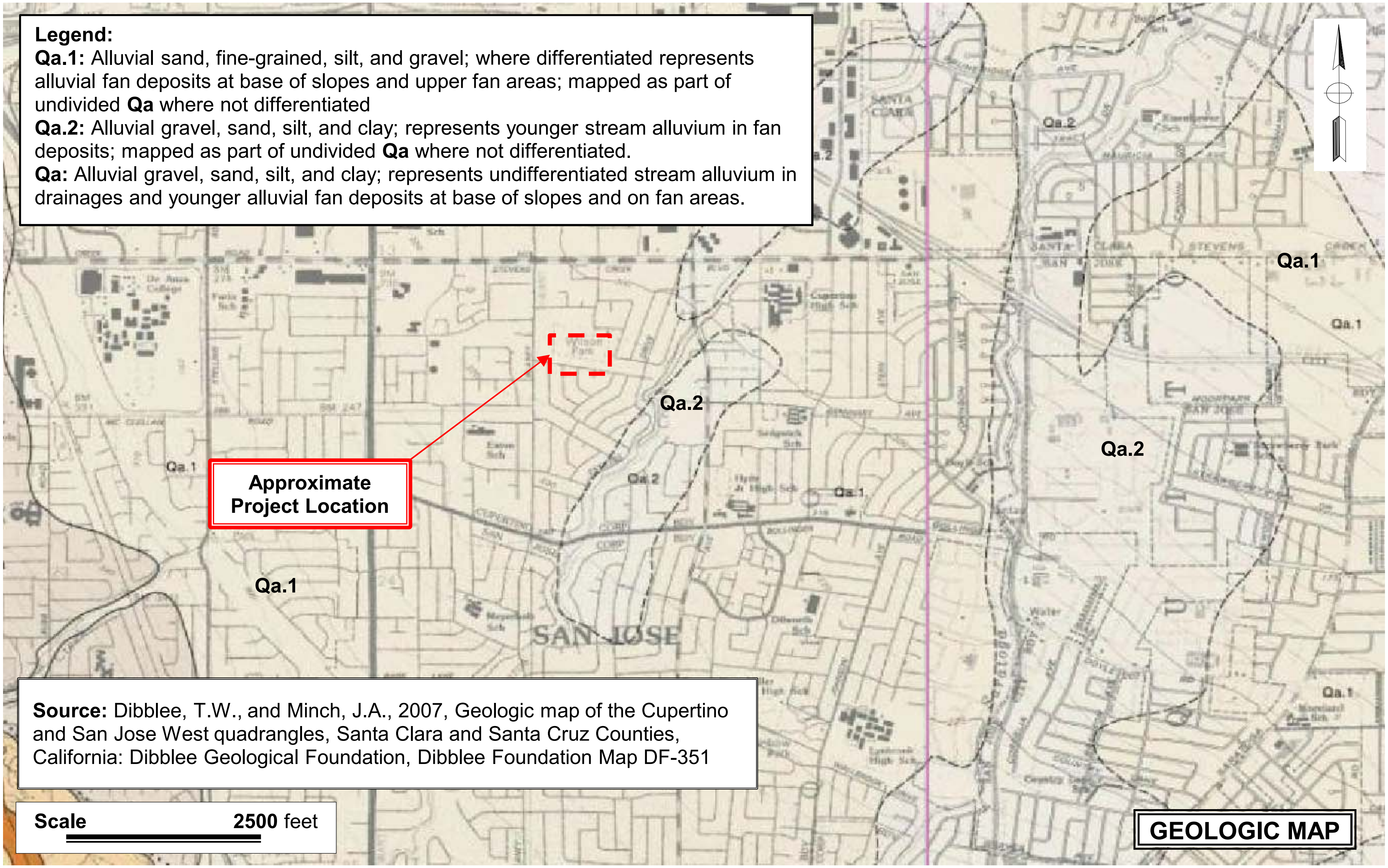
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO	**PLATE NO.: 2**



Legend:

Qa.1: Alluvial sand, fine-grained, silt, and gravel; where differentiated represents alluvial fan deposits at base of slopes and upper fan areas; mapped as part of undivided **Qa** where not differentiated

Qa.2: Alluvial gravel, sand, silt, and clay; represents younger stream alluvium in fan deposits; mapped as part of undivided **Qa** where not differentiated.

Qa: Alluvial gravel, sand, silt, and clay; represents undifferentiated stream alluvium in drainages and younger alluvial fan deposits at base of slopes and on fan areas.

Source: Dibblee, T.W., and Minch, J.A., 2007, Geologic map of the Cupertino and San Jose West quadrangles, Santa Clara and Santa Cruz Counties, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-351

Scale 2500 feet

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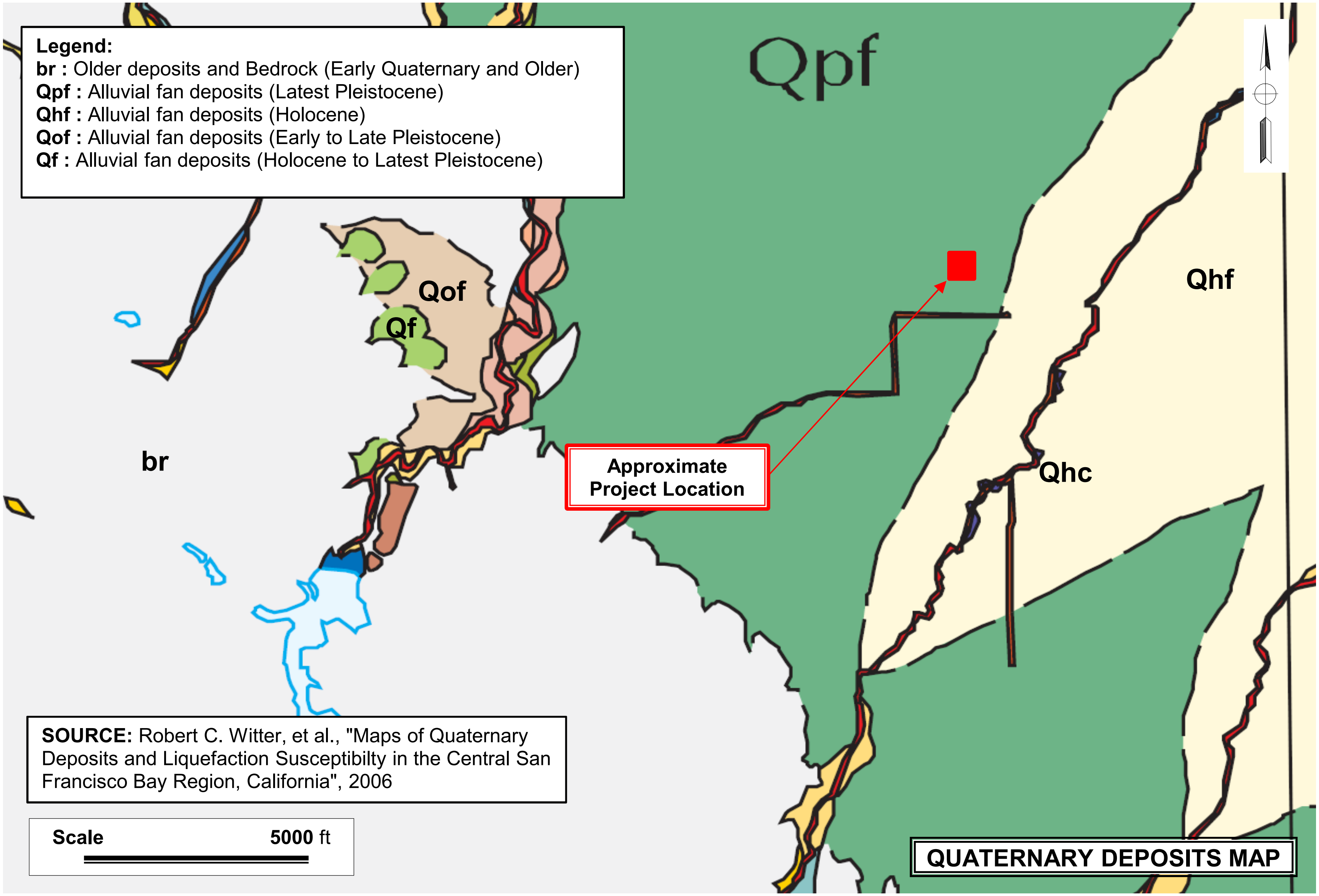
JOB NO.: 2018-151-GEO

PLATE NO.: 3



Legend:
br : Older deposits and Bedrock (Early Quaternary and Older)
Qpf : Alluvial fan deposits (Latest Pleistocene)
Qhf : Alluvial fan deposits (Holocene)
Qof : Alluvial fan deposits (Early to Late Pleistocene)
Qf : Alluvial fan deposits (Holocene to Latest Pleistocene)

SOURCE: Robert C. Witter, et al., "Maps of Quaternary Deposits and Liquefaction Susceptibilty in the Central San Francisco Bay Region, California", 2006

QUATERNARY DEPOSITS MAP

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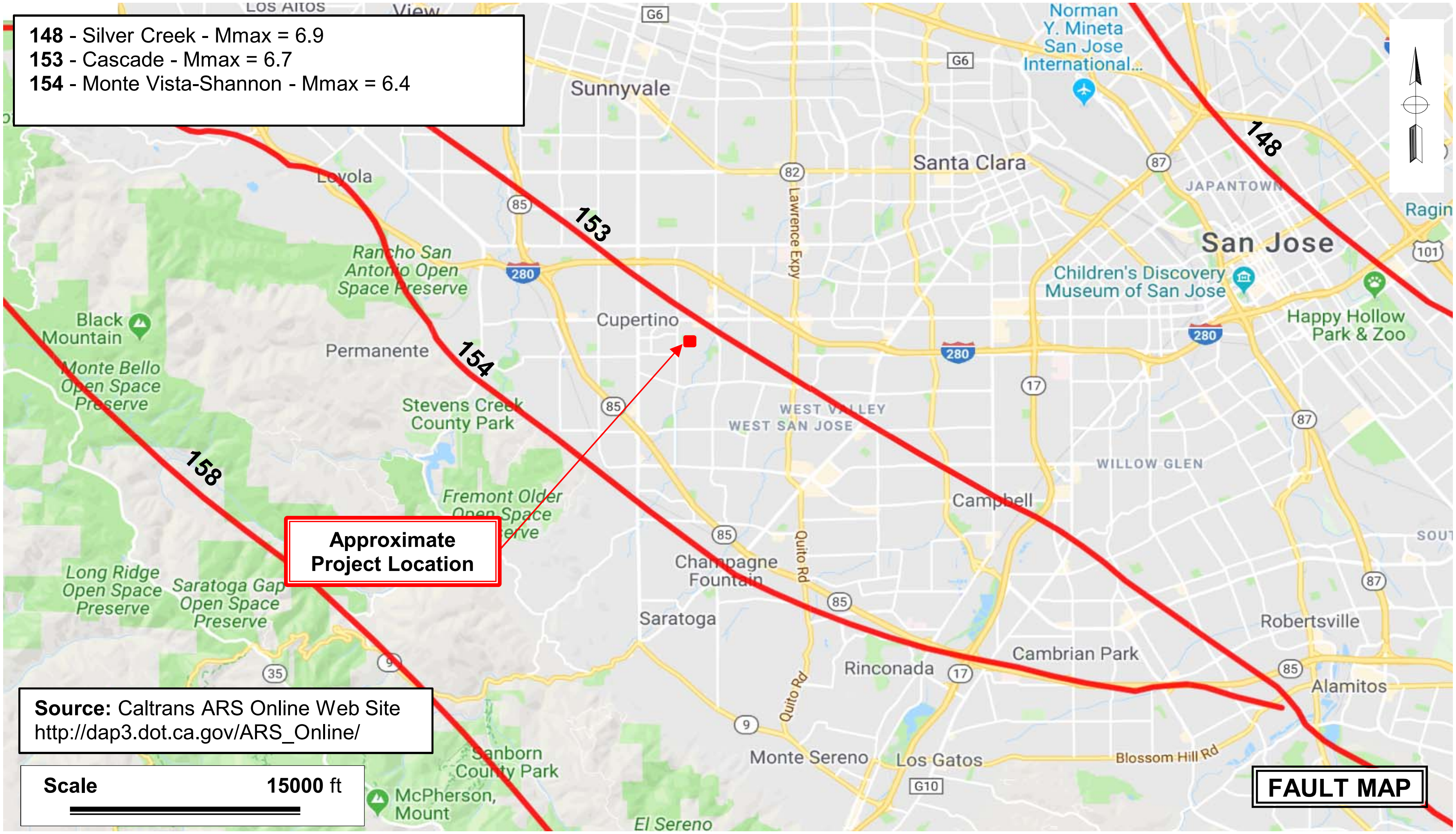
PLATE NO.: 4



148 - Silver Creek - Mmax = 6.9
153 - Cascade - Mmax = 6.7
154 - Monte Vista-Shannon - Mmax = 6.4

Approximate Project Location

Source: Caltrans ARS Online Web Site
http://dap3.dot.ca.gov/ARS_Online/

Scale **15000** ft

FAULT MAP

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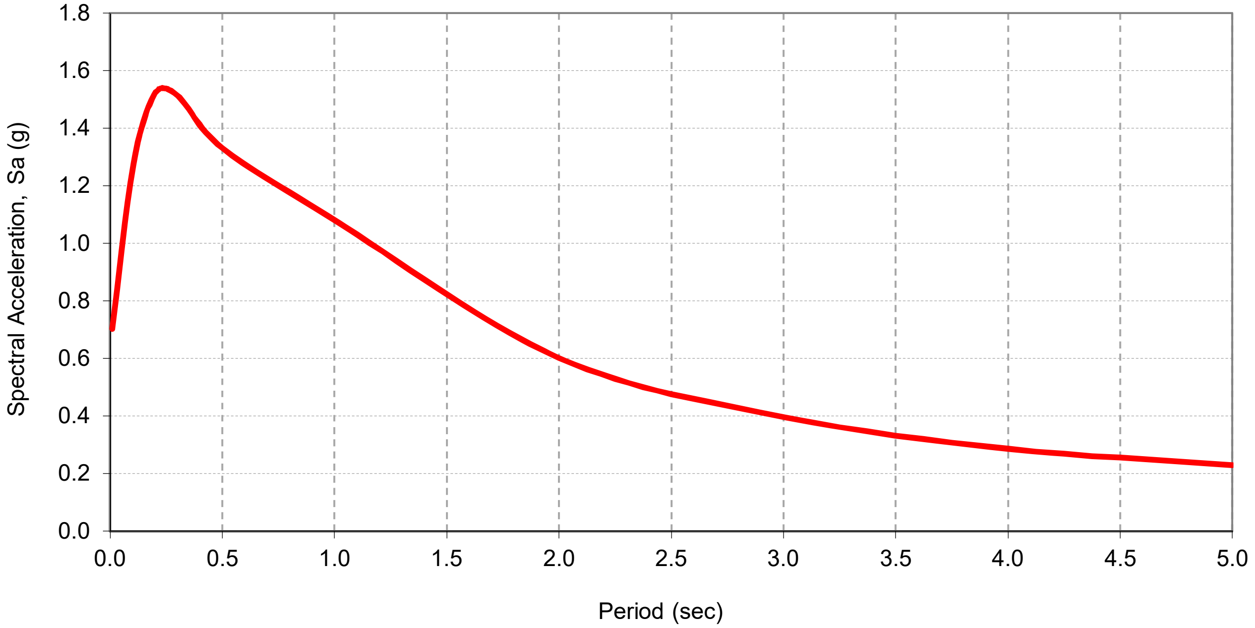
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO

PLATE NO.: 5

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

(5% Damping)



Site Information

Latitude:	37.3183
Longitude	-122.0204
V_{S30} (m/s) =	315
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Unified Hazard Tool. Dist (km) =	9.46

Governing Curve:

Caltrans Online Probabilistic ARS

Recommended Response Spectrum

Period (sec)	Caltrans Online Probabilistic Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.703	1	1	0.703
0.1	1.26	1	1	1.260
0.2	1.521	1	1	1.521
0.3	1.514	1	1	1.514
0.5	1.332	1	1	1.332
1.0	0.901	1.2	1	1.081
2.0	0.502	1.2	1	0.602
3.0	0.331	1.2	1	0.397
4.0	0.239	1.2	1	0.287
5.0	0.192	1.2	1	0.230

Source:

1. Caltrans ARS Online tool (V.2.3.09, http://dap3.dot.ca.gov/ARS_Online/)

2. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

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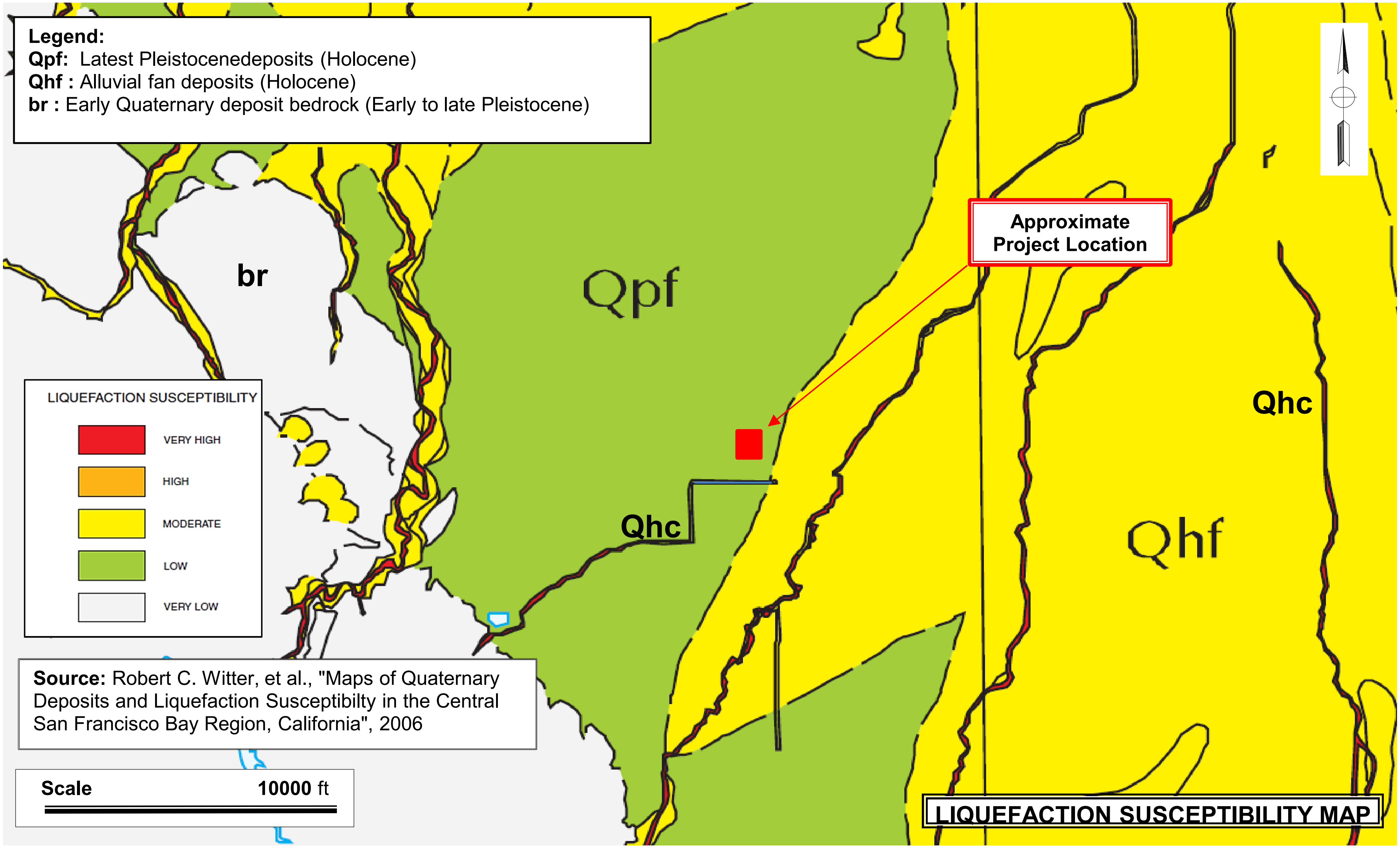
REGNART CREEK TRAIL BRIDGES
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO | **PLATE NO.: 6**



Legend:
Qpf: Latest Pleistocenedeposits (Holocene)
Qhf : Alluvial fan deposits (Holocene)
br : Early Quaternary deposit bedrock (Early to late Pleistocene)

LIQUEFACTION SUSCEPTIBILITY

- 🟥 VERY HIGH
- 🟧 HIGH
- 🟨 MODERATE
- 🟩 LOW
- ⬜ VERY LOW

Source: Robert C. Witter, et al., "Maps of Quaternary Deposits and Liquefaction Susceptibilty in the Central San Francisco Bay Region, California", 2006

