Appendices to the

INITIAL STUDY/
MITIGATED NEGATIVE DECLARATION

for the

LOMPICO WATER TANKS REPLACEMENT PROJECT

October 7, 2019

Prepared for

San Lorenzo Valley Water District
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Boulder Creek, CA 95006

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Appendix A

Biological Resources Report

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SAN LORENZO VALLEY WATER DISTRICT
LOMPICO WATER TANKS REPLACEMENT PROJECT
BIOLOGICAL RESOURCES REPORT

August 2019

Prepared for

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INTRODUCTION

Denise Duffy & Associates, Inc. (DD&A) was contracted by Schaaf and Wheeler Consulting Civil Engineers to prepare a Biological Resources Report for San Lorenzo Valley Water District (District) Lompico Water Tanks Replacement Project (project). The project is located at three distinct locations in Santa Cruz County (**Figure 1**). The purpose of the project is to replace existing redwood water tanks with steel tanks. Descriptions of each project component are provided below. Project plans are included in **Appendix A**.

The analysis presented in this report describes the existing biological resources within the survey areas, which consisted of all potentially impacted areas at each tank location, including identification of any special-status species and sensitive habitats known to occur or with the potential to occur within the survey areas. The report also provides recommended avoidance, minimization, and mitigation measures. In addition, the report includes an overview of applicable federal, state, and local regulation, regulatory and responsible agencies with jurisdiction over sensitive resources within the survey areas, and the relevant permits that may be required.

Project Components

Kaski Tank Site

The Kaski tank site (Kaski tank) is located southeast of Lompico, California in Santa Cruz County (Assessor's Parcel Number [APN] 074-261-09) (**Figure 1**). Existing infrastructure consists of two 60,000-gallon redwood tanks, surrounded by chain link fencing, with an access/staging area on the southern boundary. The existing redwood tanks have been compromised and are currently leaking water. The Kaski tank project component would remove all existing facilities, regrade the site, and replace the existing tanks with two 60,000-gallon steel tanks (**Appendix A**).

Lewis Tank Site

The Lewis tank site (Lewis tank) is located southwest of Lompico, California in Santa Cruz County (APN 075-311-06) (**Figure 1**). Existing infrastructure consists of one 100,000-gallon redwood water tank and multiple historic water processing infrastructure components. The Lewis tank site is surrounded by chain link fence, and a driveway/staging area is located along the western boundary. The existing redwood tank has been compromised and is currently leaking water. The Lewis tank project component would remove all existing facilities, regrade the site, and replace the existing redwood tank with two 60,000-gallon steel tanks (**Appendix A**).

Madrone Tank Site

The Madrone tank site (Madrone tank) is located northeast of Lompico, California (**Figure 1**), in Santa Cruz County (APN's 075-072-14 and 075-072-15). Existing infrastructure consists of two 60,000-gallon redwood water tanks, with a perimeter chain link fence, and a driveway/staging area entering from the west. The existing tanks have been compromised and are currently leaking water. The Madrone tank project component would remove all existing facilities and infrastructure, regrade the property, and replace the existing redwood tanks with two 60,000-gallon steel tanks.

Summary of Results

Kaski Tank Site

Two vegetation types[1] were observed within the Kaski tank survey area: mixed evergreen and ruderal/disturbed (**Figure 2a)**. The canopy associated with mixed evergreen is dominated by redwood (*Sequoia sempervirens*). Several other tree species are present at less dominant distributions, including California bay (*Umbellularia californica*), madrone (*Arbutus menziesii*), toyon (*Heteromeles arbutifolia*), Douglas fir (*Pseudotsuga menziesii* var. *menziesii*), and coast live oak (*Quercus agrifolia*). The understory is mostly bare ground or covered with duff. Sparse vegetation found within the understory includes sword fern (*Polystichum munitum*), wood fern (*Woodwardia fimbriata*), California rose (*Rhododendron macrophyllum*), snowberry (*Symphoricarpos* sp.), poison oak (*Toxicodendron diversilobum*) and blackberry (*Rubus armeniacus*). No vegetation is present within the access road. A complete list of plants observed during the site visit is provided in **Appendix B.**

Lewis Tank Site

Two vegetation types were observed within the Lewis tank survey area: silverleaf manzanita (*Arctostaphylos silvicola*) chaparral and ruderal/disturbed (**Figure 2b)**. The site is dominated by herbaceous plants including primarily exotic annual grasses and forbs including redstem filaree (*Erodium cicutarium*), rattail fescue (*Festuca myuros*), smooth cat's ears (*Hypochaeris glabra*), and ripgut brome (*Bromus diandrus*). The area surrounding the Lewis tank site is occupied by silverleaf manzanita chaparral, a plant community found within the sandhills ecosystem on Zayante soils in central Santa Cruz County (McGraw 2016). Shrubs within the Lewis tank site include silverleaf manzanita, deer weed (*Acmispon glaber*), silver bush lupine (*Lupinus albifrons var. albifrons*), and yerba santa (*Eriodictyon californicum*). A complete list of plants observed during the site visit is provided in **Appendix B.**

Madrone Tank Site

Two vegetation types were observed within the Madrone tank survey area: mixed evergreen and ruderal/disturbed (**Figure 2c)**. The canopy associated with mixed evergreen is dominated by redwood. Several other tree species are present at less dominant distributions, including California bay, madrone, toyon, Douglas fir, and coast live oak. The understory is mostly bare ground or covered with duff. Sparse vegetation found within the understory includes sword fern, wood fern, California rose, snowberry, poison oak and blackberry. No vegetation is present within the access road. A complete list of plants observed during the site visit is provided in **Appendix B.**

Special-Status Wildlife Species

Several special-status species are known or have the potential to occur within or adjacent to the survey area. All other species evaluated are assumed "unlikely to occur" or were determined "not present" within the survey area. Species-specific reasons for likelihood of occurrence is presented in **Appendix C**. Special-status wildlife species that are known, or have a moderate to high potential to occur within or adjacent to the survey area include:

[1] A third classification for ground cover was also observed at all tank sites; developed. This ground cover type consists of the existing water supply infrastructure and other impervious areas (cement/pavement).

Kaski and Madrone Tank

- San Francisco Dusky-Footed Woodrat (SFDW, *Neotoma fuscipes annectens*) – CSC[2];
- Cooper's Hawk (*Accipiter cooperii*) – WL;

Lewis Tank

- Santa Cruz Kangaroo Rat (*Dipodomys venustus venustus*) – CNDDB;
- SFDW;
- Cooper's Hawk;
- Mount Hermon June Beetle (MHJB, *Polyphylla barbata*) – FE.