Scale **10000** ft

LIQUEFACTION SUSCEPTIBILITY MAP

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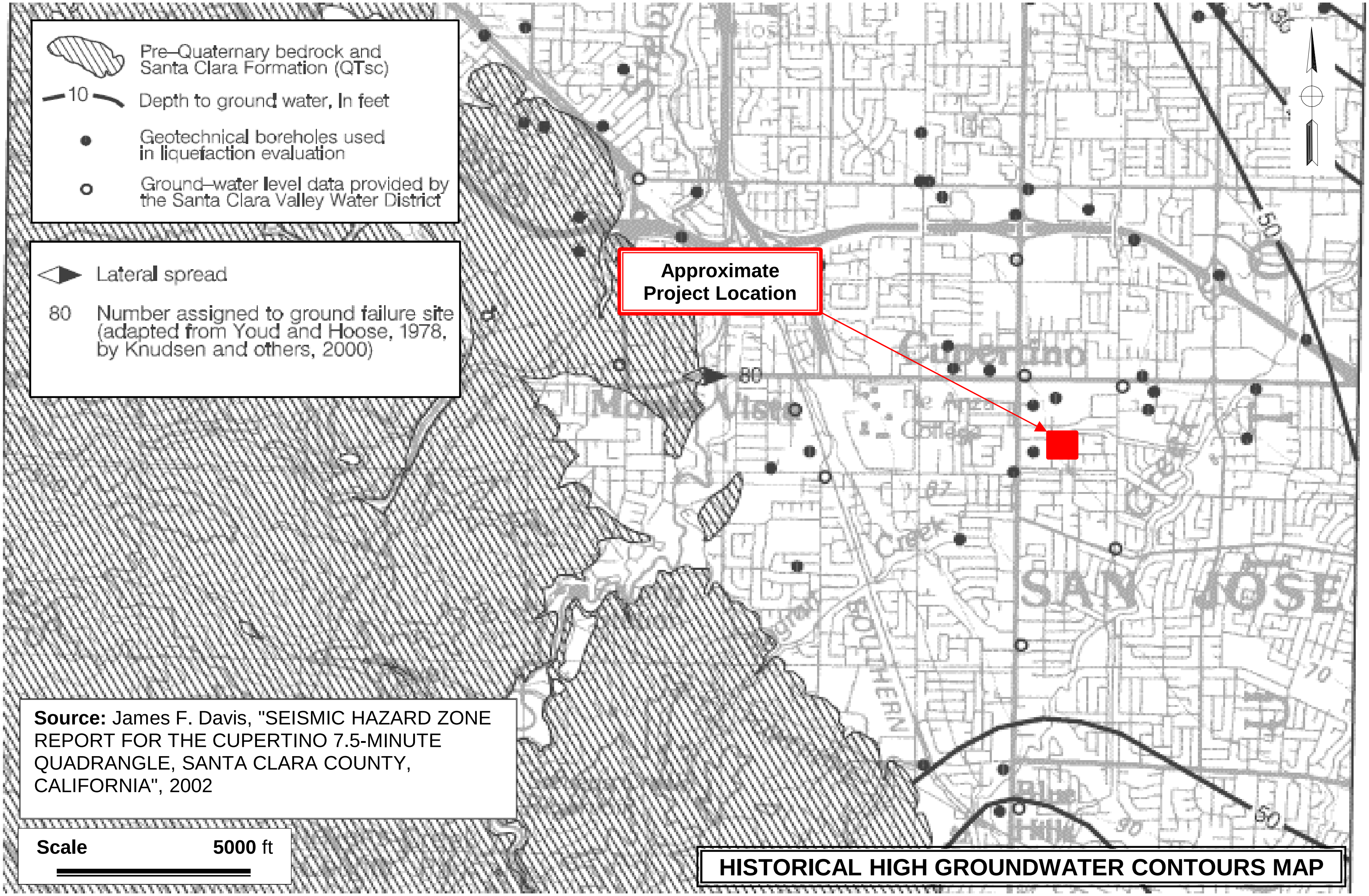
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO

PLATE NO.: 7

HISTORICAL HIGH GROUNDWATER CONTOURS MAP



Source: James F. Davis, "SEISMIC HAZARD ZONE REPORT FOR THE CUPERTINO 7.5-MINUTE QUADRANGLE, SANTA CLARA COUNTY, CALIFORNIA", 2002

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REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO.: 2018-151-GEO	**PLATE NO.: 8**

APPENDIX A

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

- ☒ Standard Penetration Test (SPT)
- ⧗ Standard California Sampler
- ⧗ Modified California Sampler
- ▯ Shelby Tube
- ▯ Piston Sampler
- ▯ NX Rock Core
- ▯ HQ Rock Core
- ▩ Bulk Sample
- ◪ Other (see remarks)

DRILLING METHOD SYMBOLS

- ▯ Auger Drilling
- ▯ Rotary Drilling
- ☒ Dynamic Cone or Hand Driven
- ☒ Diamond Core

WATER LEVEL SYMBOLS

- ▽ First Water Level Reading (during drilling)
- ▼ Static Water Level Reading (short-term)
- ▼ Static Water Level Reading (long-term)

BORING RECORD LEGEND

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 5/3/2019

Job No.: 2018-151-GEO

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Plate:

A-0A

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor		Size
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE: This legend sheet provides descriptors and associated criteria for required soil description components only.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

BORING RECORD LEGEND

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CUPERTINO, CALIFORNIA

Date: 5/3/2019

Job No.: 2018-151-GEO

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Plate:
A-0B

LOGGED BY **Virgil S.**	BEGIN DATE **1-14-18**	COMPLETION DATE **1-14-18**	BOREHOLE LOCATION (Lat/Long or North/East and Datum) **37° 19' 6.02" / 122° 1' 10.99"**	HOLE ID **B-1**
DRILLING CONTRACTOR **Access Soil Drilling**			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION **~211.0 ft**
DRILLING METHOD **Solid-Stem Auger**			DRILL RIG **Minuteman**	BOREHOLE DIAMETER **4 in**
SAMPLER TYPE(S) AND SIZE(S) ID **MC (2.5"), SPT (1.4")**			SPT HAMMER TYPE **140 lbs Manual Hammer with 30" Drop**	HAMMER EFFICIENCY, ERi **60%**
BOREHOLE BACKFILL AND COMPLETION **Neat Cement Grout**			GROUNDWATER READINGS DURING DRILLING **Not encountered** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **26.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		Fat CLAY (CH); very stiff; brownish GRAY; moist; w/ chunk of wood; (PP=2.5 tsf). (LL=54, PI=34).		1	5 8	8/6	23	96		100				PI
	1														
209.00	2														
	3		SANDY lean CLAY (CL); hard; grayish brown; moist; (PP>4.5 tsf).												
207.00	4														
	5				2	15 21 30	51	12	120		100				CR
205.00	6														
	7		SILTY SAND with GRAVEL (SM); dense; yellowish brown; moist; fine SAND; [weathered Conglomerate].												
203.00	8														
	9														
201.00	10				3	26 50 50/4"	100/10	11	110		100				
	11														
199.00	12														
	13														
197.00	14														
	15				4	18 53 50/3.5"	103/10	5			77				PA
195.00	16		Very dense; grayish brown; [weathered Sandstone and Siltstone]; (+#4=16.9%, -#200=29.6%).												
	17														
193.00	18		SILTY SAND (SM); dense; grayish brown; moist; [weathered Sandstone].												
	19														
191.00	20				5	14 17 16	33	4			89				PA
	21		(+#4=13.8%, -#200=17.1%).												
189.00	22														
	23		Poorly graded SAND with SILT and GRAVEL (SP-SM); very dense; grayish brown; moist; [weathered Sandstone].												
187.00	24														
	25														

(continued)

LOG OF TEST BORING

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-1 | Job No.: 2018-151-GEO

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILT and GRAVEL (SP-SM).	☒	6	42 36 25	61	4			100				
185.00	26														
	27		Bottom of borehole at 26.5 ft bgs/Elev. 184.5 ft												
183.00	28														
	29														
181.00	30														
	31														
179.00	32														
	33														
177.00	34														
	35														
175.00	36														
	37														
173.00	38														
	39														
171.00	40														
	41														
169.00	42														
	43														
167.00	44														
	45														
165.00	46														
	47														
163.00	48														
	49														
161.00	50														
	51														
159.00	52														
	53														
157.00	54														
	55														

LOG OF TEST BORING

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-1 | Job No.: 2018-151-GEO

Plate: A-1B

LOGGED BY **Virgil S.**	BEGIN DATE **1-15-18**	COMPLETION DATE **1-15-18**	BOREHOLE LOCATION (Lat/Long or North/East and Datum) **37° 19' 6.35" / 122° 1' 14.08"**	HOLE ID **B-2**
DRILLING CONTRACTOR **Access Soil Drilling**			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION **~209.0 ft**
DRILLING METHOD **Solid-Stem Auger**			DRILL RIG **Minuteman**	BOREHOLE DIAMETER **4 in**
SAMPLER TYPE(S) AND SIZE(S) ID **MC (2.5"), SPT (1.4")**			SPT HAMMER TYPE **140 lbs Manual Hammer with 30" Drop**	HAMMER EFFICIENCY, ERi **60%**
BOREHOLE BACKFILL AND COMPLETION **Neat Cement Grout**			GROUNDWATER READINGS DURING DRILLING **Not encountered** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **31.5 ft**

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Remarks
	0	SANDY lean CLAY (CL); very stiff; dark gray; moist; trace GRAVEL; medium to fine SAND; (PP=1.5 tsf).	1	3 10 9	19				100		
	1										
207.00	2	Lean CLAY (CL); stiff; brown; moist; trace fine SAND.									
	3										
205.00	4										
	5		2	12 12 12	24				100		
203.00	6	(UC= 1.38 tsf).				17	43	0.69			UC
	7										
201.00	8	SILTY SAND with GRAVEL (SM); very dense; yellowish brown; moist; [weathered Conglomerate].									
	9										
199.00	10		3	21 44 50/4"	94/10				100		
	11	(+#4=32.4%, -#200=18.9%).				9	64				CR, PA
197.00	12										
	13										
195.00	14										
	15		4	26 30 29	59				72		
193.00	16					9					
	17										
191.00	18	Poorly graded SAND with GRAVEL (SP); dense; gray; moist; weathered.									
	19										
189.00	20		5	22 16 21	37				72		
	21					5					
187.00	22										
	23	SILTY SAND with GRAVEL (SM); very dense; gray and yellowish brown; moist; weathered.									
185.00	24										
	25										

(continued)

LOG OF TEST BORING

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-2 | Job No.: 2018-151-GEO

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Plate:
A-2A

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	25		SILTY SAND with GRAVEL (SM).		6	36 42 35	77	6			78				
183.00	26														
	27														
181.00	28														
	29														
179.00	30				7	23 15 24	39	8			33				
	31		Dense. (+#4=37.2%, -#200=18.1%).												PA
177.00	32		Bottom of borehole at 31.5 ft bgs/Elev. 177.5 ft												
	33														
175.00	34														
	35														
173.00	36														
	37														
171.00	38														
	39														
169.00	40														
	41														
167.00	42														
	43														
165.00	44														
	45														
163.00	46														
	47														
161.00	48														
	49														
159.00	50														
	51														
157.00	52														
	53														
155.00	54														
	55														

LOG OF TEST BORING

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018	Boring ID: B-2	Job No.: 2018-151-GEO

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Plate:

A-2B

LOGGED BY **Jackson Z. & Do N.**	BEGIN DATE **3-13-19**	COMPLETION DATE **3-13-19**	BOREHOLE LOCATION (Lat/Long or North/East and Datum) **37° 19' 5.21" / 122° 1' 11.03"**	HOLE ID **B-3**
DRILLING CONTRACTOR **Exploration Geoservices**			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION **~208.0 ft**
DRILLING METHOD **Hollow-Stem Auger**			DRILL RIG **Mobile B53**	BOREHOLE DIAMETER **8 in**
SAMPLER TYPE(S) AND SIZE(S) ID **MC (2.5")**			SPT HAMMER TYPE **140 lbs Semi-Automatic Hammer with 30" Drop**	HAMMER EFFICIENCY, ERi **63%**
BOREHOLE BACKFILL AND COMPLETION **Neat Cement Grout**			GROUNDWATER READINGS DURING DRILLING **Not encountered** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **31.3 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		Fat CLAY (CH); very stiff; brown; moist; trace medium to fine SAND; medium plasticity fines; trace root (PP=3.0 tsf).												
	1														
206.00	2				1	3 6 8	14	15			56				PI
	3														
204.00	4		Lean CLAY (CL); very stiff; yellowish brown; moist; low plasticity fines; Claystone (PP>4.5 tsf).												
	5				2	17 33 37	70	13	105		72				CR
202.00	6														
	7														
200.00	8														
	9														
198.00	10				3	26 50/6"	50/6	19			100				
	11														
196.00	12														
	13														
194.00	14														
	15				4	22 26 35	61	9			94				PI
192.00	16														
	17														
190.00	18														
	19		Well-graded SAND with SILT and GRAVEL (SW-SM); very dense; brown; moist; fine GRAVEL, max. 1/2" in. dia.; fine SAND.												
188.00	20				5	28 50/5"	50/5	5			100				PA
	21														
186.00	22														
	23		CLAYEY SAND with GRAVEL (SC); very dense; brown; moist; fine GRAVEL, max. 1/2" in. dia.; medium to fine SAND.												
184.00	24														
	25														

(continued)

LOG OF TEST BORING

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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 Boring ID: B-3 Job No.: 2018-151-GEO

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	25		CLAYEY SAND with GRAVEL (SC).		6	50/4"	REF	5			100				
182.00	26														
	27														
180.00	28														
	29		Well-graded SAND with SILT and GRAVEL (SW-SM); dense; brown; moist; fine GRAVEL, max. 1/2" in. dia.; fine SAND.												
178.00	30				7	21 25 50/4"	75/10	7			100				
	31		Bottom of borehole at 31.3 ft bgs/Elev. 176.7 ft												PA
176.00	32														
	33														
174.00	34														
	35														
172.00	36														
	37														
170.00	38														
	39														
168.00	40														
	41														
166.00	42														
	43														
164.00	44														
	45														
162.00	46														
	47														
160.00	48														
	49														
158.00	50														
	51														
156.00	52														
	53														
154.00	54														
	55														

LOG OF TEST BORING

PARIKH
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REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-3 | Job No.: 2018-151-GEO

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Plate:
A-3B

LOGGED BY **Jackson Z. & Do N.**	BEGIN DATE **3-13-19**	COMPLETION DATE **3-13-19**	BOREHOLE LOCATION (Lat/Long or North/East and Datum) **37° 19' 5.77" / 122° 1' 15.36"**
HOLE ID **B-4**			
DRILLING CONTRACTOR **Exploration Geoservices**	BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION **~209.0 ft**	
DRILLING METHOD **Hollow-Stem Auger**	DRILL RIG **Mobile B53**	BOREHOLE DIAMETER **8 in**	
SAMPLER TYPE(S) AND SIZE(S) ID **MC (2.5")**	SPT HAMMER TYPE **140 lbs Semi-Automatic Hammer with 30" Drop**	HAMMER EFFICIENCY, ERi **63%**	
BOREHOLE BACKFILL AND COMPLETION **Neat Cement Grout**	GROUNDWATER READINGS — DURING DRILLING **Not encountered**	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING **61.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		Lean CLAY (CL); stiff; dark brown; moist; trace fine GRAVEL; medium to fine SAND; low to medium plasticity fines; (PP=1.25 tsf).												
	1														
207.00	2				1	2 8 11	19	16			39				CR
	3														
205.00	4														
	5		Very stiff; light brown; low plasticity fines; with root (PP=3.5 tsf).		2	8 10 18	28	11	116		83				PI
203.00	6														
	7														
201.00	8														
	9														
199.00	10		Very stiff to hard; yellowish brown; dry; with Claystone (PP>4.5 tsf).		3	27 50/6"	50/6	9			100				
	11														
197.00	12														
	13														
195.00	14		Poorly graded SAND with SILT and GRAVEL (SP-SM).												
	15				4	20 30 36	66	5			83				PA
193.00	16														
	17														
191.00	18														
	19														
189.00	20		Wet.		5	18 21 25	46	6			78				
	21														
187.00	22														
	23														
185.00	24														
	25														

(continued)

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-4 | Job No.: 2018-151-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:
A-4A

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; brown; moist; fine GRAVEL, max. 1 1/2" in. dia.; medium to fine SAND.		6	5 26 30	56	8			78				
183.00	26														
	27														
181.00	28		Well-graded GRAVEL with SAND (GW); very dense; yellowish brown; wet; coarse to fine SAND.												
	29														
179.00	30				7	50/5"	REF	5			100				PA
	31														
177.00	32														
	33														
175.00	34		Poorly graded SAND with SILT and GRAVEL (SP-SM); very dense; yellowish brown; wet; medium to fine SAND; with brown Claystone.												
	35				8	31 50/6"	50/6	6			100				
173.00	36														
	37														
171.00	38														
	39														
169.00	40		Dense; dark yellowish brown.		9	27 23 25	48	9			94				
	41														
167.00	42														
	43														
165.00	44														
	45		Moist.		10	28 40 41	81	7			94				
163.00	46														
	47														
161.00	48														
	49														
159.00	50				11	35 50/6"	50/6	11			100				PA
	51														
157.00	52														
	53														
155.00	54														
	55														

(continued)

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-4 | Job No.: 2018-151-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:
A-4B

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
			Poorly graded SAND with SILT and GRAVEL (SP-SM). Very dense; yellowish brown; wet.		12	50/5"	REF	10			100				
153.00	56														
	57														
151.00	58														
	59														
149.00	60		Dark yellowish brown.		13	35 50/6"	50/6	7			92				
	61		Bottom of borehole at 61.0 ft bgs/Elev. 148.0 ft												
147.00	62														
	63														
145.00	64														
	65														
143.00	66														
	67														
141.00	68														
	69														
139.00	70														
	71														
137.00	72														
	73														
135.00	74														
	75														
133.00	76														
	77														
131.00	78														
	79														
129.00	80														
	81														
127.00	82														
	83														
125.00	84														
	85														

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

REGNART CREEK TRAIL

CUPERTINO, CALIFORNIA

Date: 1/14/2018 | Boring ID: B-4 | Job No.: 2018-151-GEO

Plate:
A-4C

APPENDIX B

APPENDIX B
LABORATORY TESTS

Classification Tests

The field classification of the samples was visually verified in the laboratory according to the Unified Soil Classification System. The results are presented on “Log of Test Borings”, Appendix A.

Moisture-Density

The natural moisture contents were determined for selected undisturbed samples of the soils in general accordance with ASTM D2216-10 and dry unit weights based on mass/volume relationships. This information was used to classify and correlate the soils. The results are presented on Plate B-1 "Summary of Laboratory Test Results", Appendix B.

Atterberg Limits

The Atterberg Limits were determined for selected samples of the fine-grained materials. These results were used to classify the soils, as well as to obtain an indication of the expansion potential with variations in moisture content. The Atterberg Limits were determined in general accordance with ASTM D4318-17. The results of the test are presented on Plate B-2, "Plasticity Chart", Appendix B.

Grain Size Classification

Grain size classification tests (ASTM Test Method D 6913) were performed on selected samples to aid in the classification. The results are presented on Plate B-3, "Grain Size Distribution Curves", Appendix B.

Corrosion Tests

A corrosion test was performed by Sunland Analytical on selected sample to determine the corrosion potential of the soils. The pH and minimum resistivity tests (California Test Method 643), Sulfate (California Test Method 417-mod) and Chloride (California Test Method 422mod) tests were performed by Sunland Analytical. The test results are presented on Plates B-4A to B-4D, Appendix B.

Unconfined Compression Tests

Unconfined Compression Tests were performed in general accordance with ASTM D2166 to determine the shear strength of the soils under undrained condition. The test results are presented on plate B-5, Appendix B.

Hydraulic Conductivity Tests

Hydraulic Conductivity Tests were performed by Cooper Testing Labs in general accordance with ASTM D5084 to determine the permeability of porous materials. The test results are presented on Plate B-6, Appendix B.