Special-Status Plant Species

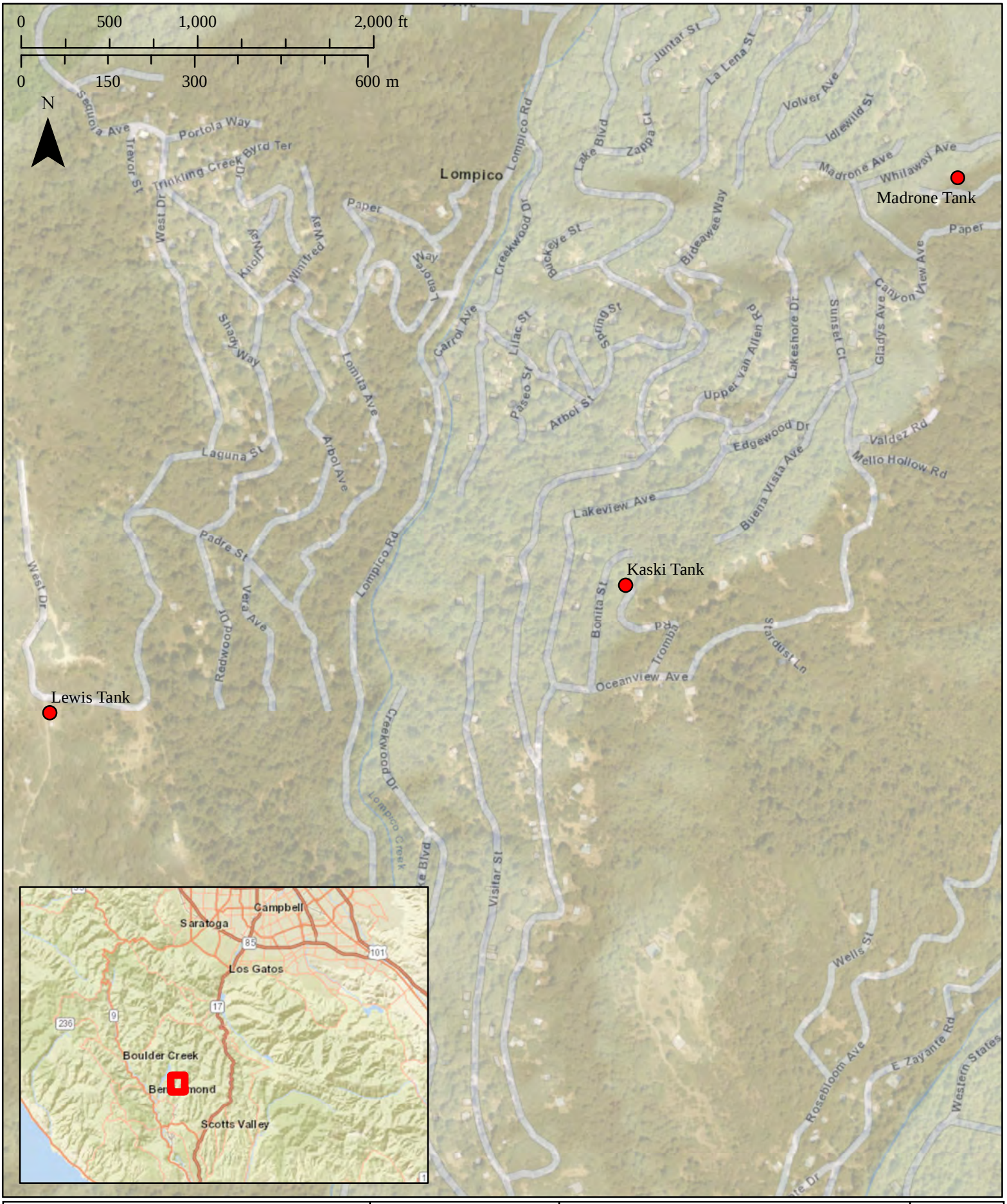
The following special-status plant species are known, or have a moderate to high potential to occur within or adjacent to the Lewis tank survey area:

- Silverleaf Manzanita – 1B;
- Ben Lomond Spineflower (*Chorizanthe pungens var. hartwegiana*) – FE/1B; and
- Ben Lomond Buckwheat (*Eriogonum nudum var. decurrens*) – 1B.

Depending on the finalized project impact area and the construction methods used, the following permits may be required:

- Significant Tree Removal Permit from Santa Cruz County (Chapter 16.34 Santa Cruz County Code)

[2] FE: Federally Endangered under the federal Endangered Species Act (ESA); CSC: CDFW Species of Concern; 1B: California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) 1B species; 4: CNPS CRPR 4; CNDDB: California Natural Diversity Database Occurrence (CNDDB); WL: CDFW Watch List.



SLVWD Lompico Water Tanks Replacement Project Location Map	Date: 1/2/2019 Scale: 1 in = 700 ft Project: 2018.62	DD&A	Monterey | San Jose **Denise Duffy and Associates, Inc.** Environmental Consultants Resource Planners 947 Cass Street, Suite 5 Monterey, CA 93940 (831) 373-4341	Figure 1

Kaski Tank Land Cover Map

Date: 2/20/2019
Scale: 1 in = 50 ft
Project: 2018.62

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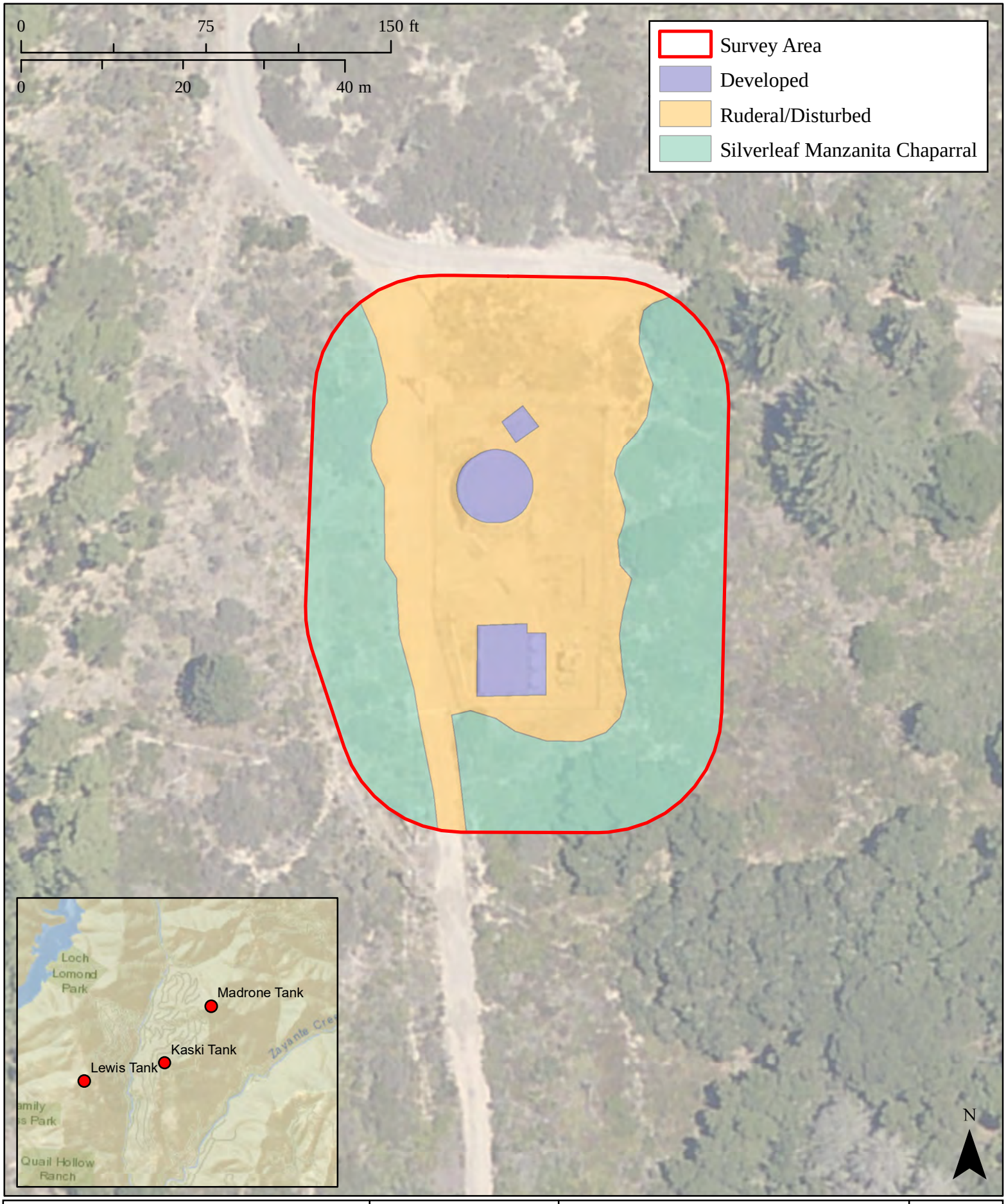
Figure 2a