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Unconfined Shear Strength (tsf)
B-1	1	0.5	CH	23.0	95.6	54	20	34			
B-1	2	6.0	CL	12.1	119.6						
B-1	3	11.0	SM	10.5	110.2						
B-1	4	16.0	SM	4.9	-				16.9	29.6	
B-1	5	21.0	SM	3.7	-				13.8	17.1	
B-1	6	26.0	SP-SM	4.1	-						
B-2	1	1.0	CL	-	-						
B-2	2	6.0	CL	16.7	43.5						0.69
B-2	3	11.0	SM	9.4	64.2				32.4	18.9	
B-2	4	16.0	SM	9.3	-						
B-2	5	21.0	SP	5.1	-						
B-2	6	26.0	SM	6.3	-						
B-2	7	31.0	SM	8.2	-				37.2	18.1	
B-3	1	3.0	CH	15.4	-	54	20	34			
B-3	2	6.0	CL	12.6	105.2						
B-3	3	10.5	CL	19.4	-						
B-3	4	16.0	CL	9.3	-	38	17	21			
B-3	5	20.5	SW-SM	5.3	-				32.6	10.7	
B-3	6	25.0	SC	4.8	-						
B-3	7	31.0	SW-SM	7.1	-				32.9	7.5	
B-4	1	3.0	CL	16.0	-						
B-4	2	6.0	CL	10.9	116.1	30	15	15			
B-4	3	10.5	CL	9.1	-						
B-4	4	16.0	SP-SM	5.1	-				26.2	8.1	
B-4	5	21.0	SP-SM	6.4	-						
B-4	6	26.0	SP-SM	7.8	-						
B-4	7	30.0	GW	5.1	-				63.8	4.8	
B-4	8	35.5	SP-SM	5.8	-						
B-4	9	41.0	SP-SM	9.0	-						
B-4	10	46.0	SP-SM	7.1	-						
B-4	11	50.5	SP-SM	11.2	-				27.3	10.1	
B-4	12	55.0	SP-SM	9.7	-						
B-4	13	60.5	SP-SM	6.7	-						

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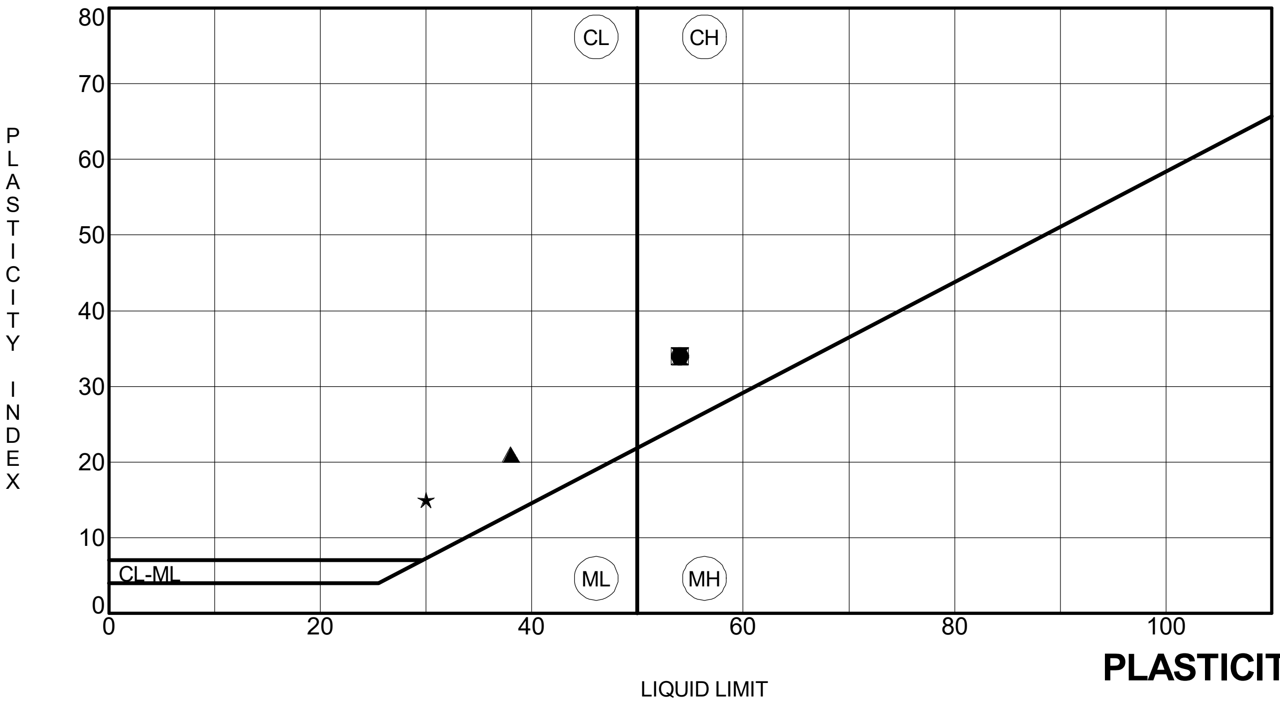
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO: 2018-151-GEO

PLATE NO: B-1



PLASTICITY

	BOREHOLE	SAMPLE #	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**1**	**0.5**	**54**	**20**	**34**		**Fat CLAY**
⧗	**B-3**	**1**	**3.0**	**54**	**20**	**34**		**Fat CLAY**
▲	**B-3**	**4**	**16.0**	**38**	**17**	**21**		**Lean CLAY**
★	**B-4**	**2**	**6.0**	**30**	**15**	**15**		**Lean CLAY**

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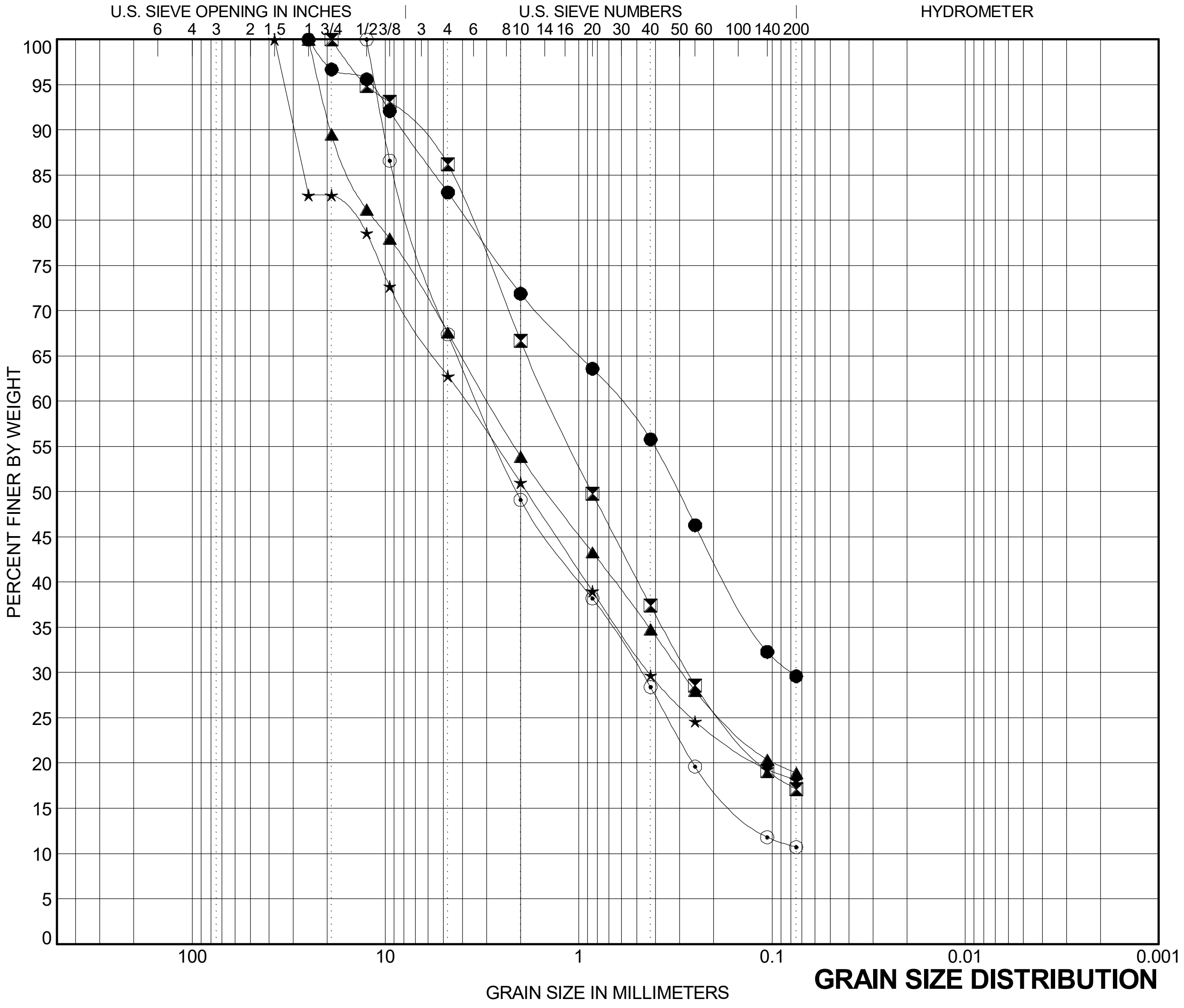
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO: 2018-151-GEO | **PLATE NO:** B-2



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-1**	**4**	**16.0**	**SILTY SAND with GRAVEL**					
⧗	**B-1**	**5**	**21.0**	**SILTY SAND**					
▲	**B-2**	**3**	**11.0**	**SILTY SAND with GRAVEL**					
★	**B-2**	**7**	**31.0**	**SILTY SAND with GRAVEL**					
⊙	**B-3**	**5**	**20.5**	**Well-graded SAND with SILT and GRAVEL**				**1.12**	**55.63**

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-1**	**4**	**16.0**	**25**	**0.617**	**0.079**		**16.9**	**53.5**	**29.6**	
⧗	**B-1**	**5**	**21.0**	**19**	**1.425**	**0.272**		**13.8**	**69.1**	**17.1**	
▲	**B-2**	**3**	**11.0**	**25**	**2.94**	**0.292**		**32.4**	**48.7**	**18.9**	
★	**B-2**	**7**	**31.0**	**37.5**	**3.869**	**0.435**		**37.2**	**44.7**	**18.1**	
⊙	**B-3**	**5**	**20.5**	**12.5**	**3.348**	**0.476**		**32.6**	**56.7**	**10.7**	

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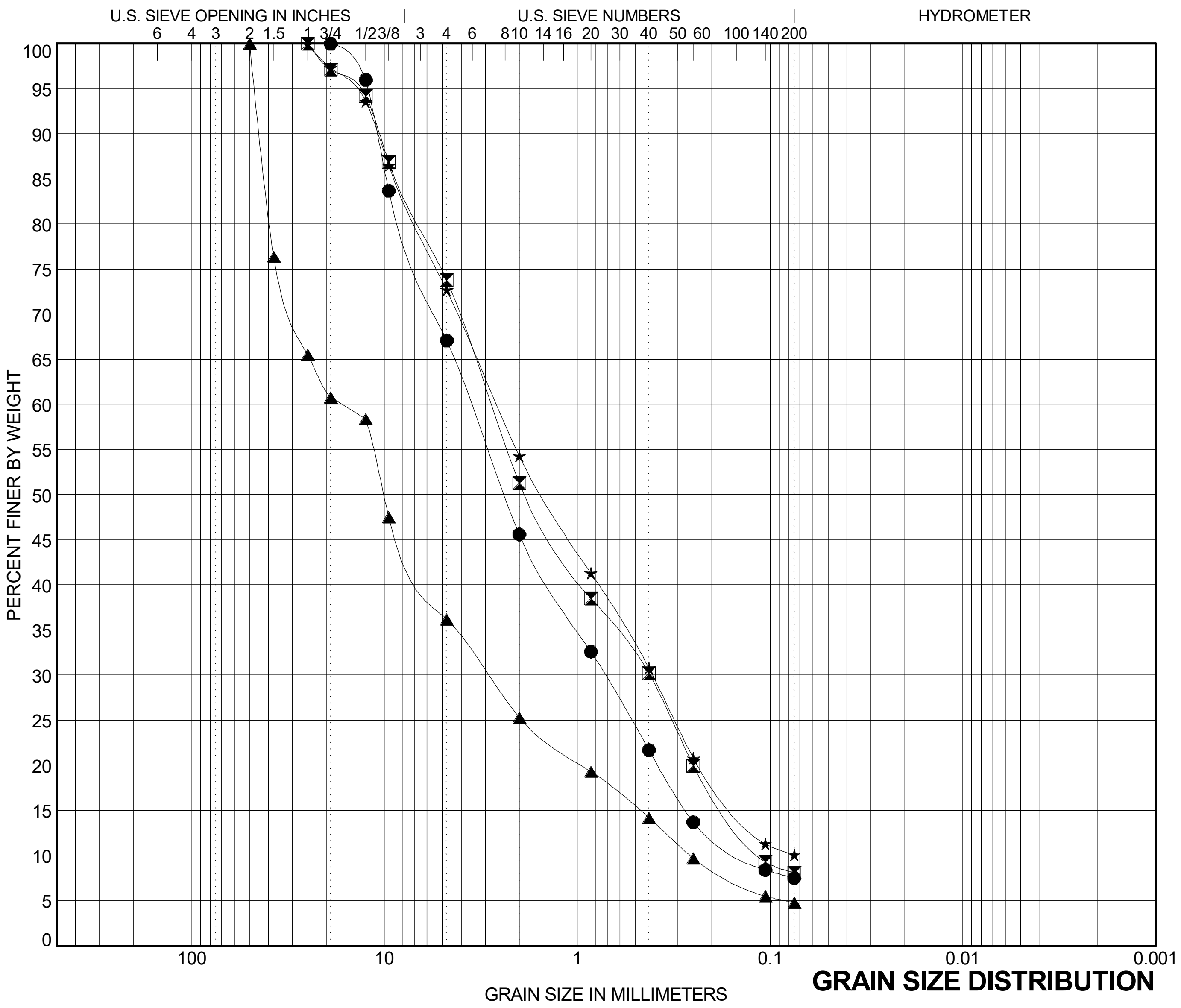
REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO: 2018-151-GEO
PLATE NO: B-3A



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-3**	**7**	**31.0**	**Well-graded SAND with SILT and GRAVEL**				**1.06**	**25.99**
⧗	**B-4**	**4**	**16.0**	**Poorly graded SAND with SILT and GRAVEL**				**0.56**	**24.92**
▲	**B-4**	**7**	**30.0**	**Well graded gravel with sand**				**1.97**	**63.80**
★	**B-4**	**11**	**50.5**	**Poorly graded SAND with SILT and GRAVEL**				**0.87**	**35.88**

	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-3**	**7**	**31.0**	**19**	**3.57**	**0.72**	**0.137**	**32.9**	**59.6**	**7.5**	
⧗	**B-4**	**4**	**16.0**	**25**	**2.794**	**0.421**	**0.112**	**26.2**	**65.7**	**8.1**	
▲	**B-4**	**7**	**30.0**	**50**	**16.525**	**2.904**	**0.259**	**63.8**	**31.4**	**4.8**	
★	**B-4**	**11**	**50.5**	**25**	**2.615**	**0.407**		**27.3**	**62.6**	**10.1**	

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REGNART CREEK TRAIL
CUPERTINO, CALIFORNIA

JOB NO: 2018-151-GEO
PLATE NO: B-3B

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 02/06/2019
Date Submitted 02/01/2019

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2018-151-GEO Site ID : B-1 #2@6FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 78915-164978.

EVALUATION FOR SOIL CORROSION

Soil pH	7.38	
Minimum Resistivity	0.88 ohm-cm (x1000)	
Chloride	132.3 ppm	00.01323 %
Sulfate	109.3 ppm	00.01093 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

PLATE NO. B-4A

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 02/06/2019
Date Submitted 02/01/2019

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2018-151-GEO Site ID : B-2 #3@11FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 78915-164979.

EVALUATION FOR SOIL CORROSION

Soil pH	6.93		
Minimum Resistivity	2.68	ohm-cm (x1000)	
Chloride	19.7 ppm	00.00197	%
Sulfate	9.2 ppm	00.00092	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

PLATE NO. B-4B

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 04/12/2019
Date Submitted 04/09/2019

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2018-151-GEO Site ID : B-3 2@6.
Thank you for your business.

* For future reference to this analysis please use SUN # 79310-165635.

EVALUATION FOR SOIL CORROSION

Soil pH	7.40		
Minimum Resistivity	1.13	ohm-cm (x1000)	
Chloride	5.1 ppm	00.00051	%
Sulfate	30.6 ppm	00.00306	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 04/12/2019
Date Submitted 04/09/2019

To: Nasir Ahmad
Parikh Consultants, Inc.
2360 Qume Dr. Suite A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2018-151-GEO Site ID : B-4 1@3.
Thank you for your business.

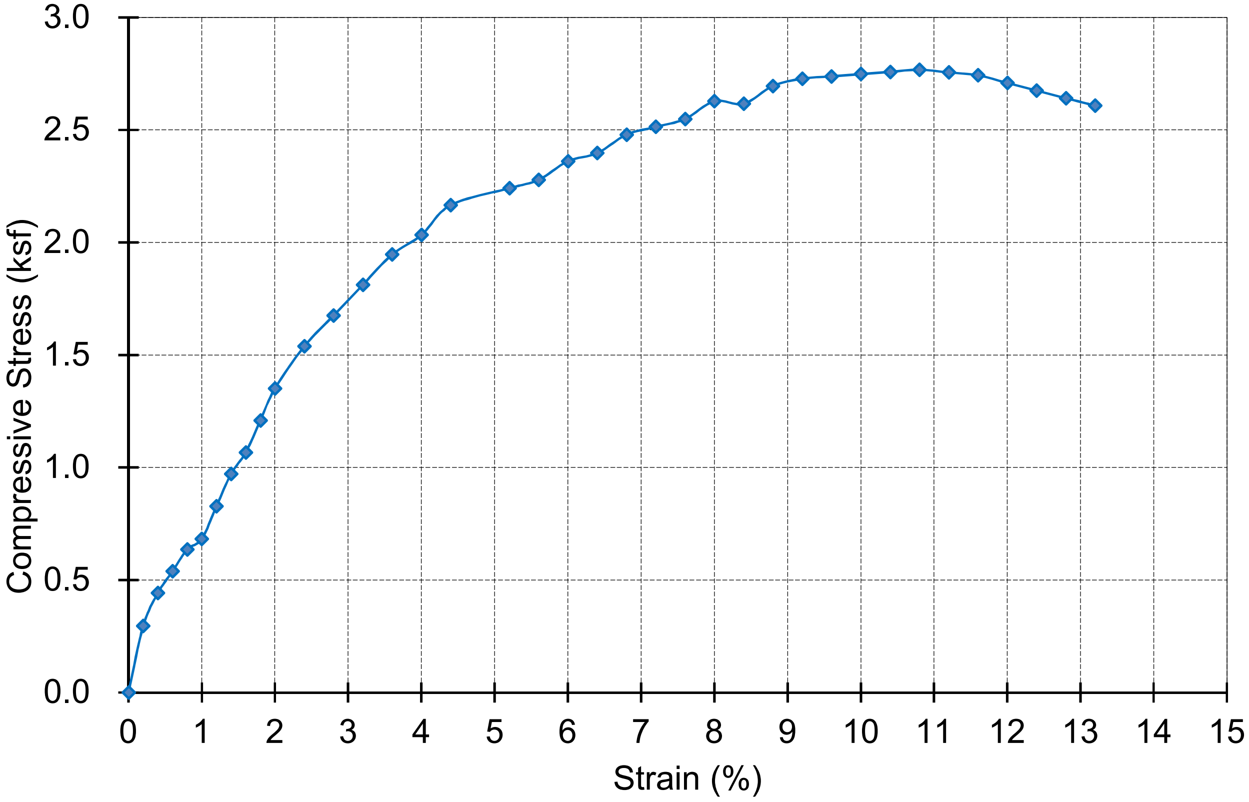
* For future reference to this analysis please use SUN # 79310-165636.