Lewis Tank Land Cover Map

Date: 2/20/2019
Scale: 1 in = 50 ft
Project: 2018.62

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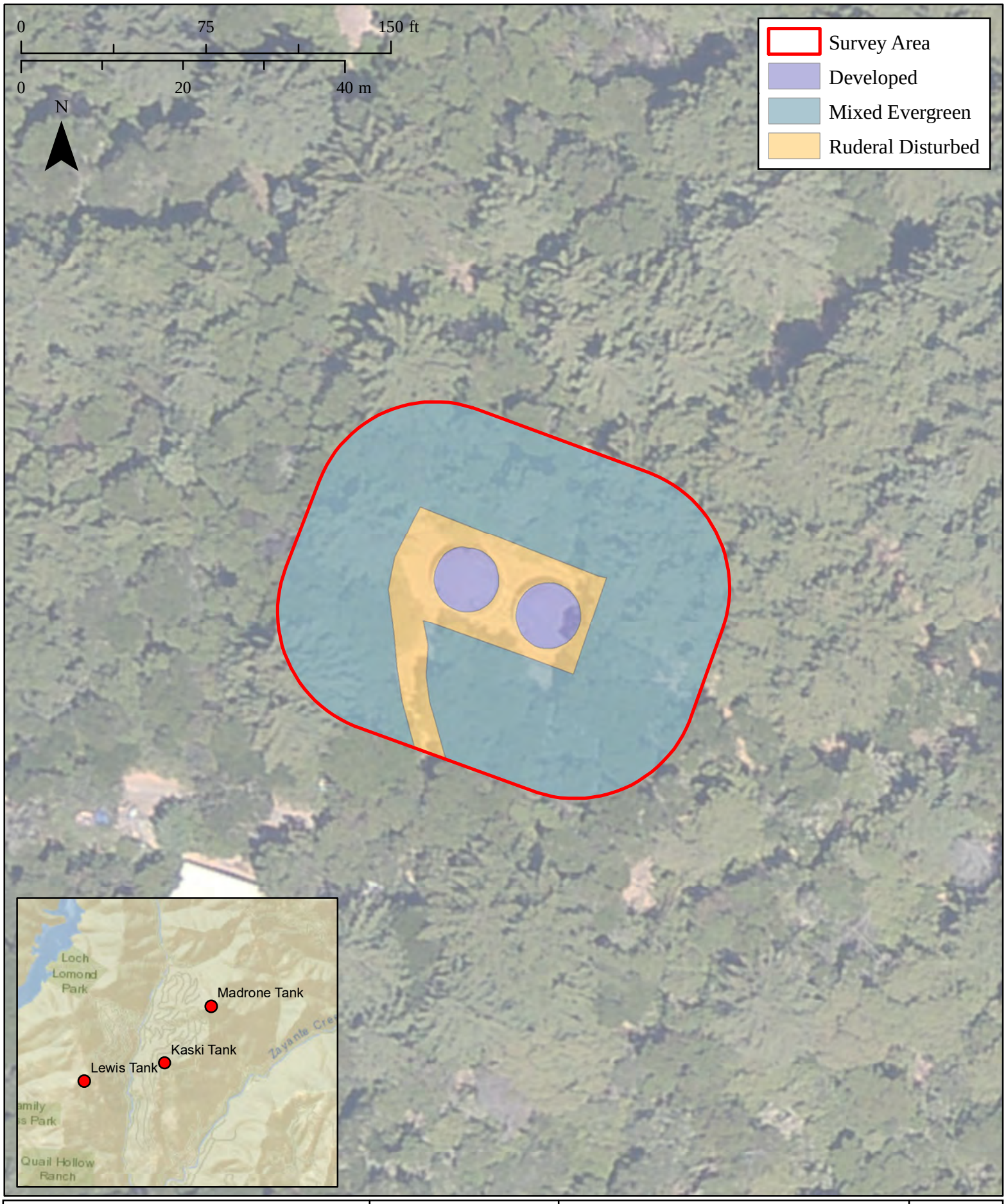
Figure 2b



Madrone Tank Land Cover Map

Date: 2/20/2019
Scale: 1 in = 50 ft
Project: 2018.62

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Figure
2c

METHODS

Personnel and Survey Dates

DD&A biologists conducted surveys of all three tank sites on December 14, 2018 to perform initial evaluation, identify potential sensitive habitats, and identify any special-status plant or wildlife species present or potentially present within the survey areas. Survey areas are defined everything within the existing chain link fence at each tank location as well as a 50-foot buffer from the fence line (**Figure 2a-2c)**. The buffer area was included to capture any potential impacts that may occur during grading of the site. Survey methods included walking the survey areas using aerial maps, maps of previously mapped resources, and GPS to identify and map any biological resources. Current reference materials were reviewed prior to conducting the field surveys, including the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Data Base (CNDDB) occurrence reports (**Appendix C**) and Special Animals list (CDFW 2019a and 2019b), the Service's IPaC Resources List for the survey areas (**Appendix D**; Service 2019), and aerial photographs.

Following the initial survey effort DD&A biologists conducted focused botanical surveys of the Lewis tank site on May 2, and July 26, 2019 to determine presence of spring- and summer-blooming special-status plants. Populations of special-status plants with five or fewer individuals were mapped as points, and populations with greater than five individuals were mapped as polygons. Populations included all individuals within approximately three feet of another individual; individual plants further than three feet apart were mapped as a separate point or polygon.

Data collected during the surveys were used to assess the environmental conditions of the survey areas and their surroundings, evaluate environmental constraints at the survey areas and within the local vicinity, and provide a basis for recommendations to minimize and avoid impacts. Cartographic materials were prepared for the survey areas using ArcGIS software and Google Earth.

Data Sources

The primary literature and data sources reviewed in order to determine the occurrence or potential for occurrence of special-status species within and adjacent to the survey areas are as follows: current agency status information from the Service and CDFW for species listed, proposed for listing, or candidates for listing as Threatened or Endangered under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA) and those considered CDFW "species of special concern" (Service 2019 and CDFW 2019b); the CNPS *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2019), CNDDB occurrence reports from the United States Geological Survey (USGS) Felton quadrangle and the seven surrounding USGS quadrangles (Big Basin, Castle Rock Ridge, Los Gatos, Laurel, Soquel, Santa Cruz, and Davenport) (CDFW 2019a). From these resources, a list of special-status plant and wildlife species known or with the potential to occur in the vicinity of the proposed project was created (**Appendix C**). The list presents these species along with their legal status, habitat requirements, and a brief statement of the likelihood to occur.

Botany

Vegetation types identified in *A Manual of California Vegetation* (Sawyer et.al., 2009) were utilized to determine if vegetation types identified as sensitive on CDFW's Natural Communities List (CDFW, 2019c)

are present within the survey area. Scientific and common nomenclature for plant species identified within this document follows *The Jepson Manual: Vascular Plants of California, Edition 2* (Baldwin et al., 2012).

The survey areas were studied for botanical resources following the applicable guidelines outlined in: G*uidelines for Conducting and Reporting Botanical Inventories for Federally listed, Proposed and Candidate Plants* (Service 2000), P*rotocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFW 2009), and C*alifornia Native Plant Society (CNPS) Botanical Survey Guidelines* (CNPS 2001). Habitats within the survey areas were characterized during field surveys. Data was recorded on physiognomy of the vegetation and on dominant and characteristic species, as well as basic ecological factors, including topography, slope, aspect, soil type, hydrologic regime, and evident disturbance. Habitat types were mapped using a combination of GIS and aerial photography, then digitized using ArcGIS software.

Wildlife

The following literature and data sources were reviewed: CDFW reports on special-status wildlife (Remsen 1978; Williams 1986; Jennings and Hayes 1994; Thelander 1994, Roest M. L. 1988); and California Wildlife Habitat Relationships Program species-habitat models (CDFW 2008; Zeiner et al. 1988; and Zeiner et al. 1990).

Special-Status Species

Special-status species are those plants and animals that have been formally listed or proposed for listing as Endangered or Threatened or are Candidates for such listing under ESA or CESA. Listed species are afforded legal protection under the ESA and CESA. Species that meet the definition of Rare or Endangered under the CEQA Section 15380 are also considered special-status species. Animals on the CDFW's list of "species of special concern" (most of which are species whose breeding populations in California may face extirpation if current population trends continue) meet this definition and are typically provided management consideration through the California Environmental Quality Act (CEQA) process, although they are not legally protected under the ESA or CESA.

Plants listed as rare under the California Native Plant Protection Act (CNPPA) or included in CNPS California Rare Plant Rank (CRPR; formerly known as "CNPS Lists") 1A, 1B, 2A, 2B, 3, and 4 are also treated as special-status species as they meet the definitions of Sections 2062 and 2067 of the CESA and in accordance with CEQA Guidelines Section 15380.[3] In general, CDFW requires that plant species on CRPR 1A (Plants presumed extirpated in California and Either Rare or Extinct Elsewhere), CRPR 1B (Plants rare, threatened, or endangered in California and elsewhere), CRPR 2A (Plants presumed extirpated in California, but more common elsewhere); CRPR 2B (Plants rare, threatened, or endangered in California, but more common elsewhere), CRPR 3 (Plants about which we need more information - a review list), and CRPR 4 (Plants of limited distribution - a watch list) of the CNPS *Inventory of Rare and Endangered Vascular Plants of California* (CNPS, 2019) be fully considered during the preparation of environmental

[3] CNPS initially created five CRPR in an effort to categorize degrees of concern; however, in order to better define and categorize rarity in California's flora, the CNPS Rare Plant Program and Rare Plant Program Committee have developed the new CRPR 2A, and CRPR 2B.

documents relating to CEQA.[4] In addition, species of vascular plants, bryophytes, and lichens listed as having special-status by CDFW are considered special-status plant species (CDFW 2019a).