EVALUATION FOR SOIL CORROSION

Soil pH	6.66		
Minimum Resistivity	1.31	ohm-cm (x1000)	
Chloride	8.5 ppm	00.00085	%
Sulfate	43.8 ppm	00.00438	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

UNCONFINED COMPRESSION TEST



Boring No.:	B-2	**Unconfined Compressive Strength (ksf):**	2.77
Sample No. :	2	**Shear Strength (ksf)**	1.38
Depth (feet):	6	**Strain @ Failure (%):**	10.8
Sample Type:	MC - 2.416 inch dia.	**Initial Dry Density (pcf):**	217
Test Method	ASTM D2166	**Water Content (%):**	16.74
Material Type:	CL		
Material Description:	Lean Clay		

Initial Height (inch):	5.00
Initial Diameter (inch)	2.42
Initial Area (ft^2):	0.032
Strain Rate (inch/min)	0.1

Remarks:

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CUPERTINO, CALIFORNIA
REGNART CREEK TRAIL

JOB NO.: 2018-151-GEO **PLATE NO.: B-5**

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	157-362	**Boring:**	B-2	**Date:**	02/11/19
Client:	Parikh Consultants	**Sample:**	1	**By:**	MD/PJ
Project:	Regnart Creek Trail - 2018-151-GEO	**Depth, ft.:**	1	**Remolded:**	

Visual Classification: Grayish Brown Sandy CLAY

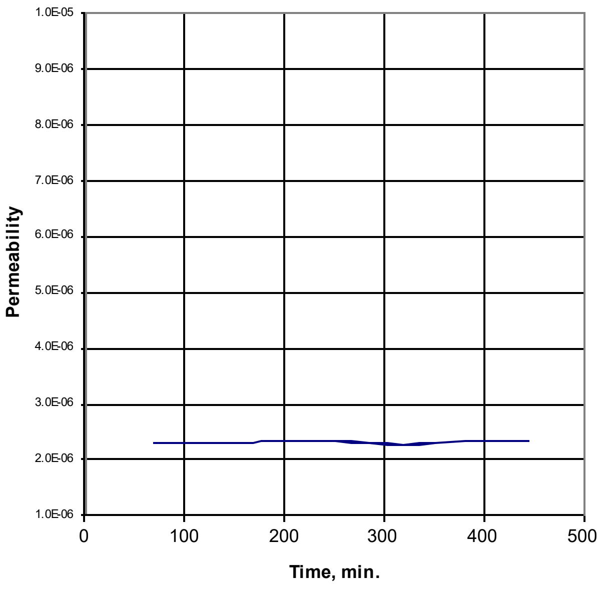
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
53.5	49	48	5

B: = >0.95 **("B" is an indication of saturation)**

Max Hydraulic Gradient: = 17

Date	Minutes	Head, (in)	K,cm/sec
2/6/2019	0.00	51.69	**Start of Test**
2/6/2019	69.00	46.79	2.3E-06
2/6/2019	160.00	40.99	2.3E-06
2/6/2019	190.00	39.09	2.3E-06
2/6/2019	251.00	35.79	2.3E-06
2/6/2019	319.00	32.79	2.3E-06
2/6/2019	382.00	29.59	2.3E-06
2/6/2019	445.00	26.94	2.3E-06



Average Hydraulic Conductivity: **2.E-06** **cm/sec**

Sample Data:	**Initial (As-Received)**		**Final (At-Test)**
Height, in	3.02		2.98
Diameter, in	2.41		2.39
Area, in2	4.55		4.49
Volume in3	13.72		13.37
Total Volume, cc	224.8		219.1
Volume Solids, cc	129.2		129.2
Volume Voids, cc	95.6		89.9
Void Ratio	0.7		0.7
Total Porosity, %	42.5		41.0
Air-Filled Porosity (θa),%	14.1		1.7
Water-Filled Porosity (θw),%	28.5		39.3
Saturation, %	66.9		95.8
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	412.7		434.9
Dry Weight, gm	348.7		348.7
Tare, gm	0.00		0.00
Moisture, %	18.3		24.7
Wet Bulk Density, pcf	114.6		123.9
Dry Bulk Density, pcf	96.8		99.3
Wet Bulk Dens.ρb, (g/cm^3)	1.84		1.98
Dry Bulk Dens.ρb, (g/cm^3)	1.55		1.59

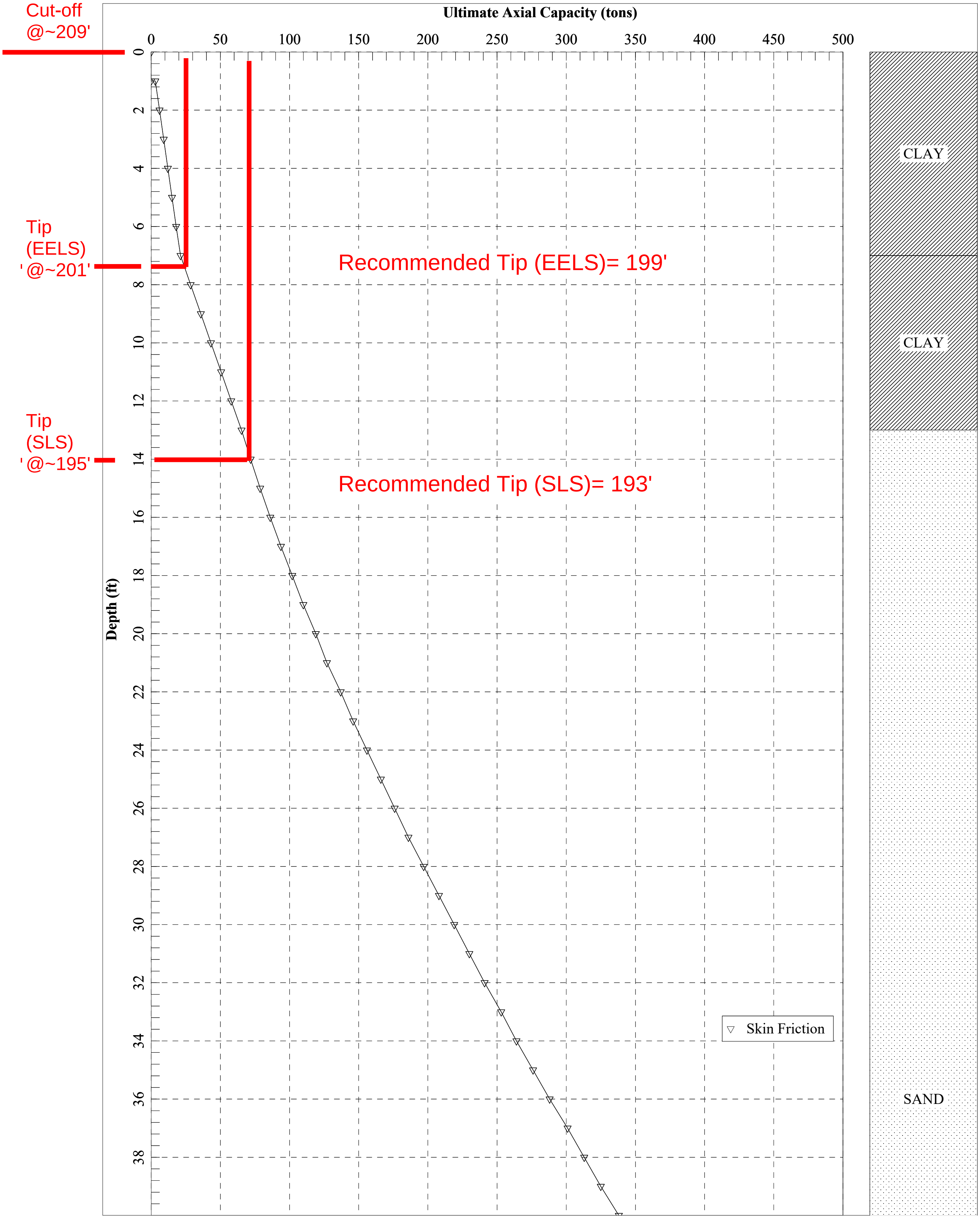
Remarks:

PLATE NO. B-6

APPENDIX C

Axial Pile Capacity Analyses

Required Nominal Resistance for Bridge 1: 98/0.7= 140 kips = 70 tons (SLS)
Required Nominal Resistance for Bridge 2: 95/0.7= 136 kips = 68 tons = ~70tons (SLS)
Required Nominal Resistance for Bridge 1: 48 kips ~= 25 tons (EELS)
Required Nominal Resistance for Bridge 2: 47 kips ~= 25 tons (EELS)



Cut-off
@~209'

Tip
(EELS)
'@~201'

Tip
(SLS)
'@~195'

Recommended Tip (EELS)= 199'

Recommended Tip (SLS)= 193'

Regnart Creek Bridges - South Abutments (Abutment 1) - 30" CIDH

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==========================================================================

                 SHAFT for Windows, Version 2017.8.9

                  Serial Number :  291911540

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     Path to file locations      : C:\Users\eortakci\Parikh Consultants
Inc\Projects - Ongoing_Projects\2018\2018-151 Regnart Creek Trail
Bridges\Calculations\Shaft\
     Name of input data file     : Regnart Creek_South Abutments.sf8d
     Name of output file         : Regnart Creek_South Abutments.sf8o
     Name of plot output file    : Regnart Creek_South Abutments.sf8p
     Name of runtime file        : Regnart Creek_South Abutments.sf8r


     --------------------------------------------------------------------------
                       Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  April 26, 2019     Time:  15:34:18

     New Pile


     PROPOSED DEPTH =      40.0 FT
     ----------------


     NUMBER OF LAYERS =    3
     ------------------


     WATER TABLE DEPTH =      60.0 FT.
     -------------------



     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 2.50
     ------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00
     ------------------------------------------------------
```

```
SOIL INFORMATION
---------------

LAYER NO  1----CLAY

  AT THE TOP

  STRENGTH REDUCTION FACTOR-ALPHA                    = 0.550E+00  (*)
  END BEARING COEFFICIENT-Nc                         = 0.600E+01  (*)
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.140E+04
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.000E+00


  AT THE BOTTOM

  STRENGTH REDUCTION FACTOR-ALPHA                    = 0.550E+00  (*)
  END BEARING COEFFICIENT-Nc                         = 0.900E+01  (*)
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.140E+04
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.700E+01


LAYER NO  2----CLAY

  AT THE TOP

  STRENGTH REDUCTION FACTOR-ALPHA                    = 0.535E+00  (*)
  END BEARING COEFFICIENT-Nc                         = 0.900E+01  (*)
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.350E+04
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
  DEPTH, FT                                          = 0.700E+01


  AT THE BOTTOM

  STRENGTH REDUCTION FACTOR-ALPHA                    = 0.535E+00  (*)
  END BEARING COEFFICIENT-Nc                         = 0.900E+01  (*)
  UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.350E+04
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
```

```
  SOIL UNIT WEIGHT, LB/CU FT                       = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT         = 0.100E+11
  DEPTH, FT                                        = 0.130E+02


LAYER NO  3----SAND

  AT THE TOP

  SIDE FRICTION PROCEDURE, BETA METHOD
  SKIN FRICTION COEFFICIENT- BETA                  = 0.101E+01  (*)
  INTERNAL FRICTION ANGLE, DEG.                    = 0.370E+02
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST    = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                       = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT         = 0.100E+11
  DEPTH, FT                                        = 0.130E+02

  AT THE BOTTOM

  SIDE FRICTION PROCEDURE, BETA METHOD
  SKIN FRICTION COEFFICIENT- BETA                  = 0.463E+00  (*)
  INTERNAL FRICTION ANGLE, DEG.                    = 0.370E+02
  BLOWS PER FOOT FROM STANDARD PENETRATION TEST    = 0.000E+00
  SOIL UNIT WEIGHT, LB/CU FT                       = 0.125E+03
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT         = 0.100E+11
  DEPTH, FT                                        = 0.590E+02


(*) ESTIMATED BY THE PROGRAM BASED ON OTHER PARAMETERS



INPUT DRILLED SHAFT INFORMATION
------------------------------

 MINIMUM SHAFT DIAMETER    =    2.500  FT.
 MAXIMUM SHAFT DIAMETER    =    2.500  FT.
 RATIO BASE/SHAFT DIAMETER =    0.000  FT.
 ANGLE OF BELL             =    0.000  DEG.
 IGNORED TOP PORTION       =    0.000  FT.
 IGNORED BOTTOM PORTION    =    0.000  FT.
 ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
```

```
COMPUTATION RESULTS
-------------------



- CASE ANALYZED      :     1
  VARIATION LENGTH   :     1
  VARIATION DIAMETER :     1



DRILLED SHAFT INFORMATION

-------------------------

 DIAMETER OF STEM          =    2.500  FT.
 DIAMETER OF BASE          =    2.500  FT.
 END OF STEM TO BASE       =    0.000  FT.
 ANGLE OF BELL             =    0.000  DEG.
 IGNORED TOP PORTION       =    0.000  FT.
 IGNORED BOTTOM PORTION    =    0.000  FT.
 AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
 ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
 VOLUME OF UNDERREAM       =    0.000  CU.YDS.
 SHAFT LENGTH              =   40.000  FT.



PREDICTED RESULTS
-----------------

QS     = ULTIMATE SIDE RESISTANCE;
QB     = ULTIMATE BASE RESISTANCE;
WT     = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU     = TOTAL ULTIMATE RESISTANCE;
QBD    = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY
         APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN    = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY
         APPLIED TO THE ULTIMATE SIDE RESISTANCE AND
         THE ULTIMATE BASE RESISTANCE.

LENGTH  VOLUME     QS      QB      QU      QBD      QDN     QU/VOLUME
 (FT)   (CU.YDS) (TONS)   (TONS)  (TONS)   (TONS)   (TONS)  (TONS/CU.YDS)
  1.0     0.18     3.02    28.42    31.44    12.50    10.68    172.92
  2.0     0.36     6.05    29.73    35.78    15.96    12.33     98.38
  3.0     0.55     9.07    43.19    52.26    23.47    18.03     95.81
  4.0     0.73    12.10    58.29    70.38    31.53    24.27     96.77
  5.0     0.91    15.12    71.00    86.12    38.79    29.71     94.72
```

```
  6.0     1.09    18.15    77.32    95.47    43.92    33.03     87.51
  7.0     1.27    21.17    77.32    98.49    46.94    34.24     77.38
  8.0     1.45    28.52    77.32   105.84    54.29    37.18     72.76
  9.0     1.64    35.87    70.33   106.20    59.31    37.79     64.90
 10.0     1.82    43.22    63.18   106.40    64.28    38.35     58.52
 11.0     2.00    50.57    58.37   108.94    70.02    39.68     54.47
 12.0     2.18    57.92    58.06   115.98    77.27    42.52     53.15
 13.0     2.36    65.27    61.75   127.02    85.85    46.69     53.74
 14.0     2.55    71.86    65.45   137.31    93.68    50.56     53.94
 15.0     2.73    78.82    69.14   147.95   101.86    54.57     54.25
 16.0     2.91    86.12    72.83   158.95   110.40    58.73     54.64
 17.0     3.09    93.76    76.52   170.28   119.27    63.01     55.09
 18.0     3.27   101.73    80.21   181.94   128.47    67.43     55.59
 19.0     3.45   110.01    83.91   193.91   137.98    71.97     56.13
 20.0     3.64   118.59    87.60   206.19   147.79    76.63     56.70
 21.0     3.82   127.46    90.28   217.74   157.55    81.08     57.02
 22.0     4.00   136.61    91.79   228.40   167.21    85.24     57.10
 23.0     4.18   146.03    92.30   238.32   176.79    89.18     56.99
 24.0     4.36   155.70    92.30   248.00   186.47    93.05     56.83
 25.0     4.55   165.62    92.30   257.92   196.39    97.01     56.74
 26.0     4.73   175.78    92.30   268.08   206.55   101.08     56.71
 27.0     4.91   186.17    92.30   278.47   216.94   105.23     56.72
 28.0     5.09   196.78    92.30   289.08   227.55   109.48     56.78
 29.0     5.27   207.60    92.30   299.89   238.36   113.80     56.87
 30.0     5.45   218.61    92.30   310.91   249.38   118.21     57.00
 31.0     5.64   229.82    92.30   322.11   260.58   122.69     57.15
 32.0     5.82   241.20    92.30   333.50   271.97   127.25     57.32
 33.0     6.00   252.76    92.30   345.06   283.53   131.87     57.51
 34.0     6.18   264.49    92.30   356.78   295.25   136.56     57.71
 35.0     6.36   276.36    92.30   368.66   307.13   141.31     57.93
 36.0     6.55   288.39    92.30   380.69   319.16   146.12     58.16
 37.0     6.73   300.55    92.30   392.85   331.32   150.99     58.39
 38.0     6.91   312.85    92.30   405.14   343.61   155.90     58.64
 39.0     7.09   325.27    92.30   417.56   356.03   160.87     58.88
 40.0     7.27   337.80    92.30   430.09   368.56   165.88     59.13



AXIAL LOAD VS SETTLEMENT CURVES
-------------------------------


   RESULT FROM TREND (AVERAGED) LINE

   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.5521E-01      0.2321E-04      0.1077E-02      0.1000E-04
```

```
  0.2760E+00      0.1160E-03      0.5384E-02      0.5000E-04
  0.5521E+00      0.2321E-03      0.1077E-01      0.1000E-03
  0.2793E+02      0.1166E-01      0.5384E+00      0.5000E-02
  0.4190E+02      0.1749E-01      0.8076E+00      0.7500E-02
  0.5587E+02      0.2332E-01      0.1077E+01      0.1000E-01
  0.1280E+03      0.5718E-01      0.2692E+01      0.2500E-01
  0.2074E+03      0.1048E+00      0.5384E+01      0.5000E-01
  0.2496E+03      0.1437E+00      0.8076E+01      0.7500E-01
  0.2740E+03      0.1771E+00      0.1077E+02      0.1000E+00
  0.3386E+03      0.3509E+00      0.2661E+02      0.2500E+00
  0.3552E+03      0.6106E+00      0.4715E+02      0.5000E+00
  0.3602E+03      0.7383E+00      0.5311E+02      0.6250E+00
  0.3660E+03      0.8660E+00      0.5907E+02      0.7500E+00
  0.3998E+03      0.1632E+01      0.9368E+02      0.1500E+01


   RESULT FROM UPPER-BOUND LINE

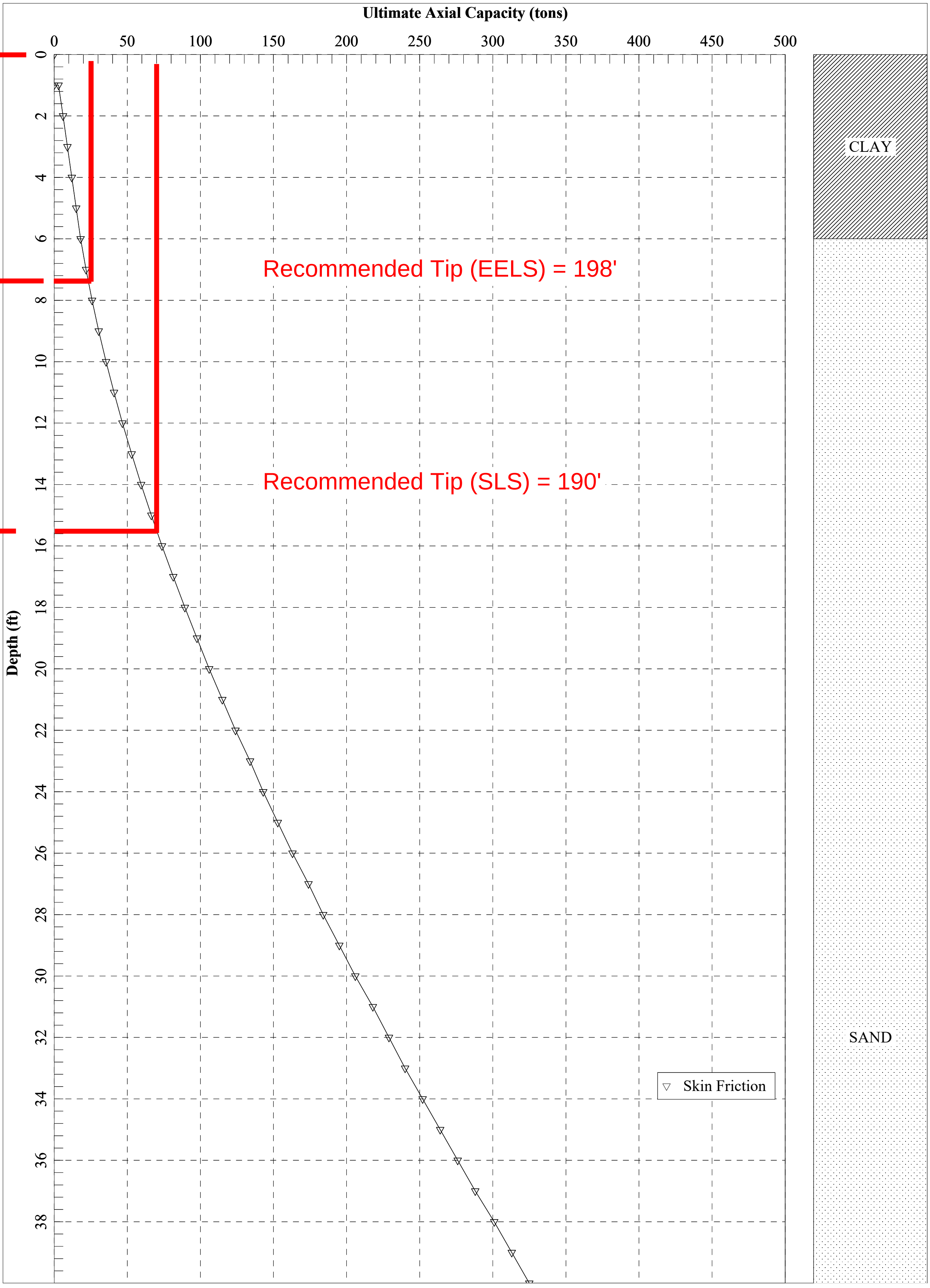
   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.8400E-01      0.2901E-04      0.1538E-02      0.1000E-04
  0.4200E+00      0.1451E-03      0.7691E-02      0.5000E-04
  0.8400E+00      0.2901E-03      0.1538E-01      0.1000E-03
  0.4269E+02      0.1462E-01      0.7691E+00      0.5000E-02
  0.6403E+02      0.2193E-01      0.1154E+01      0.7500E-02
  0.8538E+02      0.2925E-01      0.1538E+01      0.1000E-01
  0.1796E+03      0.6981E-01      0.3846E+01      0.2500E-01
  0.2657E+03      0.1223E+00      0.7691E+01      0.5000E-01
  0.3073E+03      0.1618E+00      0.1154E+02      0.7500E-01
  0.3270E+03      0.1940E+00      0.1538E+02      0.1000E+00
  0.3661E+03      0.3604E+00      0.3723E+02      0.2500E+00
  0.3869E+03      0.6221E+00      0.6322E+02      0.5000E+00
  0.3900E+03      0.7487E+00      0.6668E+02      0.6250E+00
  0.3935E+03      0.8753E+00      0.7015E+02      0.7500E+00
  0.4230E+03      0.1639E+01      0.9968E+02      0.1500E+01