Raptors (e.g., eagles, hawks, and owls) and their nests are protected in California under Fish and Game Code Section 3503.5. Section 3503.5 states that it is "unlawful to take, possess, or destroy the nest or eggs of any such bird except otherwise provided by this code or any regulation adopted pursuant thereto."

In addition, fully protected species under the Fish and Game Code Section 3511 (birds), Section 4700 (mammals), Section 5515 (fish), and Section 5050 (reptiles and amphibians) are also considered special-status animal species. Species with no formal special-status designation but thought by experts to be rare or in serious decline may also be considered special-status animal species in some cases, depending on project-specific analysis and relevant, localized conservation needs or precedence.

Sensitive Habitats

Sensitive habitats include riparian corridors, wetlands, habitats for legally protected species, areas of high biological diversity, areas supporting rare or special-status wildlife habitat, and unusual or regionally restricted habitat types. Vegetation types considered sensitive include those identified as sensitive on the CDFW's Natural Communities List (i.e., those habitats that are rare or endangered within the borders of California) (CDFW 2019c), and those that are occupied by species listed under ESA or are critical habitat in accordance with ESA. Specific habitats may also be identified as sensitive in city or county general plans or ordinances. Sensitive habitats are regulated under federal regulations (such as the CWA and Executive Order 11990 – Protection of Wetlands), state regulations (such as CEQA and the CDFW Lake and Streambed Alteration Program), or local ordinances or policies (such as city or county tree ordinances and general plan policies).

Regulatory Setting

Federal Regulations

Federal Endangered Species Act

Provisions of the ESA of 1973 (16 USC 1532 et seq., as amended) protect federally Listed Threatened or Endangered species and their habitats from unlawful take. Listed species include those for which proposed and final rules have been published in the Federal Register. The ESA is administered by the Service or NMFS. In general, NMFS is responsible for the protection of ESA-Listed marine species and anadromous fish, whereas other listed species are under Service jurisdiction.

Section 9 of ESA prohibits the take of any fish or wildlife species listed under ESA as endangered or threatened. Take, as defined by ESA, is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the fish or wildlife…including significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife." In addition, Section 9 prohibits removing, digging up, and maliciously damaging or destroying federally listed plants on sites under federal jurisdiction. Section 9 does not prohibit take of federally listed plants on sites not under federal jurisdiction. If there is the potential for

[4] Species on CRPR 3 and CRPR 4 may, but generally do not, meet the definitions of Sections 2062 and 2067 of CESA, and are not typically considered in environmental documents relating to CEQA.

incidental take of a federally listed fish or wildlife species, take of listed species can be authorized through either the Section 7 consultation process for federal actions or a Section 10 incidental take permit process for non-federal actions. Federal agency actions include activities that are on federal land, conducted by a federal agency, funded by a federal agency, or authorized by a federal agency (including issuance of federal permits).

State Regulations

California Endangered Species Act

CESA was enacted in 1984. The California Code of Regulations (Title 14, §670.5) lists animal species considered Endangered or Threatened by the State. Section 2090 of CESA requires State agencies to comply with endangered species protection and recovery and to promote conservation of these species. Section 2080 of the Fish and Game Code prohibits "take" of any species that the commission determines to be an Endangered species or a Threatened species. “Take” is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." A Section 2081 Incidental Take Permit from the CDFW may be obtained to authorize “take” of any State Listed species.

California Fish and Game Code

Birds: Section 3503 of the Fish and Game Code states that it is “unlawful to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.” Section 3503.5 prohibits the killing, possession, or destruction of any birds in the orders Falconiformes or Strigiformes (birds-of-prey). Section 3511 prohibits take or possession of fully protected birds. Section 3800 prohibits take of nongame birds.

Fully Protected Species: The classification of fully protected was the state's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish (§5515), mammals (§4700), amphibians and reptiles (§5050), and birds (§3511). Most fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations. Fully protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

Species of Special Concern: As noted above, the CDFW also maintains a list of animals “species of special concern.” Although these species have no legal status, the CDFW recommends considering these species during analysis of project impacts to protect declining populations and avoid the need to list them as Endangered in the future.

California Native Plant Protection Act

The CNPPA of 1977 directed the CDFW to carry out the legislature’s intent to “preserve, protect and enhance rare and Endangered plants in the State.” The CNPPA prohibits importing rare and Endangered plants into California, taking rare and Endangered plants, and selling rare and Endangered plants. The CESA and CNPPA authorized the Fish and Game Commission to designate endangered, threatened, and

rare species and to regulate the taking of these species (§2050-2098, Fish and Game Code). Plants listed as rare under the CNPPA are not protected under CESA.

Local Regulations

Santa Cruz County Code of Ordinances

Chapter 16.32.040 Sensitive Habitat, Definitions. An area is defined as a "sensitive habitat" if it meets one or more of the following criteria:

"(2) Areas which provide habitat for locally unique biotic species/communities including but not limited to: oak woodlands, coastal scrub, maritime chaparral, native rhododendrons and associated Elk grass, indigenous Ponderosa Pine, indigenous Monterey Pine, mapped grassland in the Coastal Zone and sand parkland; and special forests including San Andreas Oak Woodlands, indigenous Ponderosa Pine, indigenous Monterey Pine and ancient forests.

(3) Areas adjacent to essential habitats of rare, endangered or threatened species as defined in subsections (5) and (6) of this definition.

(5) Areas which provide habitat for rare or endangered species which meet the definition of Section 15380 of the California Environmental Quality Act guidelines.

(6) Areas which provide habitat for rare, endangered or threatened species as designated by the State Fish and Game Commission, United States Fish and Wildlife Service or California Native Plant Society."

16.32.090 Approval conditions, Sensitive Habitat Standards:

(3) Habitats of Locally Unique Species. Conditions include structures shall be clustered, and/or located near to any existing structure, landscaping plan shall include characteristic species, applicants shall enter into a "declaration of restriction" allowing the development and utilization of a prescribed burning program or other means to mimic the effects of natural fires.

RESULTS

Vegetation Types

A brief description of each of the vegetation types can be found below along with the identification of the presence or potential presence of special-status species within each. A generalized nomenclature for vegetation type is used within this document for ease of reference; however, each vegetation type description also lists the Manual of California Vegetation *(*Sawyer et.al. 2009*)* vegetation type(s) in order to provide a crosswalk to the Natural Communities List.

Kaski Tank

Two vegetation types were identified and delineated within the Kaski tank survey area: mixed evergreen and ruderal/disturbed (**Figure 2a**). A portion of the survey area is also developed (i.e. the Kaski tanks, infrastructure, and pavement). The following is the approximate area of each vegetation type within the Kaski tank survey area:

- Mixed Evergreen 18,130.4 square feet (ft^2) (~0.4 acre)
- Ruderal/Disturbed 5,413.4 ft^2 (~0.1 acre)
- Developed 990.9 ft^2 (~0.01 acre)

Figure 2a includes a detailed map of vegetation types within the Kaski tank survey area.

Mixed Evergreen

- *A Manual of California Vegetation classification:* Redwood *Sequoia sempervirens and* Douglas Fir *Pseudotsuga menziesii var. menziesii Forest Alliance*
- *CDFW Natural Communities List*: Sensitive

Mixed evergreen forest occurs outside of the chain link fence on all sides of the Kaski tank survey area. The canopy is dominated by Douglas fir and redwood. Several other tree species, including tan oak (*Notholithocarpus densiflorus*), madrone, toyon, big leaf maple (*Acer macrophyllum*), California bay, elderberry (*Sambucus mexicanus*) and coast live oak, are also present. The understory is mostly bare ground or covered with detritus, consisting mainly of redwood needles. Sparse vegetation found within the understory includes sword fern, wood fern, California rose, snowberry, poison oak, and blackberry.

Special-status wildlife species known or with the potential to occur within this vegetation type include SFDW and Cooper's hawk. Mixed evergreen forest may also provide nesting habitat for other raptors and protected bird species.

Ruderal/Disturbed

- *A Manual of California Vegetation classification:* redstem filaree, rattail fescue, smooth cat's ears, and ripgut brome Semi-Natural Herbaceous Stands
- *CDFW List of Alliances and Associations*: Not sensitive

Ruderal areas are those areas which have been developed and disturbed by human activities and are devoid of vegetation or dominated by non-native species. Within the Kaski tank survey area, this vegetation type

includes disturbed areas between the access road and mixed evergreen vegetation type (**Figure 2a**). These areas are either mostly devoid of vegetation or are dominated by non-native, "weedy" species such as poison hemlock (*Conium maculatum*), black mustard (*Brassica nigra*), slender oat (*Avena barbata*), French broom (*Genista monspessulana*, cheeseweed (*Malva parviflora*), and bristly ox-tongue (*Helminthotheca echioides*). Some native species such as coffeeberry (*Frangula californica*), and poison oak (*Toxicodendron diversilobum*) are also present.

Common wildlife species which do well in urbanized and disturbed areas that may occur within the ruderal habitat include American crow (*Corvus brachyrhynchos*), raccoon, striped skunk (*Mephitis mephitis*), scrub jay (*Aphelocoma californica*), European starling (*Sturnus vulgaris*), western fence lizard (*Sceloporus occidentalis*), and rock dove (*Columba livia*).

Special-status wildlife species that may be found in the ruderal areas includes Cooper's hawk. Additionally, northern harrier, white-tailed kite, and other raptor and migratory bird species may forage and nest within the ruderal areas. No special-status plant species were identified within the ruderal areas during surveys.

Developed

- *A Manual of California Vegetation classification:* None
- *CDFW List of Alliances and Associations*: None

Developed areas within the Kaski tank survey area include the Kaski tanks, associated infrastructure, and any areas covered with asphalt. These areas are completely devoid of vegetation and provide no habitat for plants and wildlife. No special-status wildlife or plant species were observed within the developed areas and none are expected to occur due to lack of suitable habitat.

Lewis Tank

Two vegetation types were identified and delineated within the Lewis tank survey area: silverleaf manzanita chaparral and ruderal/disturbed (**Figure 2b**). A portion of the survey area is also developed (i.e. the Lewis tanks, infrastructure, and pavement). The following is the approximate area of each vegetation type within the Lewis tank survey area:

- Silverleaf Manzanita Chaparral 16,578.2 square feet (ft^2) (~0.4 acre)
- Ruderal/Disturbed 16,910.7 ft^2 (~0.4 acre)
- Developed 1,597.7 ft^2 (~0.04 acre)

Figure 2b includes a detailed map of vegetation types within the Lewis tank survey area.

Silverleaf Manzanita Chaparral

- *A Manual of California Vegetation classification:* Silverleaf Manzanita *Arctostaphylos silvicola* Provisional Shrubland Alliance
- *CDFW Natural Communities List*: Sensitive

Silverleaf manzanita chaparral forms stands on sandstone substrates and old marine san deposits known as the Sandhills in the Santa Cruz Mountains. communities are composed of relatively small to medium sized plants, ranging in height from a several inches to over twelve (12) feet. Silverleaf manzanita chaparral

ranges from 100-600 meters in elevation. Within the study area, this community is dominated by a silverleaf manzanita, black sage (*Salvia mellifera*), silver bush lupine, and yerba santa. A complete list of plants observed during the site visit is provided in **Appendix B.** This vegetation type is found surrounding the Lewis tank site **Figure 2b.**

Silverleaf manzanita chaparral provide habitat to a number of wildlife species, including California vole (*Microtus californicus*), wren-tit (*Chamaea fasciata*), California thrasher (*Toxostoma redivivum*), western fence lizard, gopher snake (*Pituophis catenifer*), and coyote (*Canis latrans*)

Special-status plant species observed within this vegetation type include silverleaf manzanita, Ben Lomond spineflower, and Ben Lomond buckwheat. No other special-status plant species were observed within this vegetation type during focused botanical surveys. Special-status wildlife species that may occur within this vegetation type include MHJB, SFDW, Santa Cruz kangaroo rat, and Cooper's hawk.

Ruderal/Disturbed

Ruderal areas are those areas which have been developed and disturbed by human activities and are devoid of vegetation or dominated by non-native species. Within the Lewis tank survey area this vegetation type is present within the chain link fence, the access road/staging area, and on the northern end of the survey area (**Figure 2b**). These areas are either mostly devoid of vegetation or are dominated by non-native, "weedy" species such as redstem filaree (*Erodium cicutarium*), black mustard (*Brassica nigra*), ripgut brome (*Bromus diandrus*), western goldentop (*Euthamia occidentalis*), tall whitetop (*Lepidium latifolium*), and smooth cat's ear (*Hypochaeris glabra*). Some native species such as tall cyperus (*Cyperus eragrostis*), yerba santa, and Sneezeweed (*Helenium puberulum*) are also present.

Common wildlife species observed within the ruderal habitat include Nuttall's woodpecker (*Picoides nuttallii*), striped skunk (*Mephitis mephitis*), scrub jay (*Aphelocoma californica*), western fence lizard (*Sceloporus occidentalis*), and rock dove (*Columba livia*).

Ben Lomond spineflower was the only special-status plant species observed within this vegetation type. Special-status wildlife species that may be found in the ruderal areas includes Santa Cruz kangaroo rat, Cooper's hawk, and MHJB.

Madrone Tank

Two vegetation types were identified and delineated within the Madrone tank survey area: mixed evergreen and ruderal/disturbed (**Figure 2c**). A portion of the survey area is also developed (i.e. the Madrone tanks, infrastructure, and pavement). The following is the approximate area of each vegetation type within the Madrone tank survey area

- Mixed Evergreen 17,787.5 square feet (ft^2) (~0.4 acre)
- Ruderal/Disturbed 3.033.3 ft^2 (~0.07 acre)
- Developed 1,092.8 ft^2 (~0.03 acre)

A brief description of each of these vegetation types can be found below along with the identification of the presence or potential presence of special-status species within each type. A generalized nomenclature for vegetation types is used within this document for ease of reference; however, each vegetation type

description also lists the *Manual of California Vegetation* (Sawyer et.al., 2009) vegetation type(s) in order to provide a crosswalk to the Natural Communities List. **Figure 2c** includes a detailed map of vegetation types within the Madrone tank survey area.

Mixed Evergreen

For a complete description of this vegetation type, refer to the Kaski tank section above. Mixed evergreen forest occurs outside of the chain link perimeter fence on all sides of the project and bordering the access road/staging area of the Madrone tank survey area (**Figure 2c**).

No special-status plant species were observed within this vegetation type. Special-status wildlife species observed within this habitat type include SFDW and Cooper's hawk. Mixed evergreen forest may also provide nesting habitat for other raptors and protected bird species.

Ruderal/Disturbed

For a complete description of this vegetation type, refer to the Kaski tank section above. Within the Madrone tank survey area, this vegetation type is present within the chain link fence, and within the access road/staging area of the survey area (**Figure 2c**).

Sensitive Habitats

CDFW Sensitive Natural Communities

Silverleaf manzanita chaparral is listed as a sensitive habitat on the CDFW Natural Communities List. This vegetation type occurs within the Lewis tank survey area and provides suitable habitat for several special-status plant and wildlife species (**Figure 2b**). Mixed evergreen forest is also listed as a sensitive habitat on the CDFW Natural Communities List. This vegetation type occurs at Madrone and Kaski tank survey areas. Descriptions for these vegetation types are presented above.

Suitable Habitat for Mount Hermon June Beetle

DD&A's field investigation, conducted on December 14, 2018, identified suitable habitat for MHJB at the Lewis Tank project site. As identified above, two vegetation types were observed within the Lewis tank survey area: silverleaf manzanita chaparral and ruderal/disturbed (**Figure 2b**). Descriptions of these habitats are presented above. Zayante soils, present within both habitat types, represents suitable habitat for MHJB. While still considered suitable, the areas within and immediately surrounding the fence line are relatively degraded due to the dominance of non-native invasive plant species and disturbance attributed to the operations of the tank site.

Special-Status Species

Published occurrence data within the survey areas and surrounding USGS quadrangles were evaluated to compile a table of special-status species known to occur in the vicinity of the project (**Appendix C**).[5] Each of these species was evaluated for their likelihood to occur within and immediately adjacent to the survey areas. The special-status wildlife species that are known to or have been determined to have a moderate to

[5] The USGS quadrangles in which published CNDDB data was searched included Calveras, Cupertino, La Costa Valley, Milpitas, Mountain View, Newark, Niles, San Jose East, and San Jose West.

high potential to occur within or immediately adjacent to the survey areas are discussed below. All other wildlife species within the table are assumed "not present," "unlikely to occur," or have a low potential to occur within the survey areas for the species-specific reasons presented in **Appendix C**.