   RESULT FROM LOWER-BOUND LINE

   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.3138E-01      0.1802E-04      0.6153E-03      0.1000E-04
  0.1569E+00      0.9012E-04      0.3077E-02      0.5000E-04
  0.3138E+00      0.1802E-03      0.6153E-02      0.1000E-03
  0.1581E+02      0.9034E-02      0.3077E+00      0.5000E-02
  0.2371E+02      0.1355E-01      0.4615E+00      0.7500E-02
  0.3162E+02      0.1807E-01      0.6153E+00      0.1000E-01
  0.7784E+02      0.4506E-01      0.1538E+01      0.2500E-01
```

```
0.1397E+03      0.8659E-01      0.3077E+01      0.5000E-01
0.1851E+03      0.1246E+00      0.4615E+01      0.7500E-01
0.2178E+03      0.1595E+00      0.6153E+01      0.1000E+00
0.3111E+03      0.3414E+00      0.1600E+02      0.2500E+00
0.3230E+03      0.5991E+00      0.3107E+02      0.5000E+00
0.3304E+03      0.7278E+00      0.3953E+02      0.6250E+00
0.3386E+03      0.8567E+00      0.4799E+02      0.7500E+00
0.3767E+03      0.1625E+01      0.8768E+02      0.1500E+01
```

Required Nominal Resistance for Bridge 1: 98/0.7= 140 kips = 70 tons (SLS)
Required Nominal Resistance for Bridge 2: 95/0.7= 136 kips = 68 tons = ~70tons (SLS)
Required Nominal Resistance for Bridge 1: 48 kips ~= 25 tons (EELS)
Required Nominal Resistance for Bridge 2: 47 kips ~= 25 tons (EELS)



Cut-off
@~208'

Tip
(EELS)
'@~200'

Tip
@~192'

Recommended Tip (EELS) = 198'

Recommended Tip (SLS) = 190'

Regnart Creek Bridges - North Abutments (Abutment 2) - 30" CIDH

```
     ==========================================================================

                       SHAFT for Windows, Version 2017.8.9

                        Serial Number :  291911540

                      VERTICALLY LOADED DRILLED SHAFT ANALYSIS
                       (c) Copyright ENSOFT, Inc., 1987-2017
                             All Rights Reserved

     ==========================================================================


     Path to file locations      : C:\Users\eortakci\Parikh Consultants
Inc\Projects - Ongoing_Projects\2018\2018-151 Regnart Creek Trail
Bridges\Calculations\Shaft\
     Name of input data file     : Regnart Creek_North Abutments.sf8d
     Name of output file         : Regnart Creek_North Abutments.sf8o
     Name of plot output file    : Regnart Creek_North Abutments.sf8p
     Name of runtime file        : Regnart Creek_North Abutments.sf8r


     --------------------------------------------------------------------------
                         Time and Date of Analysis
     --------------------------------------------------------------------------

               Date:  April 26, 2019     Time:  15:39:26

     New Pile


     PROPOSED DEPTH =      40.0 FT
     ----------------


     NUMBER OF LAYERS =    2
     ------------------


     WATER TABLE DEPTH =      60.0 FT.
     -------------------



     FACTOR OF SAFETY APPLIED TO THE ULTIMATE SIDE FRICTION CAPACITY = 2.50
     -------------------------------------------------------
     FACTOR OF SAFETY APPLIED TO THE ULTIMATE BASE CAPACITY = 3.00
     ------------------------------------------------------
```

```
     SOIL INFORMATION
     ---------------

     LAYER NO  1----CLAY

       AT THE TOP

       STRENGTH REDUCTION FACTOR-ALPHA                    = 0.550E+00  (*)
       END BEARING COEFFICIENT-Nc                         = 0.600E+01  (*)
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.140E+04
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.000E+00


       AT THE BOTTOM

       STRENGTH REDUCTION FACTOR-ALPHA                    = 0.550E+00  (*)
       END BEARING COEFFICIENT-Nc                         = 0.888E+01  (*)
       UNDRAINED SHEAR STRENGTH, LB/SQ FT                 = 0.140E+04
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.600E+01


     LAYER NO  2----SAND

       AT THE TOP

       SIDE FRICTION PROCEDURE, BETA METHOD
       SKIN FRICTION COEFFICIENT- BETA                    = 0.117E+01  (*)
       INTERNAL FRICTION ANGLE, DEG.                      = 0.370E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
       MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT           = 0.100E+11
       DEPTH, FT                                          = 0.600E+01

       AT THE BOTTOM

       SIDE FRICTION PROCEDURE, BETA METHOD
       SKIN FRICTION COEFFICIENT- BETA                    = 0.472E+00  (*)
       INTERNAL FRICTION ANGLE, DEG.                      = 0.370E+02
       BLOWS PER FOOT FROM STANDARD PENETRATION TEST      = 0.000E+00
       SOIL UNIT WEIGHT, LB/CU FT                         = 0.125E+03
```

```
  MAXIMUM LOAD TRANSFER FOR SOIL, LB/SQ FT          = 0.100E+11
  DEPTH, FT                                         = 0.580E+02


(*) ESTIMATED BY THE PROGRAM BASED ON OTHER PARAMETERS



INPUT DRILLED SHAFT INFORMATION
------------------------------

 MINIMUM SHAFT DIAMETER    =    2.500  FT.
 MAXIMUM SHAFT DIAMETER    =    2.500  FT.
 RATIO BASE/SHAFT DIAMETER =    0.000  FT.
 ANGLE OF BELL             =    0.000  DEG.
 IGNORED TOP PORTION       =    0.000  FT.
 IGNORED BOTTOM PORTION    =    0.000  FT.
 ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN






COMPUTATION RESULTS
-------------------



- CASE ANALYZED      :     1
  VARIATION LENGTH   :     1
  VARIATION DIAMETER :     1



DRILLED SHAFT INFORMATION

-------------------------

 DIAMETER OF STEM          =    2.500  FT.
 DIAMETER OF BASE          =    2.500  FT.
 END OF STEM TO BASE       =    0.000  FT.
 ANGLE OF BELL             =    0.000  DEG.
 IGNORED TOP PORTION       =    0.000  FT.
 IGNORED BOTTOM PORTION    =    0.000  FT.
 AREA OF ONE PERCENT STEEL =    7.069  SQ.IN.
 ELASTIC MODULUS, Ec       = 0.290E+07 LB/SQ IN
 VOLUME OF UNDERREAM       =    0.000  CU.YDS.
```

```
 SHAFT LENGTH              =   40.000  FT.


PREDICTED RESULTS
-----------------

QS     = ULTIMATE SIDE RESISTANCE;
QB     = ULTIMATE BASE RESISTANCE;
WT     = WEIGHT OF DRILLED SHAFT (FOR UPLIFT CAPACITY ONLY);
QU     = TOTAL ULTIMATE RESISTANCE;
QBD    = TOTAL ALLOWABLE LOAD USING A FACTOR OF SAFETY
         APPLIED TO THE ULTIMATE BASE RESISTANCE;
QDN    = TOTAL ALLOWABLE LOAD USING FACTORS OF SAFETY
         APPLIED TO THE ULTIMATE SIDE RESISTANCE AND
         THE ULTIMATE BASE RESISTANCE.

LENGTH  VOLUME     QS      QB      QU      QBD      QDN     QU/VOLUME
 (FT)   (CU.YDS) (TONS)  (TONS)  (TONS)   (TONS)   (TONS)  (TONS/CU.YDS)
  1.0     0.18     3.02   28.42   31.44    12.50    10.68    172.92
  2.0     0.36     6.05   28.34   34.39    15.50    11.87     94.57
  3.0     0.55     9.07   28.54   37.61    18.58    13.14     68.95
  4.0     0.73    12.10   29.67   41.77    21.99    14.73     57.42
  5.0     0.91    15.12   32.22   47.34    25.86    16.79     52.07
  6.0     1.09    18.15   35.91   54.06    30.12    19.23     49.55
  7.0     1.27    21.79   39.60   61.40    34.99    21.92     48.24
  8.0     1.45    25.91   43.30   69.20    40.34    24.80     47.58
  9.0     1.64    30.48   46.99   77.47    46.14    27.85     47.34
 10.0     1.82    35.48   50.68   86.16    52.38    31.09     47.39
 11.0     2.00    40.91   54.37   95.28    59.03    34.49     47.64
 12.0     2.18    46.74   58.06  104.80    66.09    38.05     48.03
 13.0     2.36    52.95   61.75  114.71    73.54    41.77     48.53
 14.0     2.55    59.55   65.45  124.99    81.36    45.63     49.10
 15.0     2.73    66.50   69.14  135.64    89.55    49.65     49.73
 16.0     2.91    73.81   72.83  146.64    98.09    53.80     50.40
 17.0     3.09    81.45   76.52  157.97   106.96    58.09     51.11
 18.0     3.27    89.42   80.21  169.63   116.15    62.50     51.83
 19.0     3.45    97.70   83.91  181.60   125.66    67.05     52.57
 20.0     3.64   106.28   87.60  193.87   135.48    71.71     53.31
 21.0     3.82   115.15   90.28  205.43   145.24    76.15     53.80
 22.0     4.00   124.30   91.79  216.09   154.89    80.32     54.02
 23.0     4.18   133.71   92.30  226.01   164.48    84.25     54.04
 24.0     4.36   143.39   92.30  235.68   174.15    88.12     54.01
 25.0     4.55   153.31   92.30  245.61   184.08    92.09     54.03
 26.0     4.73   163.47   92.30  255.77   194.24    96.15     54.10
 27.0     4.91   173.86   92.30  266.16   204.63   100.31     54.21
 28.0     5.09   184.47   92.30  276.76   215.23   104.55     54.36
 29.0     5.27   195.28   92.30  287.58   226.05   108.88     54.54
```

```
30.0     5.45   206.30    92.30   298.59   237.06   113.28     54.74
31.0     5.64   217.50    92.30   309.80   248.27   117.77     54.96
32.0     5.82   228.89    92.30   321.19   259.66   122.32     55.20
33.0     6.00   240.45    92.30   332.75   271.22   126.95     55.45
34.0     6.18   252.17    92.30   344.47   282.94   131.63     55.72
35.0     6.36   264.05    92.30   356.35   294.82   136.39     55.99
36.0     6.55   276.08    92.30   368.37   306.84   141.20     56.28
37.0     6.73   288.24    92.30   380.54   319.01   146.06     56.56
38.0     6.91   300.54    92.30   392.83   331.30   150.98     56.85
39.0     7.09   312.95    92.30   405.25   343.72   155.95     57.15
40.0     7.27   325.48    92.30   417.78   356.25   160.96     57.44



AXIAL LOAD VS SETTLEMENT CURVES
-------------------------------


   RESULT FROM TREND (AVERAGED) LINE

   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.4745E-01      0.2225E-04      0.1077E-02      0.1000E-04
  0.2373E+00      0.1112E-03      0.5384E-02      0.5000E-04
  0.4745E+00      0.2225E-03      0.1077E-01      0.1000E-03
  0.2398E+02      0.1117E-01      0.5384E+00      0.5000E-02
  0.3597E+02      0.1676E-01      0.8076E+00      0.7500E-02
  0.4796E+02      0.2234E-01      0.1077E+01      0.1000E-01
  0.1136E+03      0.5533E-01      0.2692E+01      0.2500E-01
  0.1890E+03      0.1024E+00      0.5384E+01      0.5000E-01
  0.2315E+03      0.1412E+00      0.8076E+01      0.7500E-01
  0.2575E+03      0.1748E+00      0.1077E+02      0.1000E+00
  0.3250E+03      0.3489E+00      0.2661E+02      0.2500E+00
  0.3456E+03      0.6091E+00      0.4715E+02      0.5000E+00
  0.3513E+03      0.7368E+00      0.5311E+02      0.6250E+00
  0.3571E+03      0.8645E+00      0.5907E+02      0.7500E+00
  0.3909E+03      0.1630E+01      0.9368E+02      0.1500E+01


   RESULT FROM UPPER-BOUND LINE

   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.6999E-01      0.2732E-04      0.1538E-02      0.1000E-04
  0.3499E+00      0.1366E-03      0.7691E-02      0.5000E-04
  0.6999E+00      0.2732E-03      0.1538E-01      0.1000E-03
  0.3550E+02      0.1375E-01      0.7691E+00      0.5000E-02
```

```
  0.5325E+02      0.2063E-01      0.1154E+01      0.7500E-02
  0.7101E+02      0.2751E-01      0.1538E+01      0.1000E-01
  0.1599E+03      0.6726E-01      0.3846E+01      0.2500E-01
  0.2487E+03      0.1199E+00      0.7691E+01      0.5000E-01
  0.2907E+03      0.1594E+00      0.1154E+02      0.7500E-01
  0.3107E+03      0.1917E+00      0.1538E+02      0.1000E+00
  0.3505E+03      0.3581E+00      0.3723E+02      0.2500E+00
  0.3750E+03      0.6203E+00      0.6322E+02      0.5000E+00
  0.3785E+03      0.7469E+00      0.6668E+02      0.6250E+00
  0.3819E+03      0.8735E+00      0.7015E+02      0.7500E+00
  0.4115E+03      0.1637E+01      0.9968E+02      0.1500E+01


   RESULT FROM LOWER-BOUND LINE

   TOP  LOAD     TOP MOVEMENT       TIP LOAD      TIP  MOVEMENT
      TON             IN.              TON             IN.
  0.2814E-01      0.1761E-04      0.6153E-03      0.1000E-04
  0.1407E+00      0.8804E-04      0.3077E-02      0.5000E-04
  0.2814E+00      0.1761E-03      0.6153E-02      0.1000E-03
  0.1416E+02      0.8823E-02      0.3077E+00      0.5000E-02
  0.2125E+02      0.1323E-01      0.4615E+00      0.7500E-02
  0.2833E+02      0.1765E-01      0.6153E+00      0.1000E-01
  0.6999E+02      0.4404E-01      0.1538E+01      0.2500E-01
  0.1264E+03      0.8485E-01      0.3077E+01      0.5000E-01
  0.1692E+03      0.1225E+00      0.4615E+01      0.7500E-01
  0.2018E+03      0.1574E+00      0.6153E+01      0.1000E+00
  0.2993E+03      0.3396E+00      0.1600E+02      0.2500E+00
  0.3162E+03      0.5979E+00      0.3107E+02      0.5000E+00
  0.3242E+03      0.7267E+00      0.3953E+02      0.6250E+00
  0.3324E+03      0.8556E+00      0.4799E+02      0.7500E+00
  0.3703E+03      0.1624E+01      0.8768E+02      0.1500E+01
```

Lateral Soil Pressures

Rankine Active Lateral Pressure Coefficient (K_a)

Project Name/Number: Regnart Creek **By:** EO
Structure Name/Number: Abutments **Date:** 4/17/2019

Parameters	Angle in degrees	Angle in radians	
ϕ	34	0.593	(Friction Angle of Soil)
β	0	0.000	(Backfill angle with horizontal)

K_a	0.283

$$K_a = \frac{\cos\beta - \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}{\cos\beta + \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}$$

M-O Seismic Active Lateral Pressure Coefficient (K_{AE})

Project Name/Number: Regnart Creek **By:** EO
Structure Name/Number: Abutments **Date:** 4/17/2019

Parameters	Angle in degrees	Angle in Radians	
ϕ	34	0.593	(Friction Angle of Soil)
i	0	0.000	(Backfill angle with horizontal)
β	0	0.000	(Wall backface angle **with vertical**)
δ	22.78	0.398	(Friction Angle between Soil and the backface of the wall)
kh (no unit)	0.35		
kv (no unit)	0		
θ_{MO} (rad)		0.337	

ΔKae=0.57-0.283 = 0.287
=0.287*125~=36 pcf EFP

K_{ae}	0.57

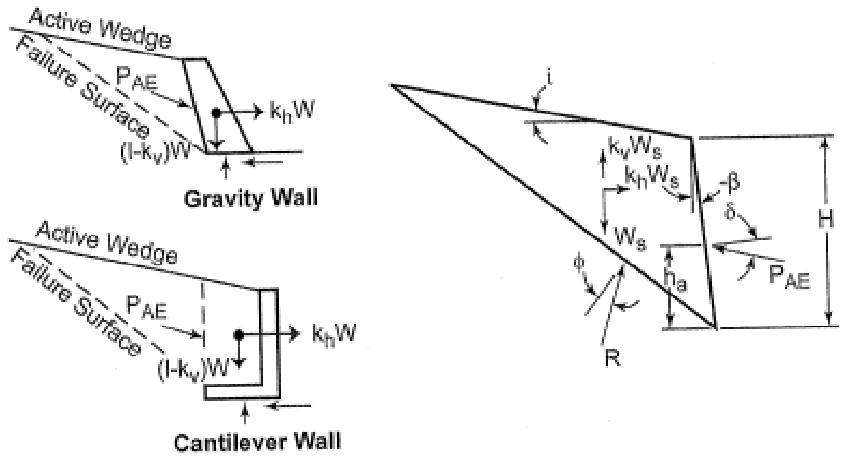


Figure A11.3.1-1—Mononobe-Okabe Method Force Diagrams

$$K_{AE}=\frac{\cos^2(\phi-\theta_{MO}-B)}{\cos\theta_{MO}\cos^2\beta\cos(\delta+\beta+\theta_{MO})}\times\left[1+\sqrt{\frac{\sin(\phi+\delta)\sin(\phi-\theta_{MO}-i)}{\cos(\delta+\beta+\theta_{MO})\cos(i-\beta)}}\right]^{-2} \quad (A11.3.1\text{-}1)$$

where:

K_{AE} = seismic active earth pressure coefficient (dim)
γ = unit weight of soil (kcf)
H = height of wall (ft)
h = height of wall at back of wall heel considering height of sloping surcharge, if present (ft)
ϕ_f = friction angle of soil (degrees)
θ_{MO} = arc tan $[k_h/(1-k_v)]$ (degrees)
δ = wall backfill interface friction angle (degrees)
k_h = horizontal seismic acceleration coefficient (dim.)
k_v = vertical seismic acceleration coefficient (dim.)
i = backfill slope angle (degrees)
β = slope of wall to the vertical, negative as shown (degrees)

Rankine Active Lateral Pressure Coefficient (K_a)

Project Name/Number: Regnart Creek
Structure Name/Number: Retaining Wall and Railing
By: EO
Date: 4/17/2019

Parameters	Angle in degrees	Angle in radians	
ϕ	28	0.489	(Friction Angle of Soil)
β	0	0.000	(Backfill angle with horizontal)

K_a	0.361

$$K_a = \frac{\cos\beta - \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}{\cos\beta + \left(\cos^2\beta - \cos^2\phi\right)^{1/2}}$$

M-O Seismic Active Lateral Pressure Coefficient (K_{AE})

Project Name/Number: Regnart Creek
Structure Name/Number: Retaining Wall and Railing
By: EO
Date: 4/17/2019

Parameters	Angle in degrees	Angle in Radians	
ϕ	28	0.489	(Friction Angle of Soil)
i	0	0.000	(Backfill angle with horizontal)
β	0	0.000	(Wall backface angle **with vertical**)
δ	18.76	0.327	(Friction Angle between Soil and the backface of the wall)
kh (no unit)	0.35		
kv (no unit)	0		
θ_{MO} (rad)		0.337	

ΔKae=0.70-0.361 = 0.339
=0.339*125~=43 pcf EFP

K_{ae}	0.70

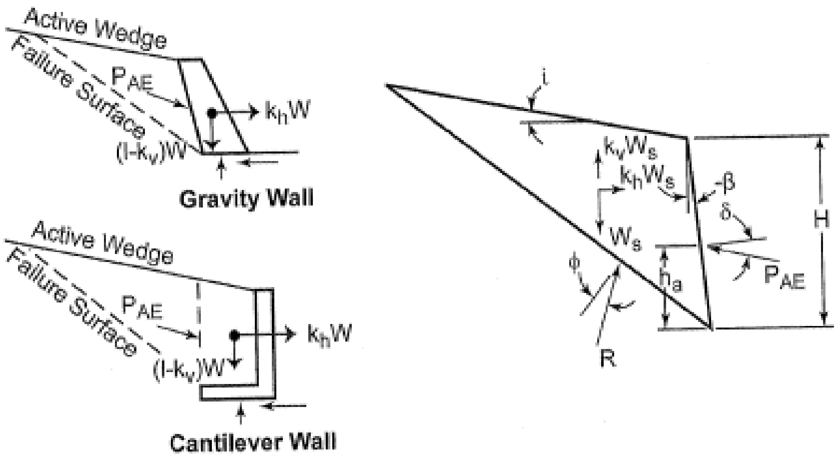


Figure A11.3.1-1—Mononobe-Okabe Method Force Diagrams

$$K_{AE}=\frac{\cos^2(\phi-\theta_{MO}-B)}{\cos\theta_{MO}\cos^2\beta\cos(\delta+\beta+\theta_{MO})}\times\left[1+\sqrt{\frac{\sin(\phi+\delta)\sin(\phi-\theta_{MO}-i)}{\cos(\delta+\beta+\theta_{MO})\cos(i-\beta)}}\right]^{-2} \quad \text{(A11.3.1-1)}$$

where:

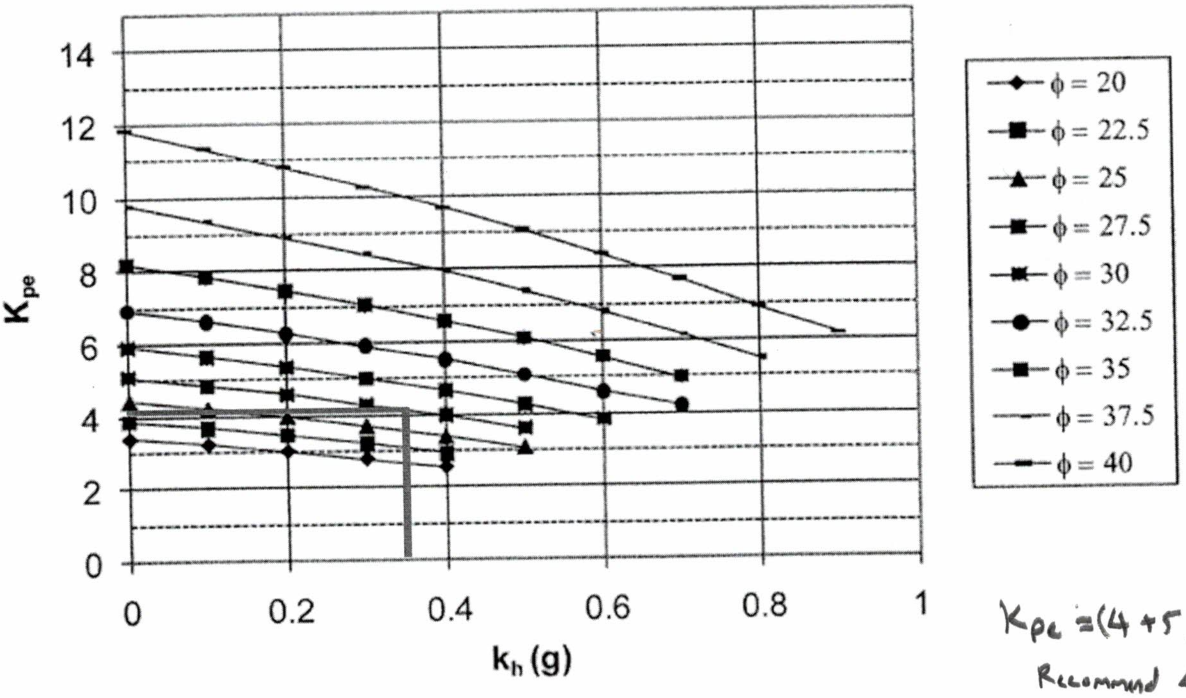
K_{AE} = seismic active earth pressure coefficient (dim)
γ = unit weight of soil (kcf)
H = height of wall (ft)
h = height of wall at back of wall heel considering height of sloping surcharge, if present (ft)
ϕ_f = friction angle of soil (degrees)
θ_{MO} = arc tan $[k_h/(1-k_v)]$ (degrees)
δ = wall backfill interface friction angle (degrees)
k_h = horizontal seismic acceleration coefficient (dim.)
k_v = vertical seismic acceleration coefficient (dim.)
i = backfill slope angle (degrees)
β = slope of wall to the vertical, negative as shown (degrees)

5/7/19

kh = 0.35 , For c=150 psf , H= 8', γ=125pcf

c/γH = 0.15 , ϕ = 28°

c/γH = 0.1

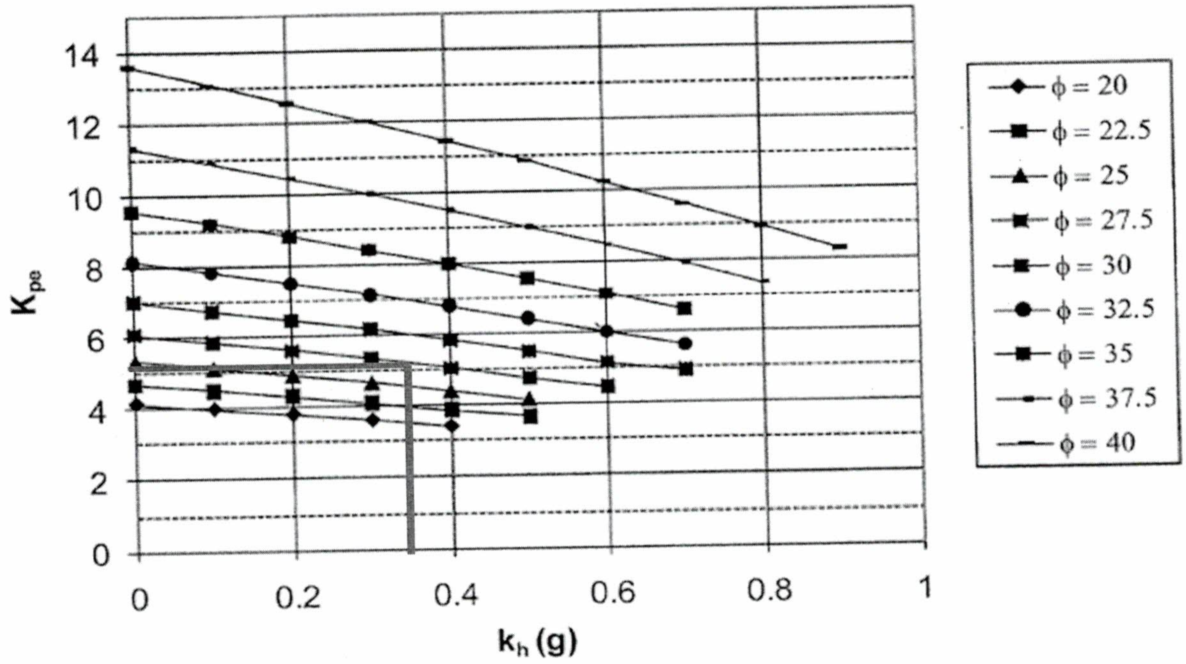


Kpe = (4+5)/2 = 4.5

Recommend 4.0 //

Kp (kh=0) = (5+6)/2 = 5.5 //

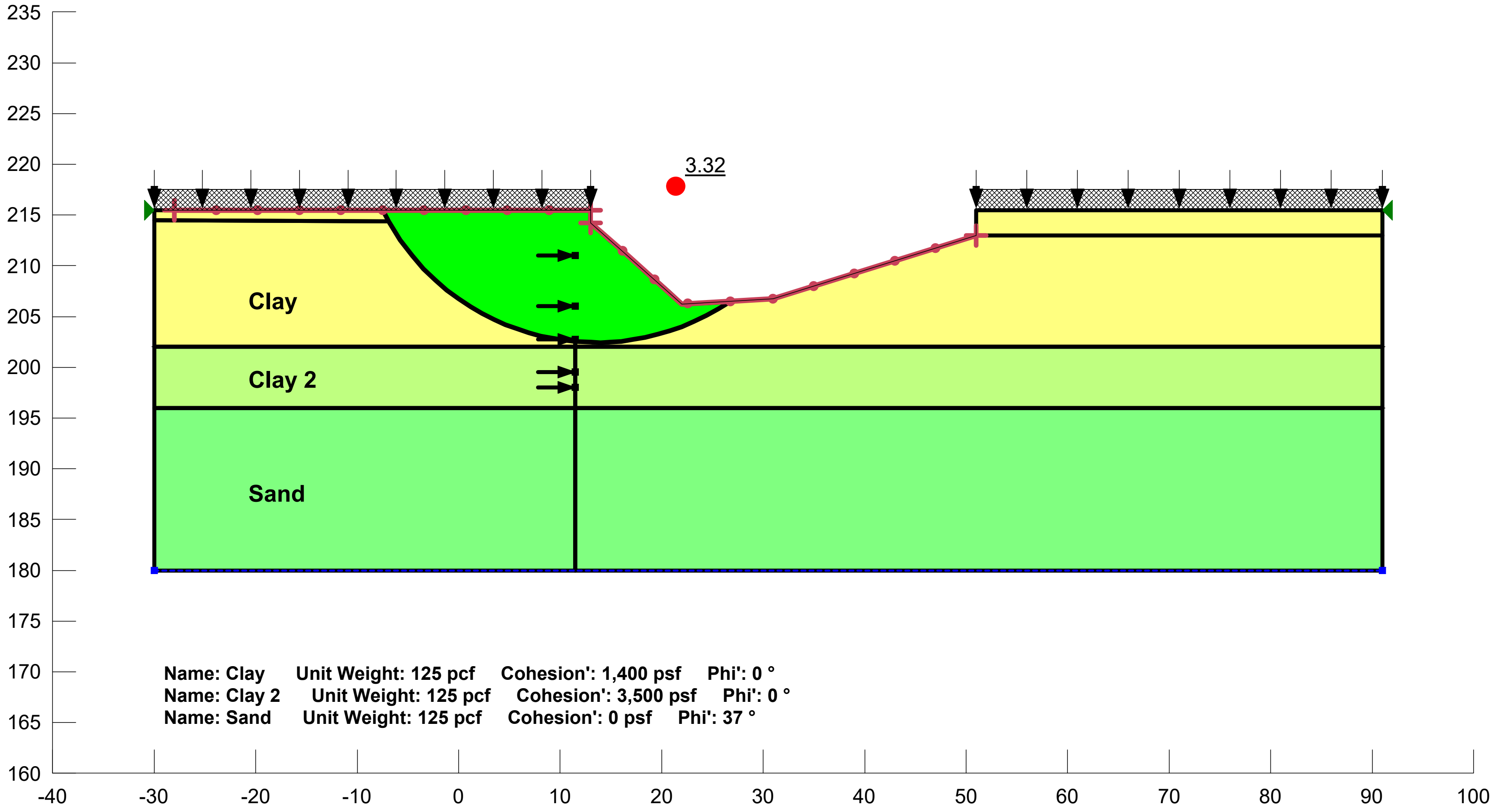
c/γH = 0.2



Regnart Creek - Passive pressure for wall and railing

Slope Stability Analysis

Regnart Creek Trail Slope Stability Analyses at the Abutment 1 (Static - No Flood)



Name: Clay Unit Weight: 125 pcf Cohesion': 1,400 psf Phi': 0 °
Name: Clay 2 Unit Weight: 125 pcf Cohesion': 3,500 psf Phi': 0 °
Name: Sand Unit Weight: 125 pcf Cohesion': 0 psf Phi': 37 °

Static - Sloped Ground - 36°

5/6/19

212.75

Pile Cap

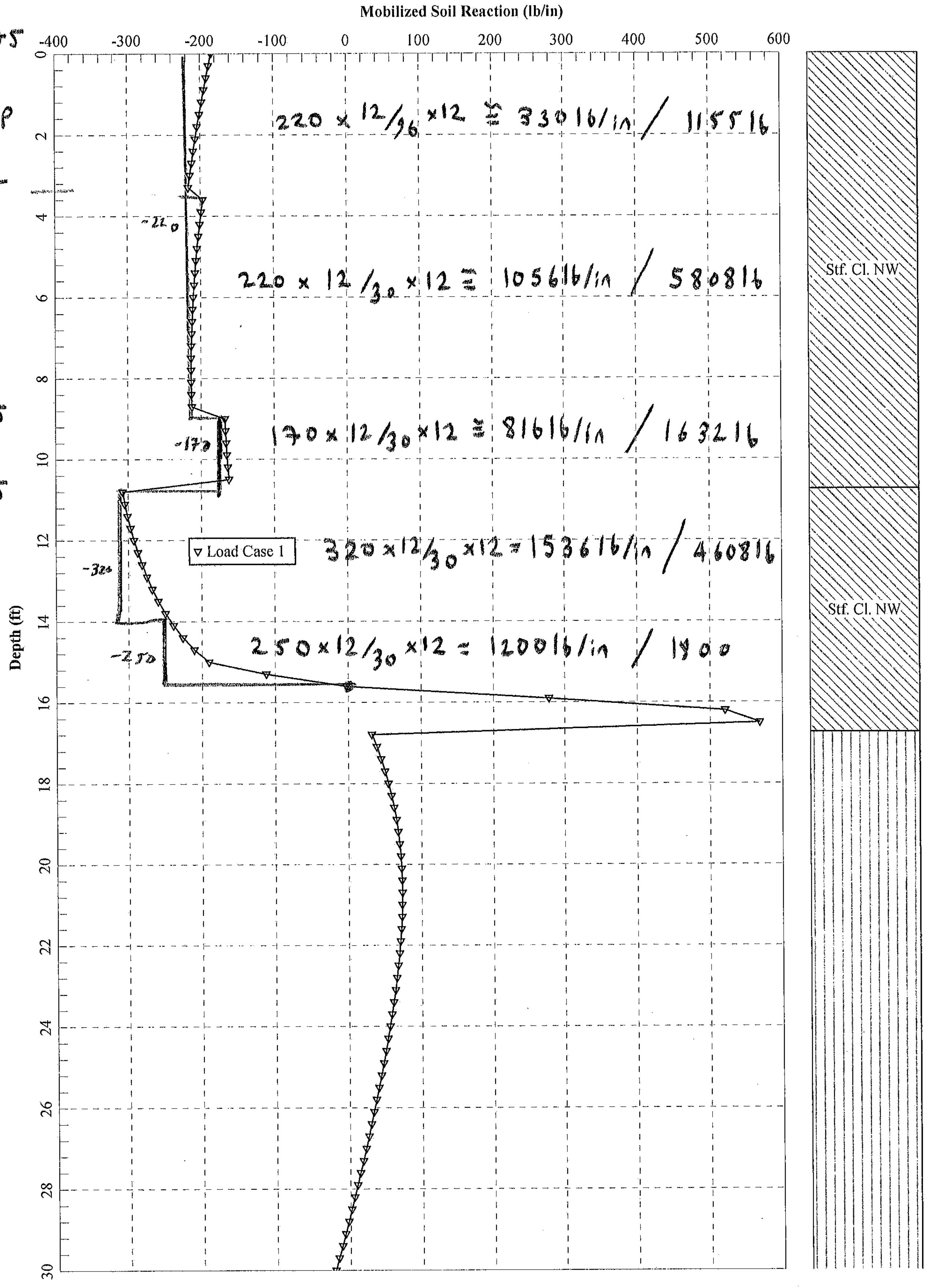
209.25

203.75

201.75

198.75

197.25



-220

-170

-320

-250

220 × 12/96 × 12 ≅ 330 lb/in / 1155 lb

220 × 12/30 × 12 ≅ 1056 lb/in / 5808 lb

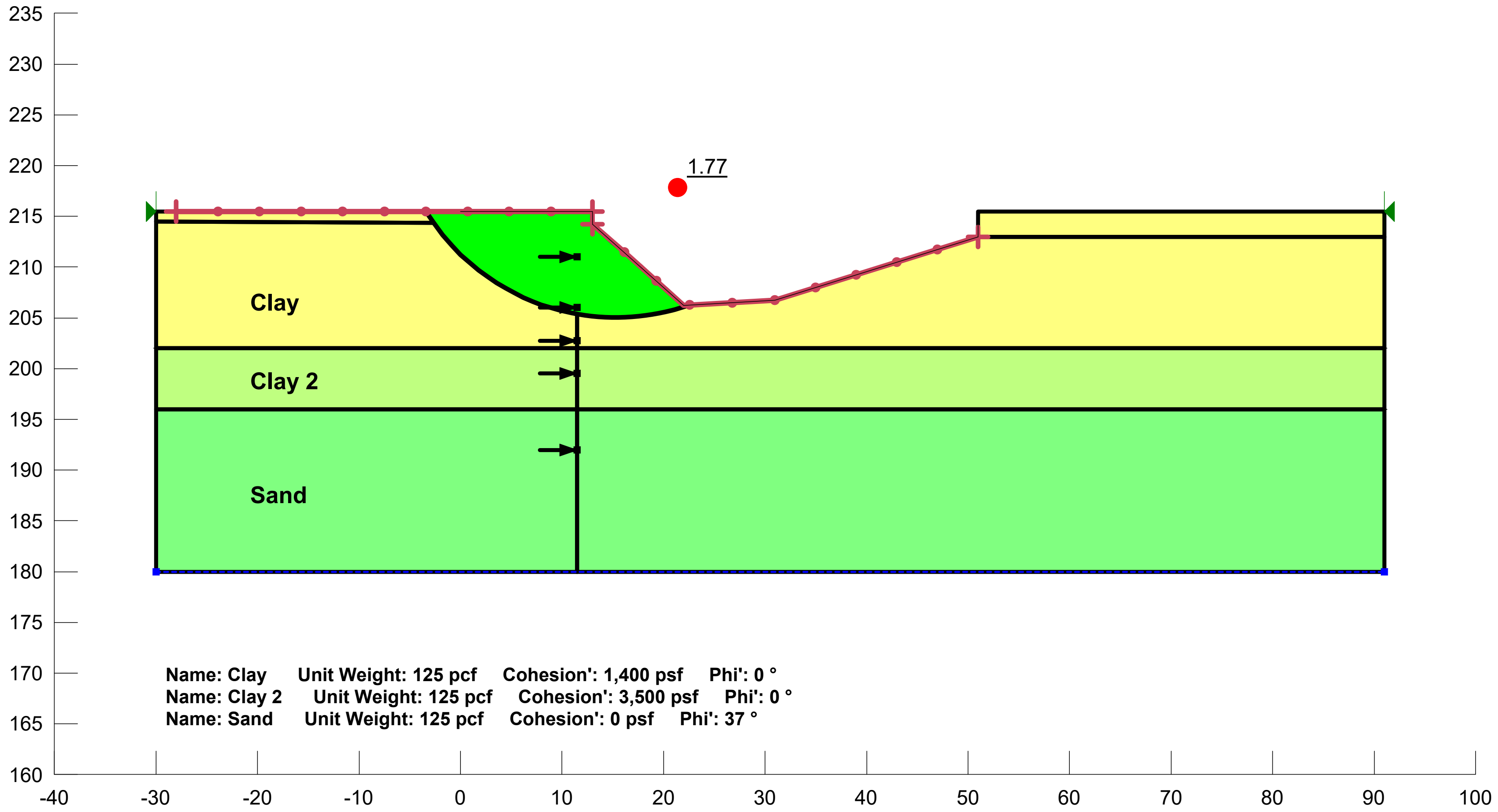
170 × 12/30 × 12 ≅ 816 lb/in / 1632 lb

320 × 12/30 × 12 = 1536 lb/in / 4608 lb

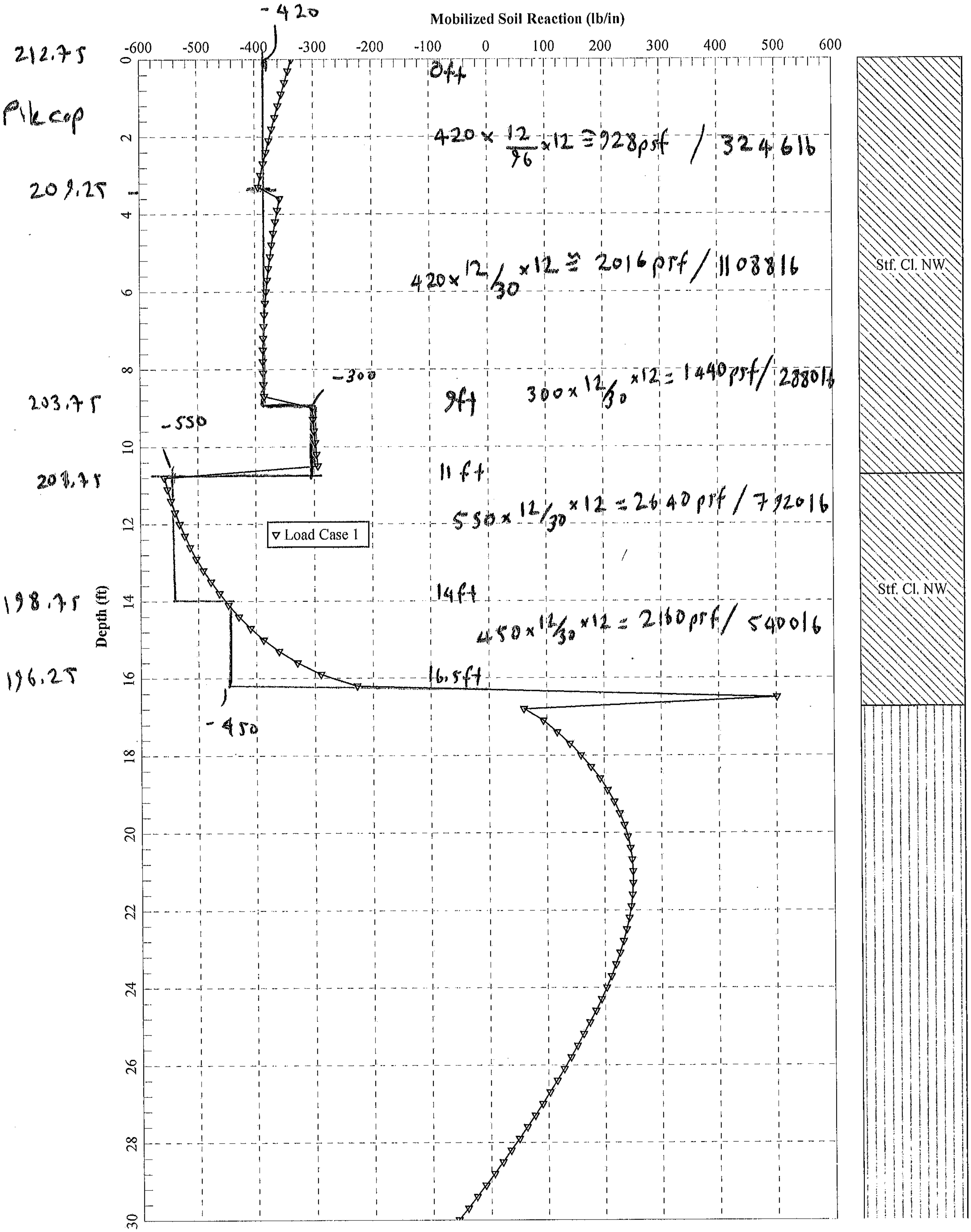
250 × 12/30 × 12 = 1200 lb/in / 1800

Rynort Creek - 30" CIDH - Abut 1

Regnart Creek Trail Slope Stability Analyses at the Abutment 1 (Pseudo-static kh=0.35)



Seismic - Sloped Ground - 36°



$420 \times \frac{12}{96} \times 12 \cong 928$ psf / 3246 lb

$420 \times 12/30 \times 12 \cong 2016$ psf / 11088 lb

$300 \times 12/30 \times 12 = 1440$ psf / 2880 lb

$550 \times 12/30 \times 12 = 2640$ psf / 7920 lb

$450 \times 12/30 \times 12 = 2160$ psf / 5400 lb

Regnort creek - 30" CIDH - Abut 1

APPENDIX C

Noise and Vibration Assessment

REGNART CREEK TRAIL PROJECT NOISE AND VIBRATION ASSESSMENT

Cupertino, California

January 30, 2020

Prepared for:

Demetri S. Loukas
Principal Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Carrie J. Janello
Michael S. Thill

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

Project: 18-244

INTRODUCTION

The City of Cupertino proposes to construct an approximately 0.8-mile shared-use facility along Regnart Creek, between Pacifica Drive and East Estates Drive. The trail would provide a bicycle and pedestrian pathway between the Cupertino Civic Center to the west and Creekside Park to the east, with intermediate connections to Wilson Park and local neighborhoods. The proposed project would extend a trail with shoulders of varying width along the existing Santa Clara Valley Water District maintenance road and would include the construction of one bridge at Wilson Park, as well as the demolition of the existing creek access ramp and construction of a replacement ramp near the park. The proposed bridge would be free-span. It is likely that the abutments would be outside the channel, and no work is expected in the bed or banks of the creek. The project would also construct wood privacy fences along residential property lines, pedestrian signal heads at road crossings, and signage at primary and secondary trailheads.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from "Historic and some old buildings" to "Modern industrial/commercial buildings". Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 **Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels**

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background

The State of California and the City of Cupertino have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

(c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the CNEL noise level resulting from the project at noise sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA CNEL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

City of Cupertino General Plan. The Health and Safety Chapter in the City of Cupertino General Plan Community Vision 2015-2040 sets forth policies related to noise control in the City. The following policies are applicable to the proposed project:

> **Policy 6-60: Noise Control Techniques.** Require analysis and implementation of techniques to control the effects of noise from industrial equipment and processes for projects near homes.
>
> **Policy 6-61: Hours of Construction.** Restrict non-emergency building construction work near homes during evening, early morning, and weekends by enforcing the noise regulations in the Municipal Code.
>
> **Policy 6-62: Construction and Maintenance Activities.** Regulate construction and maintenance activities. Establish and enforce reasonable periods of the day, for weekdays, weekends and holidays for construction activities. Require construction contractors to use only construction equipment incorporating the best available noise control technology.
>
> **Policy 6-63: Sound Wall Requirements.** Exercise discretion in requiring sound walls to be sure that all other measures of noise control have been explored and that the sound wall blends with the neighborhood. Sound walls should be landscaped.

City of Cupertino Municipal Code. The City's Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. The following sections establish applicable limits:

> **10.48.040 Daytime and Nighttime Maximum Noise Levels.** Individual noise sources, or the combination of a group of noise sources located on the same property, shall not produce a noise level exceeding those specified on property zoned as follows, unless specifically provided in another section of this chapter:

Land Use at Point of Origin	Maximum Noise Level at Complaint Site of Receiving Property	
	Nighttime	Daytime
Residential	50 dBA	60 dBA
Nonresidential	55 dBA	65 dBA

> **10.48.050 Brief Daytime Incidents.**
>
> A. During the daytime period only, brief noise incidents exceeding limits in other sections of this chapter are allowed; providing, that the sum of the noise duration in minutes plus the excess noise level does not exceed twenty in a two-hour period. For example, the following combinations would be allowable:

Noise Increment Above Normal Standard	Noise Duration in 2-Hour Period
5 dBA	15 minutes
10 dBA	10 minutes
15 dBA	5 minutes
19 dBA	1 minute

B. For multifamily dwelling interior noise, Section 10.48.054, the sum of excess noise level and duration in minutes of a brief daytime incident shall not exceed ten in any two-hour period, measured at the receiving location.

C. Section 10.48.050A does not apply to Section 10.48.055 (Motor Vehicle Idling).

10.48.051 Landscape Maintenance Activities. The use of motorized equipment for landscape maintenance activities shall be limited to the hours of 8:00 a.m. to 8:00 p.m. on weekdays, and 9:00 a.m. to 6:00 p.m. on weekends and holidays, with the exception of landscape maintenance activities for public schools, public and private golf courses, and public facilities, which are allowed to begin at 7:00 a.m. The use of motorized equipment for landscape maintenance activities during these hours is exempted from the limits of Section 10.48.040; provided, that reasonable efforts are made by the user to minimize the disturbances to nearby residents by, for example, installation of appropriate mufflers or noise baffles, running equipment only the minimal period necessary, and locating equipment so as to generate minimum noise levels on adjoining properties.

10.48.053 Grading, Construction and Demolition.

A. Grading, construction and demolition activities shall be allowed to exceed the noise limits of Section 10.48.040 during daytime hours; provided, that the equipment utilized has high-quality noise muffler and abatement devices installed and in good condition, and the activity meets one of the following two criteria:
   1. No individual device produces a noise level more than eighty-seven dBA at a distance of twenty-five feet (7.5 meters); or
   2. The noise level on any nearby property does not exceed eighty dBA.

B. Notwithstanding Section 10.48.053A, it is a violation of this chapter to engage in any grading, street construction, demolition or underground utility work within seven hundred fifty feet of a residential area on Saturdays, Sundays and holidays, and during the nighttime period, except as provided in Section 10.48.030.

C. Construction, other than street construction, is prohibited on holidays, except as provided in Sections 10.48.029 and 10.48.030.

D. Construction, other than street construction, is prohibited during nighttime periods unless it meets the nighttime standards of Section 10.48.040.

E. The use of helicopters as a part of a construction and/or demolition activity shall be restricted to between the hours of nine a.m. and six thirty p.m. Monday through Friday only, and prohibited on the weekends and holidays. The notice shall be given at least twenty-four hours in advance of said usage. In cases of emergency, the twenty-four hour period may be waived.

10.48.060 Noise Disturbances. No person shall unreasonably make, continue, or cause to be made or continued, any noise disturbance as defined in Section 10.48.010. "Noise disturbance" means any sound which:

1. Endangers or injures the safety or health of humans or animals; or
2. Annoys or disturbs a reasonable person of normal sensitivities; or
3. Endangers or damages personal or real property.

Existing Noise Environment

The proposed trail would run along Regnart Creek between Torre Avenue and East Estates Drive in the City of Cupertino. This trail would be adjacent to single-family residences. Other surrounding land uses would include Wilson Park, Civic Center buildings, and Library Field.

A noise monitoring survey was performed at the site beginning on Wednesday, January 2, 2019 and concluding on Friday, January 4, 2019. The monitoring survey included two long-term (LT-1 and LT-2) and two short-term (ST-1 and ST-2) noise measurements, as shown in Figure 1.

The noise environment in the project vicinity is dominated by traffic noise along the local roadways that either run parallel to the proposed trail or cross the trail, such as Pacifica Drive and South Blaney Avenue. Local neighborhood activities also contribute to the noise environment in the area.

Long-term noise measurement LT-1 was made from a tree located along the western segment of the existing access road, approximately 170 feet east of the Cupertino Library. Hourly average noise levels at this location typically ranged from 48 to 55 dBA L_{eq} during the day and from 42 to 50 dBA L_{eq} at night. The community noise equivalent level on Thursday, January 3, 2019 was 54 dBA CNEL.

Long-term noise measurement LT-2 was made from a tree located along the northern segment of the existing access road, approximately 475 feet from the Rodrigues Avenue access gate to the west. Hourly average noise levels at this location typically ranged from 44 to 57 dBA L_{eq} during the day and from 40 to 48 dBA L_{eq} at night. The community noise equivalent level on Thursday, January 3, 2019 was 52 dBA CNEL.

Short-term noise measurements were made over 10-minute periods, concurrent with the long-term noise data, on Friday, January 4, 2019, between 1:00 p.m. and 1:30 p.m. in order to complete the noise survey. The short-term measurement results for ST-1 and ST-2 are summarized in Table 4.

Noise measurement ST-1 was made between LT-1 and LT-2 along Rodrigues Avenue, approximately 40 feet from the centerline of the roadway. Traffic noise along the roadway was the dominant noise source and resulted in noise levels ranging from 62 to 65 dBA. An airplane flyover also contributed to the noise measurement, with noise levels of 51 dBA. The 10-minute average noise level measured at ST-1 was 57 dBA $L_{eq(10\text{-min})}$. ST-2 was made along the existing access road just south of Wilson Park baseball fields. Typical ambient noise dominated this measurement, with other noise sources including three airplane flyovers with noise levels ranging from 55 to 56 dBA, two sirens with noise levels ranging from 50 to 55 dBA, and a noisy truck along Blaney Avenue generating noise levels of 56 dBA at ST-2. The 10-minute average noise level measured at ST-2 was 47 dBA $L_{eq(10\text{-}min)}$.

FIGURE 1 Noise Measurement Locations

Source: Google Earth, 2018.

FIGURE 2 Daily Trend in Noise Levels at LT-1, Wednesday, January 2, 2019

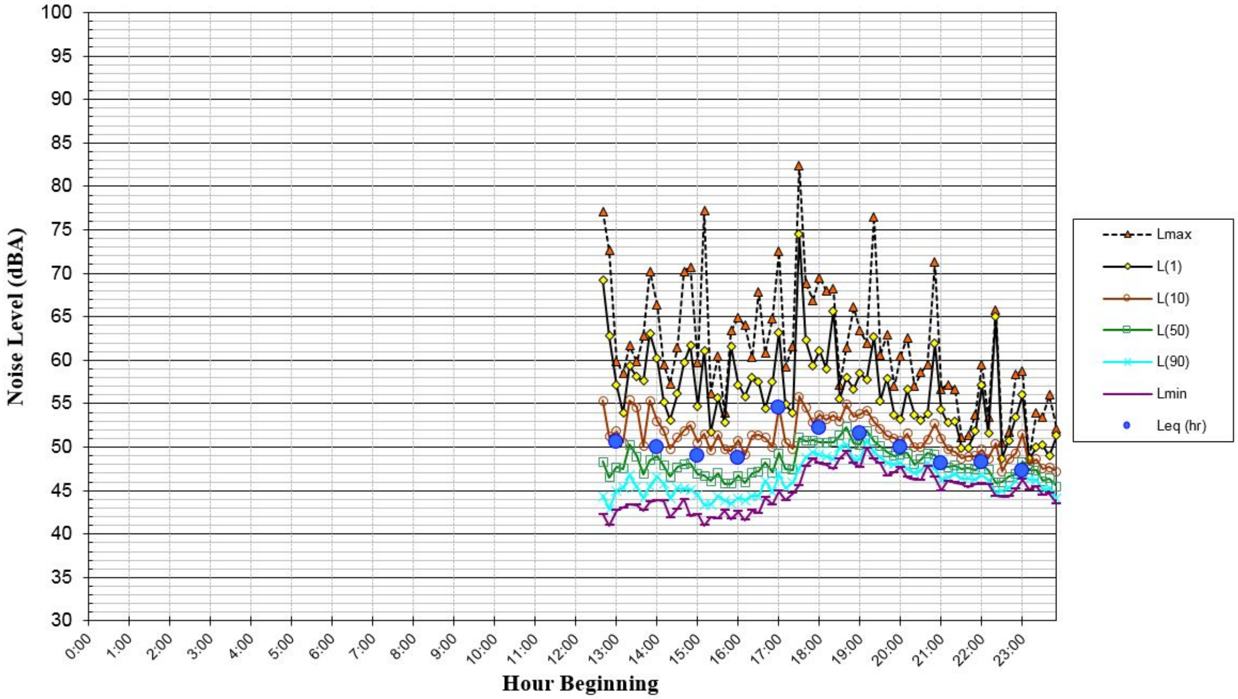


FIGURE 3 Daily Trend in Noise Levels at LT-1, Thursday, January 3, 2019

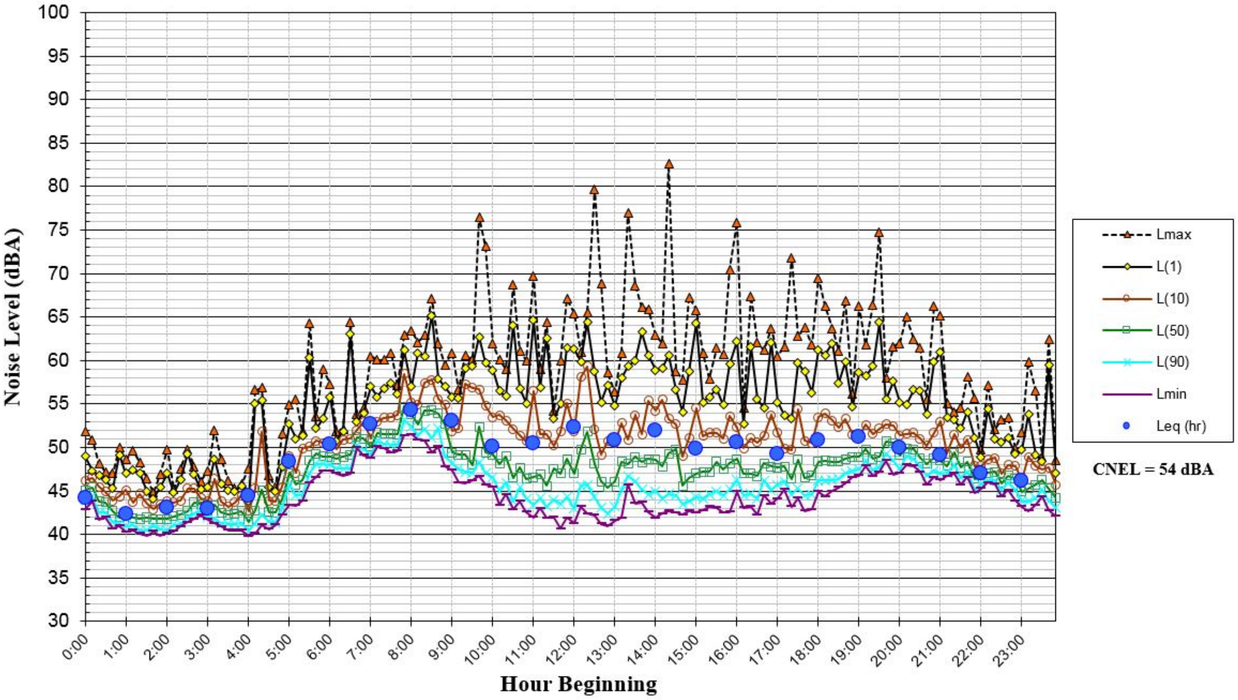


FIGURE 4 Daily Trend in Noise Levels at LT-1, Friday, January 4, 2019

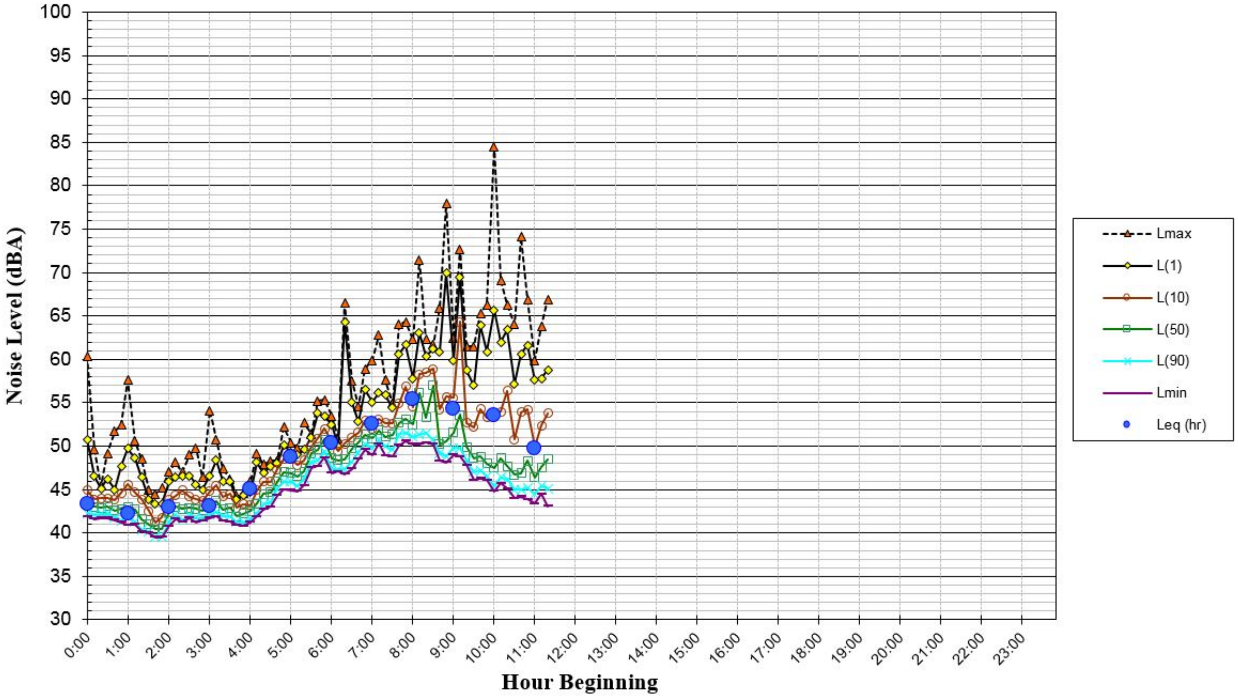


FIGURE 5 Daily Trend in Noise Levels at LT-2, Wednesday, January 2, 2019

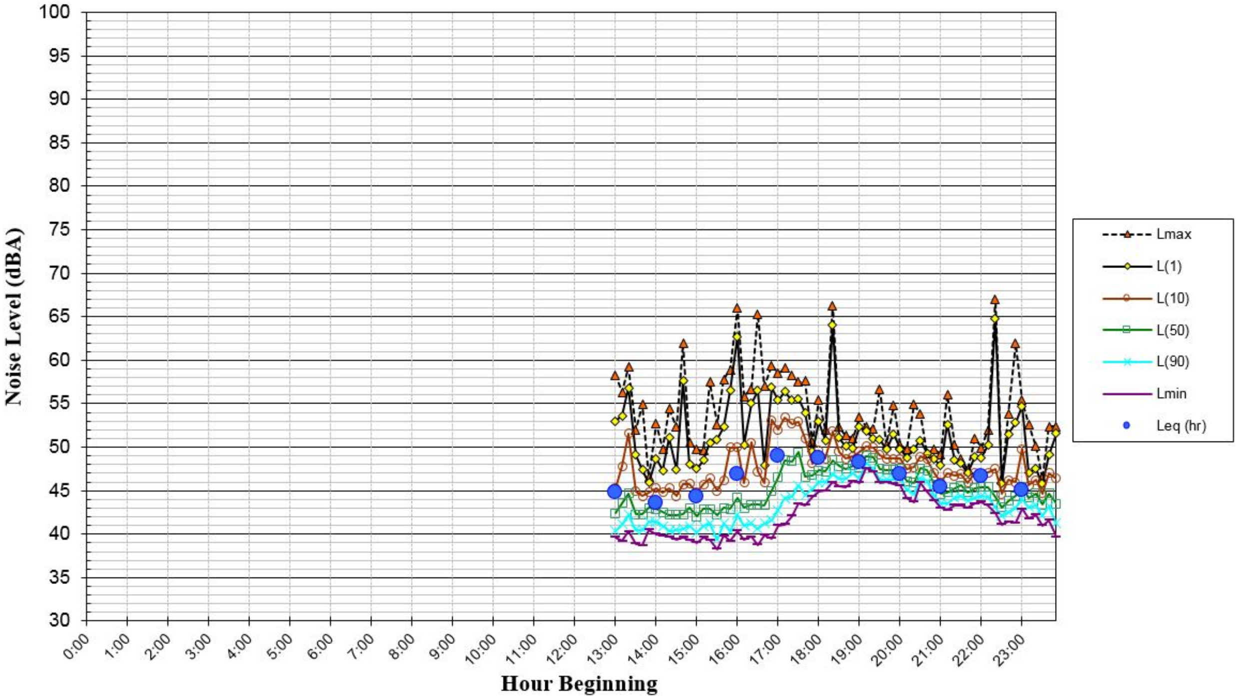


FIGURE 6 Daily Trend in Noise Levels at LT-2, Thursday, January 3, 2019

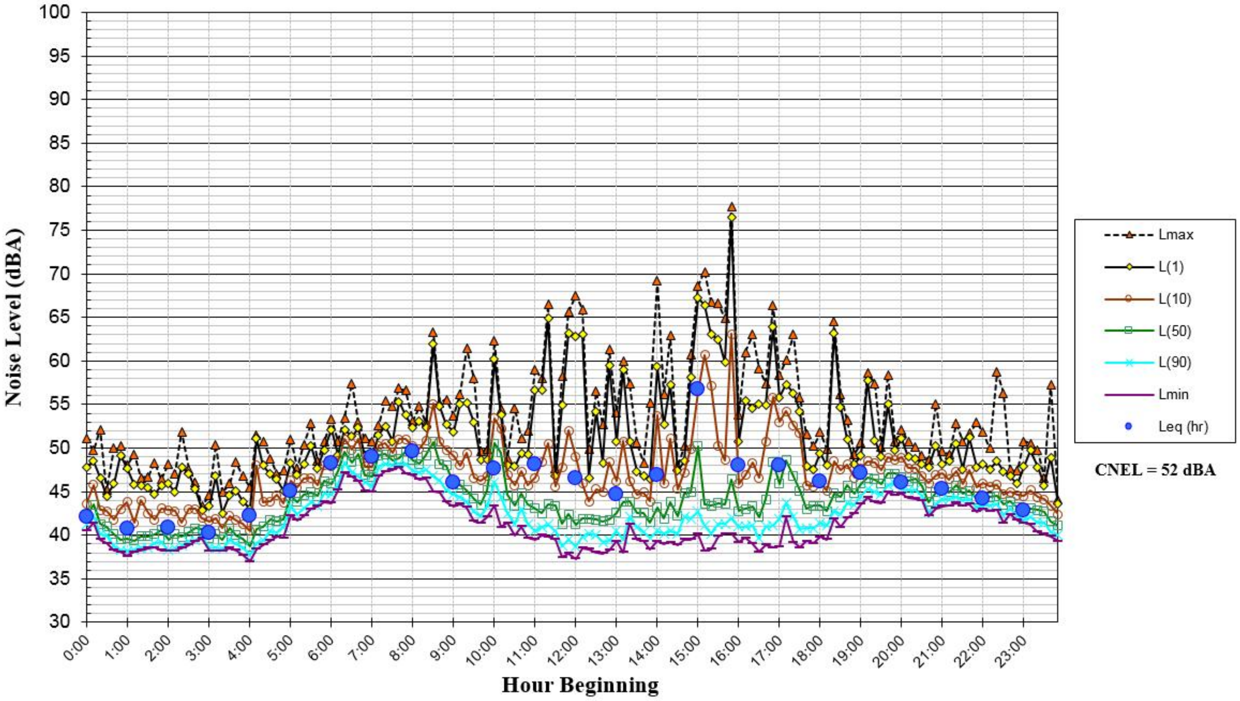


FIGURE 7 Daily Trend in Noise Levels at LT-2, Friday, January 4, 2019

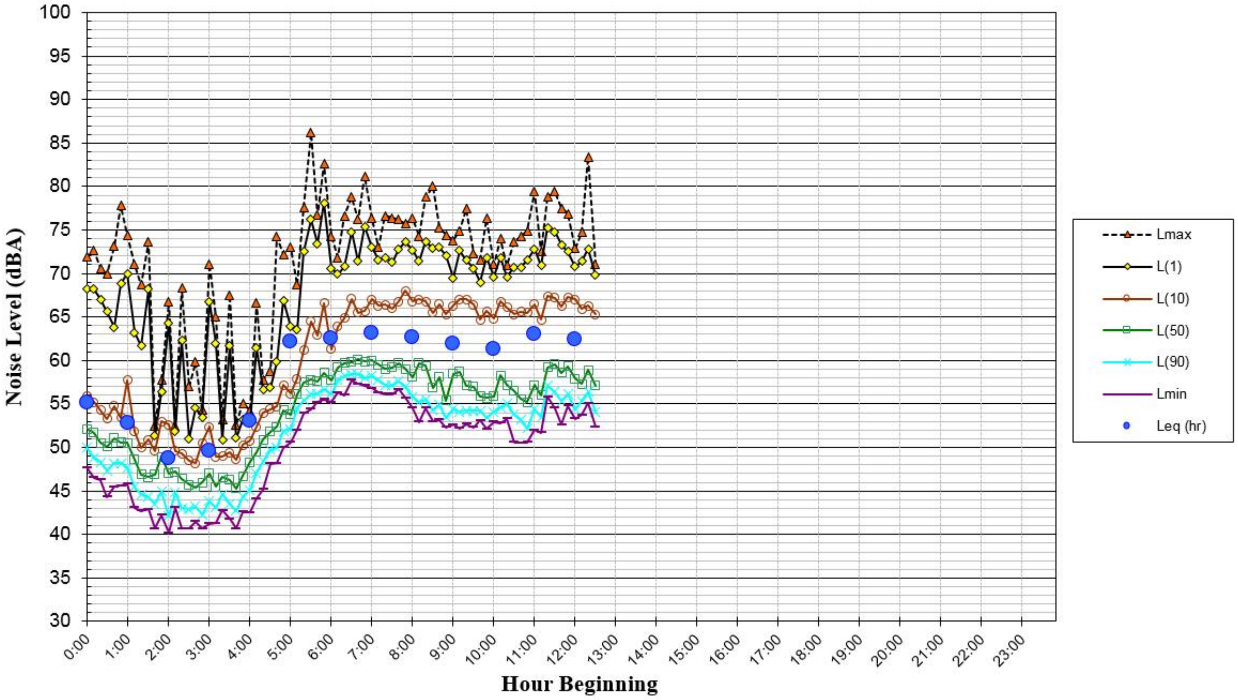


TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location	Date, Time	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10)}$
ST-1: On access road near the Rodrigues Avenue gate.	1/2/2019, 13:00-13:10	67	66	62	53	45	57
ST-2: On access road just south of Wilson Park baseball fields.	1/2/2019, 13:20-13:30	57	56	51	44	42	47

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan or Municipal Code at existing noise-sensitive receptors surrounding the project site.
    - Hourly average noise levels during construction that would exceed 60 dBA L_{eq} at residential land uses or exceed 70 dBA L_{eq} at public buildings and exceed the

ambient noise environment by at least 5 dBA L_{eq} for a period of more than one year would constitute a significant temporary noise increase in the project vicinity.

  - A significant permanent noise level increase would occur if project operations would result in: a) a noise level increase of 5 dBA CNEL or greater, with a future noise level of less than 60 dBA CNEL, or b) a noise level increase of 3 dBA CNEL or greater, with a future noise level of 60 dBA CNEL or greater.

  - A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise impact.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Section 10.48.053 of the City’s Municipal Code exempts construction noise from the noise limits defined in Section 10.48.040 if activities occur on weekdays during daytime hours, provided that the equipment utilized has high-quality noise muffler and abatement devices installed and are in good condition. The construction activities also need to meet the following two criteria: 1) no individual device shall produce noise levels exceeding 87 dBA at a distance of 25 feet; and 2) the noise level measured at any nearby property shall not exceed 80 dBA. Construction activities are prohibited on weekends, holidays, or during nighttime hours at sites within 750 feet of a residential land use.

The noise level threshold for speech interference indoors is 45 dBA. Assuming a 15 dBA exterior-to-interior reduction for standard residential construction and a 25 dBA exterior-to-interior reduction for standard commercial/public building construction, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses and 70 dBA L_{eq} at public buildings. Additionally, temporary construction would be annoying to surrounding land uses if the ambient noise environment increased by at least 5 dBA L_{eq} for an extended period of time. Therefore, the temporary construction noise impact would be considered significant if project construction activities exceeded 60 dBA L_{eq} at nearby residences or exceeded 70 dBA L_{eq} at nearby public buildings and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

The existing residential receptors located along the proposed trail between Pacifica Drive and Rodrigues Avenue would be exposed to ambient noise from the Civic Center buildings and local traffic. Ambient noise levels at these residences and the public buildings would range from 48 to 57 dBA L_{eq} during daytime hours, as measured at LT-1 and ST-1. The residences located between Rodrigues Avenue and East Estates Drive would be exposed to ambient noise levels from Wilson Park and surrounding traffic noise. The ambient noise levels measured at LT-2, ST-1, and ST-2 represent the existing conditions at these residences, which range from 44 to 57 dBA L_{eq} during daytime hours.

Construction activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. The typical range of maximum instantaneous noise levels would be 78 to 90 dBA L_{max} at a distance of 50 feet, as shown in Table 5. Typical hourly average construction-generated noise levels for recreational land uses are about 71 to 89 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.), as shown in Table 6.

Construction activities for the proposed project, in addition to the walking path construction, would include demolition of the existing creek access ramp just south of Wilson Park and construction of a replacement ramp and a single bridge. The bridge would connect the park to the walking path along the southern bank of the creek. A detailed list of equipment expected to be used for the proposed project construction and phasing information was provided. Table 7 summarizes these data and provides the estimated hourly average noise levels expected at the nearest noise-sensitive land uses, public buildings, and parks located along the proposed trail. The equipment expected for each phase of construction were assumed to be operating simultaneously for the construction noise level calculations, which represents a credible worst-case scenario at nearby receptors. Construction noise levels were estimated from the center of the trail to nearest property line of the receptor. However, no one receptor would be exposed to construction over the entire duration of the project due to the length of the project corridor and the fact that construction activities would advance along the corridor as construction proceeds. This would further reduce the cumulative amount of time that individual receptors would be exposed to elevated construction noise levels.

The backyards of each of the residences along the trail have a solid wooden fence that is expected to remain or be reconstructed under project conditions. This fence, which is about 5 to 6 feet tall, would provide up to 5 dBA of noise reduction from the construction activity. However, for receptors in second-story rooms of the residences, the fence would not provide acoustical shielding. Additionally, the backyard receptors may still have direct line-of-sight to some pieces of noisy equipment that are taller than the fence. Conservatively, the estimated noise levels summarized in Table 7 do not assume reductions due to intervening buildings or the existing fence.

TABLE 5 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

[3] Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses

Phase	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} from Center of Trail to Nearest Land Use Property Line, dBA			
			Pacifica Dr. to Rodrigues Ave.		Rodrigues Ave. to E. Estates Dr.	
			Res. (35ft)	Public Bldgs. (25ft)	Res. (25ft)	Wilson Park (65ft)
Demolition	1/1/2020-3/27/2020	Concrete/Industrial Saw (2) Excavator (2) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	92	95	95	87
Site Preparation	1/1/2020-3/27/2020	Grader (3) Scraper (3) Tractor/Loader/Backhoe (3)	92	95	95	87
Grading/ Excavation	1/1/2020-3/27/2020	Excavator (3) Grader (3) Rubber-Tired Dozer (3) Tractor/Loader/Backhoe (3)	93-97[a]	96-100[a]	96-100[a]	88-92[a]
Trenching	3/27/2020-6/22/2020	Tractor/Loader/Backhoe (2) Excavator (2)	88	91	91	82
Structure	6/22/2020-10/29/2020	Crane (1) Tractor/Loader/Backhoe (1)	84	87	87	78