Special-Status Wildlife Species

Santa Cruz Kangaroo Rat

The Santa Cruz kangaroo rat is included on the CDFW's CNDDB "Special Animals" list. The CDFW's CNDDB "Special-Animals" list is a list referred by the CDFW as a list of species at risk, this species is mentioned in this report because the all tank sites are located within Santa Cruz County, the known core population for this species. Santa Cruz kangaroo rat occur in the cool, maritime mountains of west-central California. Historical records range from Mount Hamilton to Corralitos, with most specimens collected around Mount Hermon, Felton, and Bonny Doon, in Santa Cruz County. The species occurs in Mount Hermon, but in remnant patches of suitable habitat surrounded by development. Burrow surveys at Bonny Doon suggest the species still occurs there, although limited live-trapping efforts yielded no captures. This species is active year-round with a diet dominated by seeds. Burrows are simple often located in open, abandoned agricultural land. Santa Cruz kangaroo rat occurs in chaparral habitat in the low foothills of the Santa Cruz Mountains, on substrates of sands, loams, and sandy loams; often described as sandy ponderosa pine parkland, with a chaparral understory. The species distribution conforms closely to the distribution of open chaparral habitat occurring on sandy soils (Zayante or Santa Margarita soils) (Hawbecker 1940, Rudd 1948). The largest undisturbed area of occupied habitat in Santa Cruz County is the S. H. Cowell Foundation property adjacent to Henry Cowell State park; the Department Reserve in Bonny Doon, Wilder Ranch, and Henry Cowell state parks also contains important patches of habitat, that may or may not be occupied by this species.

The CNDDB reports nine (9) occurrences of Santa Cruz kangaroo rat within the quadrangles evaluated, the closest of which is a nonspecific occurrence (2,000-acre general area) located within the Kaski and Lewis tanks survey areas. However; suitable habitat for this species is present only within the sandy loam soils and chaparral at the Lewis tank survey area.

San Francisco Dusky-Footed Woodrat

The SFDW is listed on the CDFW's list of species of special concern. This species is found in heavy chaparral, hardwood, conifer, and mixed forests, typically in densely wooded areas with heavy undergrowth riparian woodlands. This species builds its nest with debris on the ground or in a tree; nests tend to be in situations that are shaded, relatively cool, and in good cover, and they may be used by many generations over several years (Carraway, 1991). Nests for this species were observed in the vegetated portions of the survey area at all three tank sites.

Raptors and Other Migratory Bird Species

Raptors and their nests are protected under Fish and Game Code. While the life histories of these species vary, overlapping nesting and foraging similarities (approximately February through August) allow for their concurrent discussion. Most raptors are breeding residents throughout most of the wooded portions of the state. Open wetland and ruderal habitat can often be used for hunting. Breeding occurs February through August, with peak activity May through July. Prey for these species includes small birds, small mammals,

and some reptiles and amphibians. Many raptor species hunt in open wetlands and habitat edges. Various common raptor species (such as red-tailed hawk (*Buteo jamaicensis)*, red-shouldered hawk (*Buteo lineatus)*, American kestrel (*Falco sparverius)*, and turkey vulture (*Cathartes aura*) and special-status raptor species (such as white-tailed kite and northern harrier) have the potential to forage and nest within the survey areas of the Kaski and Madrone tanks and adjacent to the survey area of Lewis tank.

Mount Hermon June Beetle

MHJB is a federally Endangered species under ESA. This species is restricted to the Zayante sandhills habitat of the Ben Lomond-Mount Harmon-Scotts Valley area. MHJB feeds as a fossorial larva on plant roots and associated mycorrhizae, and then emerges as an adult in late spring and early summer to mate. MHJB occurs in areas with Zayante soils that feature a variety of vegetation. While not always present, silver-leaf manzanita is often an indicator of suitable habitat. Other vegetation types that may provide suitable habitat include but are not limited to sand parkland, ponderosa pine forest, as well as areas that have been landscaped and feature ornamental vegetation.

Approximately 0.76-acre (33,465.08 square feet [ft^2]) of suitable MHJB habitat exists within the Lewis tank survey area (**Figure 3**). Approximately 0.17-acre (7,262.98 ft^2) of this habitat will be permanently impacted[6] by the tank replacement and approximately 0.16-acre (7,061.70 ft^2) of this habitat will be temporarily[7] impacted by the temporary tanks/staging/other construction activities.

Special-Status Plant Species

The CDFW requires that focused rare plant surveys be conducted approximately every two to three years to determine presence or absence. Although there is only a low potential for other special-status plant species to occur within the survey areas, the discussion below includes plant species whose preferred habitat types occur within the survey areas. All other species within the table are assumed "not present" or "unlikely to occur" within the survey areas for the species-specific reasons presented in **Appendix C**.

Silverleaf Manzanita

Silverleaf manzanita is endemic to the Santa Cruz sandhills is a CNPS CRPR 1B species. This evergreen shrub, in the Ericaceae family, is associated with chaparral, closed-cone coniferous forests, and lower montane coniferous forests on inland marine Zayante soils at a range of 120-600 meters in elevation. The typical blooming period is from February through March. Silverleaf manzanita was observed adjacent to and within silverleaf manzanita chaparral at the Lewis tank survey area (in the adjacent parcels to the north and west) during botanical surveys.

Ben Lomond Spineflower

Ben Lomond spineflower is a federally endangered, CNPS CRPR 1B species. This annual herb, in the Polygonaceae family, typically blooms from April through July. Ben Lomond spineflower is associated with lower montane coniferous forest (maritime ponderosa pine sandhills) at elevations of 90-610 meters.

[6] Due to soil disturbance and compactions all areas within the existing fence line will be permanently impacted.
[7] Areas outside of the existing fence line will be restored, therefore impacts are considered temporary.

Ben Lomond spineflower was observed within the Lewis tank survey area during focused botanical surveys. DD&A recorded nine polygons totaling approximately 645 ft^2 and 5 points totaling 7 individuals within the Lewis tank survey area (**Figure 4**).

Ben Lomond Buckwheat

Ben Lomond buckwheat is a CNPS CRPR 1B species. This perennial herb, in the Polygonaceae family, is associated with chaparral, cismontane woodland, and lower montane coniferous forest (maritime ponderosa pine sandhills) on sandy soils, at elevations of 50-800 meters. The typical blooming period is from July through October.

Ben Lomond buckwheat was observed within the Lewis tank survey area during focused botanical surveys. DD&A recorded one polygon (97 ft^2) of this species within the silverleaf manzanita chaparral vegetation cover (**Figure 4**).