Paving	6/22/2020-10/29/2020	Cement and Mortar Mixer (3) Paver (3) Paving Equipment (3) Roller (3) Tractor/Loader/Backhoe (3)	93-94[b]	96-97[b]	96-97[b]	88-89[b]

[a] The range of levels for the grading/excavation phase reflects the grading/excavation equipment only and the overlapping period with the demolition and site preparation phases.

[b] The range of levels for the paving phase reflects the paving equipment only and the overlapping period with the structure phase.

As shown in Table 7, noise from the construction of the proposed project would potentially exceed the 87 dBA threshold for a single piece of equipment at a distance of 25 feet and hourly average noise levels estimated during worst-case scenario conditions (i.e., all pertinent equipment present at the site) would potentially exceed the 80 dBA L_{eq} threshold at nearby properties. Further, noise levels would at times exceed 60 dBA L_{eq} at residential land uses during typical construction phases and would at times exceed 70 dBA L_{eq} at public buildings. Further, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction.

The proposed project is expected to take a total of 10 months to complete, which would be less than the one-year threshold, which defines a temporary increase in noise. As stated previously, no individual receptor would be exposed to construction over the entire duration of the project due to the length of the project corridor and the fact that construction activities would advance along the corridor as construction proceeds. This would further reduce the cumulative amount of time that individual receptors would be exposed to elevated construction noise levels.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life.

Construction activities will be conducted in accordance with the provisions of the City's Municipal Code, which limits temporary construction work to daytime hours, Monday through Friday. Construction is prohibited on weekends and all holidays. Further, the City requires that all equipment have a high-quality noise muffler and abatement devices installed and are in good condition. Additionally, the construction crew shall adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

Construction Best Management Practices

Develop and implement a construction noise control plan, including, but not limited to, the following available controls:

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Unnecessary idling of internal combustion engines should be strictly prohibited.
- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site in order to minimize disruption and annoyance. With the implementation of these controls and recognizing that noise generated by construction activities would occur over a temporary period, the increase in ambient noise levels due to project construction would be less-than-significant.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: Noise Levels in Excess of Standards. The proposed project is not expected to generate noise in excess of standards established in the City's General Plan and Municipal Code at the nearby sensitive receptors. **This is a less-than-significant impact.**

Daily Operational Noise

When the source of noise originates from nonresidential land uses, Section 10.48.040 of the City's Municipal Code limits noise levels received on any nearby land use to 65 dBA L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and to 55 dBA L_{eq} at night (10:00 p.m. to 7:00 a.m.). Additionally, Section 10.48.050 provides further noise limitations during daytime hours for sources that occur for brief periods of time. For a 5-minute noise duration occurring within a 2-hour period, the noise limits mentioned above would increase by 15 dBA (80 dBA during daytime hours and 70 dBA during nighttime hours). For a 1-minute noise duration occurring within a 2-hour period, the noise limits mentioned above would increase by 19 dBA (84 dBA during daytime hours and 74 dBA during nighttime hours).

Activities expected along the proposed trail would include bicycling, walking, and jogging. Noise levels generated by activity on the trail would be minimal. Typical noise levels generated by people talking or laughing would range from 50 to 55 dBA at 20 feet. The loudest noise sources would include warning whistles or bells from bicycles or a person shouting, which would typically range from 65 to 70 dBA at 20 feet. Typical hourly average noise levels for trails is less than 45 dBA L_{eq} at 20 feet.

The nearest residential property line would be approximately 6 feet from the center of the trail. While most of the adjacent residences have a 5- to 6-foot wooden fence along the edge of the property lines that would provide 5 dBA reduction, residences along Lozano Lane and De Palma Lane would have direct line-of-sight to the proposed trail. At a distance of 6 feet from the property line, talking or laughing would generate noise levels of 61 to 66 dBA assuming no attenuation from a property line fence. Whistles, bells, or shouting would generate unattenuated noise levels of 76 to 81 dBA at the nearest residential property line. The hourly average noise level at these residential backyards would be 56 dBA L_{eq}. For residences with 5- to 6-foot property line fence, hourly average noise levels at a distance of 6 feet would be 51 dBA L_{eq}.

Due to the nature of the activities on the trail, the length of time nearby residences would be exposed to potential noise from these activities would be short in duration, as the trail occupants would be moving along the trail. Typical talking or laughing would be below the daytime and nighttime thresholds for sources lasting less than 1 minute and 5 minutes during any two-hour period. Additionally, whistles, bells, and shouting would result in noise levels below the 1-minute and 5-minute thresholds during both daytime and nighttime hours. With hourly average noise levels of up to 56 dBA L_{eq}, operational noise from the proposed project would meet the daytime and nighttime thresholds at property lines of the residential uses. This would be a less-than-significant impact.

Maintenance and Landscaping Activities

Section 10.48.051 of the City's Municipal Code limits landscape maintenance activities to between 8:00 a.m. and 8:00 p.m. on weekdays and to between 9:00 a.m. and 6:00 p.m. on weekends and holidays. During these allowable hours, maintenance activities are exempt from the above noise limits, provided reasonable efforts are made to minimize noise disturbance.

It is assumed that all maintenance and landscaping activities would occur during the City's allowable hours. Under this assumption, this would be a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: **Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

A significant impact would occur if the permanent noise level increase due to project-generated traffic was 3 dBA CNEL or greater for future ambient noise levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future ambient noise levels at or below 60 dBA CNEL. Based on the 2020 Noise Contours for the City of Cupertino provided in the City's General Plan, and the results of the ambient noise survey, the residences adjoining the proposed trail would be exposed to future noise levels below 60 dBA CNEL. Therefore, a significant impact would occur if the project increased levels by 5 dBA CNEL or more.

To determine the effect of the project-generated noise level increase, the hourly average noise levels due to project operations, which as stated in Impact 1b would be less than 45 dBA L_{eq}, is conservatively assumed to occur every hour within a 24-hour period although high activity along the trail is not expected to occur during nighttime hours. Under this assumption, the estimated community noise equivalent level would be below 52 dBA CNEL. With ambient noise levels ranging from 52 to 54 dBA CNEL, the proposed project would increase noise levels by up to 3 dBA CNEL (assuming activities 24 hours per day, as described above) and would not result in a permanent noise level increase of 5 dBA CNEL or more at the surrounding noise-sensitive receptors. This is a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 2: Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities at the project site would potentially exceed 0.3 in/sec PPV at the nearest noise-sensitive receptors. **This is a potentially significant impact.**

The construction of the project may generate vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include grading, foundation work, paving, and new building framing and finishing. According to the list of construction equipment provided for this project, pile driving, which can cause excessive vibration, would not be required for the proposed project construction. Critical factors pertaining to the impact of construction vibration on sensitive receptors include the proximity of the existing structures to the project site, the soundness of the structures, and the methods of construction used.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. No known ancient buildings or buildings that are documented to be structurally weakened adjoin the project area. Therefore, conservatively, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as rolling stock equipment (tracked vehicles, compactors, etc.) and structural construction of walking bridges, may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

Noise-sensitive receptors are located along the walking trail on either side of the project corridor. Each of these residences adjoin the edge of the project site, and the nearest building façades could be as close as 5 to 30 feet from the nearest construction equipment. At 30 feet, vibration levels would be up to 0.17 in/sec PPV; however, for construction activities 5 feet from the nearest building façade, vibration levels would potentially be up to 1.23 in/sec PPV, which would potentially exceed the 0.3 in/sec PPV threshold. This is a potentially significant impact.

TABLE 8 Vibration Source Levels for Construction Equipment

Equipment		**PPV at 25 ft. (in/sec)**	**PPV at 20 ft. (in/sec)**	**Vibration Levels at Nearest Façades (in/sec PPV)**	
				PPV at 5 ft. (in/sec)	**PPV at 30 ft. (in/sec)**
Clam shovel drop		0.202	0.258	1.186	0.165
Hydromill (slurry wall)	in soil	0.008	0.010	0.047	0.007
	in rock	0.017	0.022	0.100	0.014
Vibratory Roller		0.210	0.268	1.233	0.172
Hoe Ram		0.089	0.114	0.523	0.073
Large bulldozer		0.089	0.114	0.523	0.073
Caisson drilling		0.089	0.114	0.523	0.073
Loaded trucks		0.076	0.097	0.446	0.062
Jackhammer		0.035	0.045	0.206	0.029
Small bulldozer		0.003	0.004	0.018	0.002

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., January 2020.

Mitigation Measure 2:

The following measures shall be implemented where vibration levels due to construction activities would exceed 0.3 in/sec PPV at nearby sensitive uses:

- Comply with the construction noise ordinance to limit hours of exposure. The City's Municipal Code allows construction activities during daytime hours, Monday through Friday. Construction is prohibited on weekends and all holidays.

- Prohibit the use of heavy vibration-generating construction equipment within 20 feet of the structures located along the project corridor.

- The contractor shall alert heavy equipment operators to the close proximity of the adjacent structures so they can exercise extra care.

The implementation of these mitigation measures would reduce a potential impact to a less-than-significant level.

Impact 3: **Excessive Aircraft Noise.** The project site is located more than two miles from a public airport or public use airport and would not expose people residing or working in the project area to excessive noise levels. **This is a less-than-significant impact.**

The City of Cupertino has no commercial, military, or general aviation airports. Mineta San José International Airport, located approximately 5.4 miles northeast of the project site, is the closest airport to the project site. The project site lies outside the area of influence for this airport. Noise from aircraft would not substantially increase ambient noise levels at the project site and would have no impact on the proposed project.

Mitigation Measure 3: **None required.**