Endangered Species Act

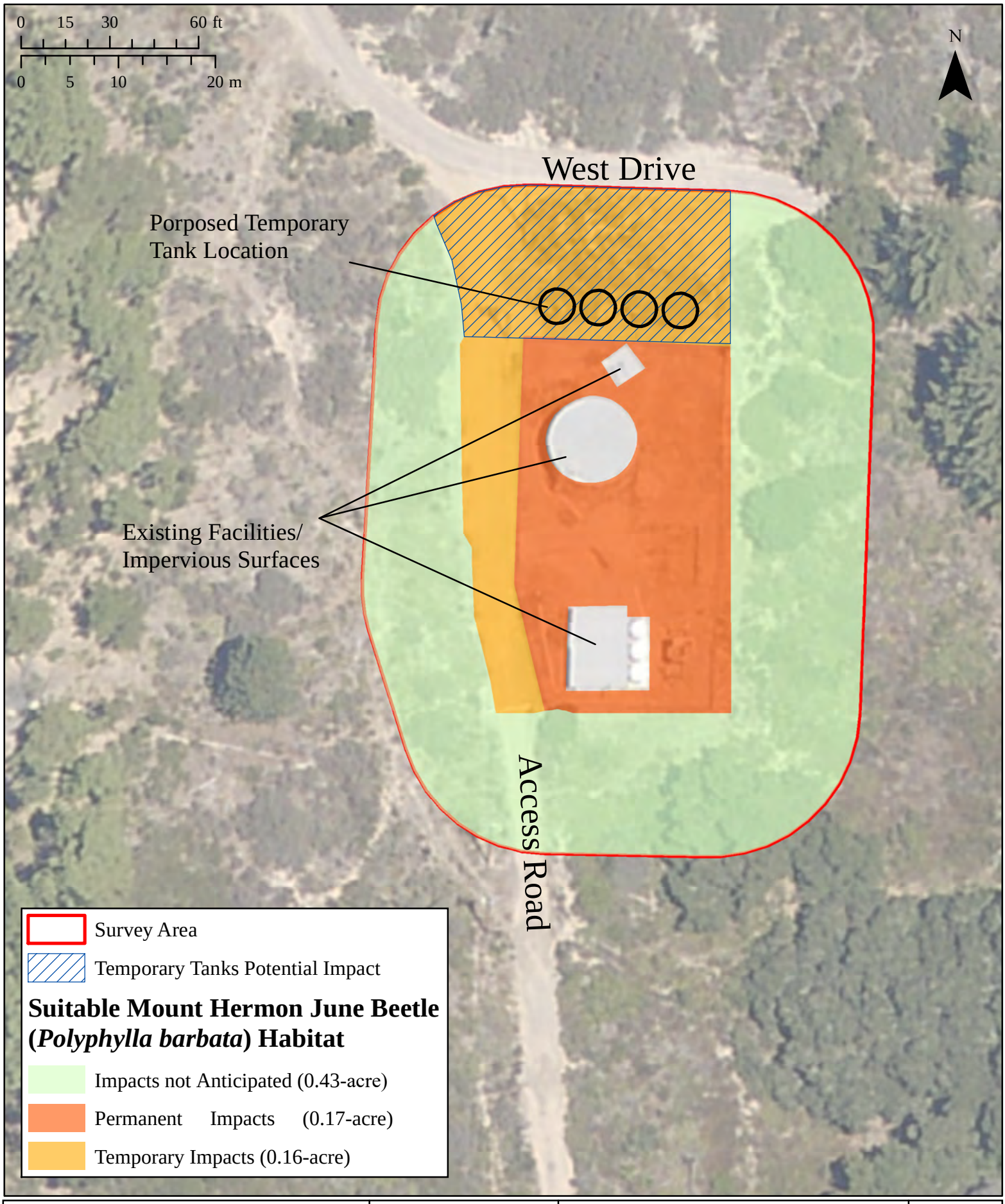
The Lewis tank began leaking excessively in June 2019, and the District employed divers to repair the tank; however, they were not able to repair all the leaks and the District has determined that the tank will soon fail. To ensure water storage and availability for the residents that rely on the Lompico Tanks infrastructure, including the Lewis tank, the District proposed to install temporary storage tanks as soon as possible. Due to the current state of the Lewis tank, the District proposed to install the temporary tanks prior to completion of the CEQA review process and other related regulatory permit requirements. The temporary tanks and associated infrastructure, shown in the attached site plans, will be placed north of the existing Lewis tank site fence line. The District considered the following alternatives for temporary tank placement:

1. Inside the Lewis tank site existing fence line,
2. Outside the Lewis tank site existing fence line between West Ave and the north fence, and
3. A nearby District lot (APN 075-321-02), which was the old Lewis tank #1 site.

The proposed temporary tank location (Option 2) was determined to be the least impactful and most efficient option. The off-site location (Option 3) would require grading and pipe installation that would impact a larger footprint of suitable habitat for MHJB, a federally Endangered species. There is an existing Pressure Release Valve (PRV) vault adjacent to the onsite location so ground disturbance for temporary piping would be reduced when compared to the off-site option. Additionally, the proposed off-site location has not been utilized by the District in approximately 20 years and vegetation removal would be extensive. Option 1, placing the temporary tanks within the existing fence line, was dismissed because the replacement of the existing Lewis tank will involve removing and regrading everything inside the existing fence line, so temporary tanks installed inside the existing fence would eventually be relocated outside the fence. Additionally, the site north of the fence is approximately 5-feet higher in elevation than the area inside the fence; the elevation reduces the change in system water pressure.

The installation of the temporary tanks and the completion of the tank replacement project will result in temporary and permanent impacts to MHJB suitable habitat and Ben Lomond spineflower populations. DD&A and the District discussed the potential impacts to listed species during a conference call with the Service on June 3, 2019. The Service requested that DD&A identify avoidance and minimization measures

to reduce the potential for the project to impact MHJB individuals and habitat. Measures are included below to avoid or minimize these potential impacts to the greatest extent possible. At the request of the Service, measures were adapted from the *Low-Effect Habitat Conservation Plan for the San Lorenzo Valley Water District's Probation Tank Replacement Project* (McGraw Consulting 2017) and the *Final Mitigated Negative Declaration and Response to Comments Received Probation Tank Replacement Project* (District, 2017). The District sent an official request to the Service requesting take coverage under ESA on July 9, 2019 (Appendix E). The Service responded via email (Appendix F) to the District's request confirming ESA compliance on July 15, 2019.

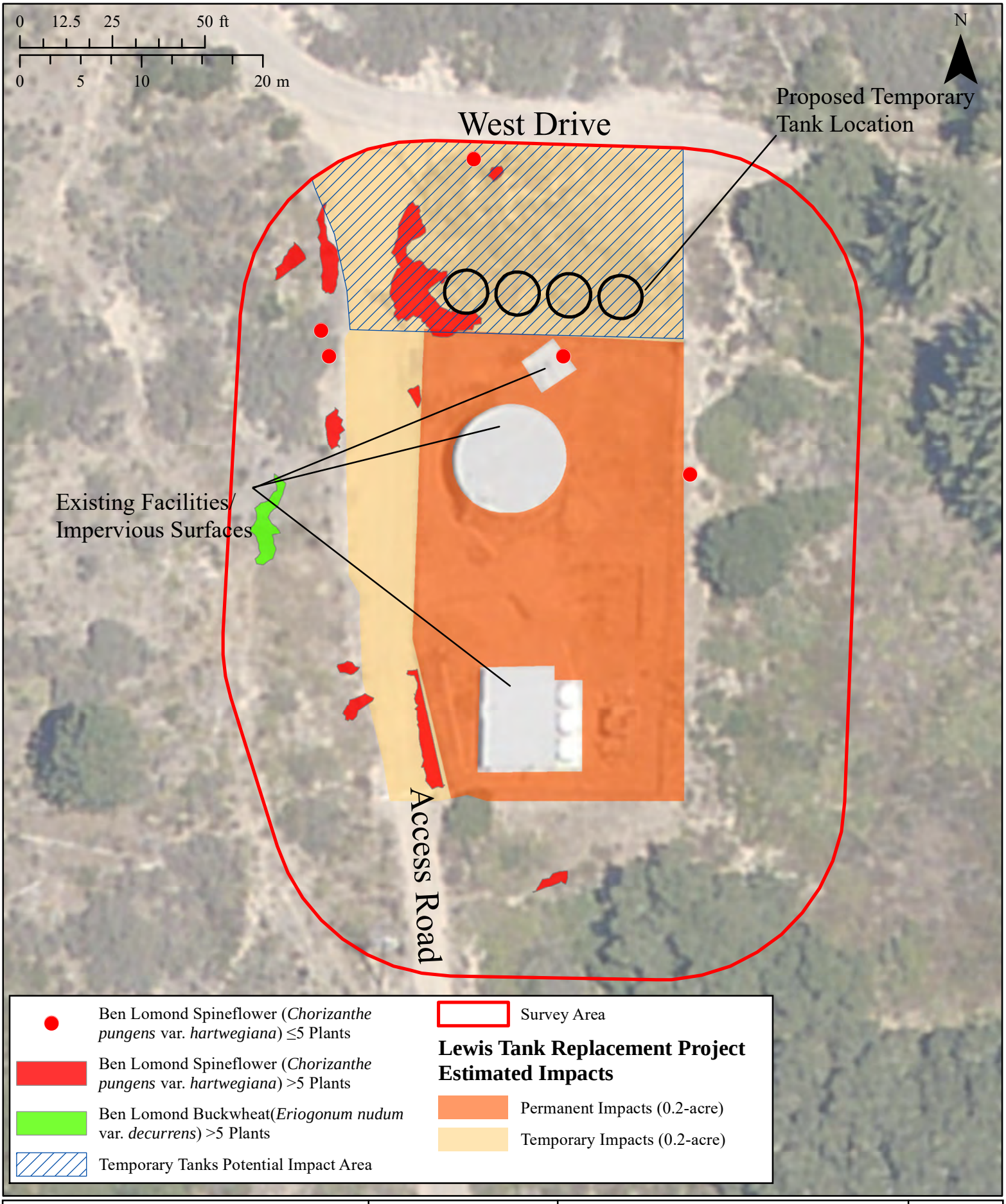


Potential Impacts to Suitable Mount Hermon June Beetle Habitat

Date: 7/9/2019
Scale: 1 in = 40 ft
Project: 2018.62

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341

Figure 3



Rare Plant Map
Lewis Tank Site

Date: 9/3/2019
Scale: 1 in = 30 ft
Project: 2018.62

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
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Figure 4

Document Path: F:\GIS\GIS_Projects\2018-62 Lompico Tanks\Map Products\Figure 4. Rare Plant Map Lewis Tank Impact.mxd

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IMPACTS AND MITIGATION

This report describes the biological resources within the identified survey areas that could potentially be impacted by the project. Sensitive habitats, and special-status species, as well as the potential for several special-status species, were identified within the survey area. Implementation of the project could result in potentially significant impacts to these resources. The following provides an overview of mitigation measures that are recommended to reduce impacts to special-status species and sensitive habitats to a less than significant level under CEQA.

All Tank Sites

To reduce impacts to all special-status species and sensitive habitats the District will implement the following Mitigation Measures:

MM 1. The District shall ensure that a qualified biologist conducts an education program for all persons employed on the project prior to performing construction activities. Instruction shall consist of a presentation by the qualified biologist that includes a discussion of the biology and general behavior of any special-status species which may be in the area, how they may be encountered within the work area, and procedures to follow when they are encountered. The status of CESA-listed species including legal protection, penalties for violations and project-specific protective management measures shall be discussed. The District shall prepare and distribute wallet-sized cards or a factsheet handout containing this information for workers to carry on-site. Upon completion of the program, employees shall sign an affidavit stating they attended the program and understand all protection measures.

To reduce impacts to SFDW the District will implement the following Mitigation Measures:

MM 2. A qualified biologist will conduct preconstruction surveys of all ground disturbance areas to determine if SFDW are present prior to the start of construction. The biologist will conduct these surveys no more than 2 weeks prior to the beginning of construction. If SFDW nests are found, nests shall be mapped/flagged and documented in pre-construction report.

MM 3. In the event, a SFDW nest is found, and assuming the nest is of the SFDW sub-species, one of the following measures will be implemented. These measures are listed in order of priority, where the first measure is the preferred measure to be implemented as it provides the least amount of impact to the woodrat. If the first measure cannot be implemented due to extenuating site conditions, the second shall be implemented and so forth down the list.

1. The development will be rerouted/re-sited if possible, to avoid the woodrat nest by at least 50 feet.
2. Safety and/or silt fencing will be erected around all nests within 25 feet of the grading and construction activities to avoid impacts during site work.
3. In the event, the project footprint must go directly through a nest, the District shall dismantle the nest and replace the materials outside of the project impact area. Nests shall be moved in the early morning during the non-breeding season (October through February), if possible.

MM 4. A biological monitor should be on site for all vegetation removal and initial ground disturbing activities. Following ground disturbance, the biological monitor shall train a construction crewmember to act as the biological monitor for the remainder of the construction.

To reduce impacts to nesting raptors and other avian species the District will implement the following Mitigation Measures:

MM 5. If equipment staging, site preparation, grading, excavation or other Project-related construction work is scheduled during the nesting season of protected raptors and other avian species, a qualified biologist shall conduct two surveys for active nests within 14 days prior to the beginning of Project construction. The final survey shall be conducted within 48 hours prior to construction. Surveys shall be conducted in all suitable habitat located at Project work sites, in staging, storage and soil stockpile areas. Nesting seasons are typically defined as March 15 to August 30 for small bird species such as passerines and February 15 to September 15 for other raptors. The minimum survey radii surrounding the work area shall be 300 feet. If an active nest is found during surveys, the qualified biologist shall designate a protected area (while occupied) during Project construction by demarking a "No Work Zone" around each nest site. The qualified biologist shall monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by Project construction work. Nest monitoring shall continue during construction until the young have fully fledged (have completely left the nest site and are no longer being fed by the parents), as determined by the qualified biologist.

Lewis Tank

To reduce impacts to silverleaf manzanita and Ben Lomond buckwheat the District will implement the following Mitigation Measures:

MM 7. The District will install exclusionary fencing (orange cyclone fencing) at the limits of construction for the Lewis Tank Site. A qualified biologist will be onsite to direct the fence installation and ensure that silverleaf manzanita and Ben Lomond buckwheat are avoided. The fencing will be inspected once a week to ensure that it remains intact during project construction.

To avoid and minimize impacts to Ben Lomond spineflower the District will implement the following avoidance and minimization measures (A&MMs):

A&MM 1. Prior to construction, implement a construction fencing plan that demarcates construction access routes and staging areas such that inadvertent impacts to special-status plant species are avoided including silverleaf manzanita and Ben Lomond buckwheat. Install construction fencing prior to work and maintain fencing throughout the construction period.

A&MM 2. During the summer prior to construction, if possible, a qualified biologist will collect seed of all the Ben Lomond spineflower plants from within the project impact area, for use in restoration (see RM 3).

A&MM 3. For all mapped Ben Lomond spineflower populations that cannot be avoided during installation of the temporary storage tanks or implementation of the larger tank replacement project, and have already desiccated beyond the ability to collect seed, topsoil shall be salvaged for use in restoration efforts, post-project.

a) Topsoil (top 6-8 inches) will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and will be stockpiled in uncompacted piles less than 4 feet tall. Stockpiled soils will be placed on top of an impervious surface, such as a tarp, within temporary disturbance areas. Topsoil stockpiles will be stabilized by spraying with a tackifier (soil stabilizer) or covered with a permeable natural material, such as jute or coconut fiber blankets, as consistent with SWPPP requirements. To minimize compaction, no equipment will be allowed to travel over or park on the salvaged soil stockpiles (see RM 3).

b) Areas within the existing fence line of the Lewis tank site are dominated by non-native invasive plant species. To reduce the potential for these species to cultivate new areas, this measure does not apply to Ben Lomond spineflower populations within the existing fence line of the Lewis tanks site.

To avoid or minimize impacts to MHJB, the District will implement the following A&MMs:

A&MM 4. Prior to construction, implement a construction fencing plan that demarcates construction access routes and staging areas such that inadvertent impacts to suitable habitat for MHJB are avoided. Install construction fencing prior to work and maintain fencing throughout the construction period.

A&MM 5. The District will salvage the soil within the approximately 0.11-acre area proposed for use by the temporary tanks that has not already been salvaged for Ben Lomond spineflower restoration (A&MM 3). Topsoil (top 6-8 inches) will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and will be stockpiled in uncompacted piles less than 4 feet tall. Stockpiled soils will be placed on top of an impervious surface, such as a tarp, within temporary disturbance areas. Topsoil stockpiles will be stabilized by spraying with a tackifier (soil stabilizer) or covered with a permeable natural material, such as jute or coconut fiber blankets, as consistent with SWPPP requirements. To minimize compaction, no equipment will be allowed to travel over or park on the salvaged soil stockpiles (see RM 3).

A&MM 6. Implement Worker Environmental Awareness Training: A qualified biologist will conduct training sessions to familiarize all construction personnel with the following: identification of MHJB, Santa Cruz kangaroo rat, SFDW, Ben Lomond spineflower, silverleaf manzanita, Ben Lomond buckwheat, and other protected wildlife and plants, as well as their habitat, general provisions and protections afforded by the Endangered Species Act (ESA), measures implemented to protect the species, penalties for violation of the ESA, reporting requirements, and a review of project footprint boundaries. the District and/or their contractor(s) will require all construction employees to participate in the training prior to working on-site.

A&MM 7. If ground disturbing activities are conducted during the flight season of the MHJB, cover exposed soil nightly to avoid impacts to dispersing males. Adult male MHJB actively search for mates and breed during the evenings for approximately 12-14 weeks between May 1 and August 30. During this period, males and females may burrow into duff and soils at relatively shallow depths for protection during the daytime hours. Every attempt will be made to conduct soil disturbing aspects of the project outside of the adult flight season (May to August). If construction occurs during any part of the flight season, tarps or other impervious material will be used to cover open soil each night by 7:00 p.m. This will prevent adult males from burrowing into the exposed area and then being impacted by subsequent soil disturbance (digging, grading, or covering).

A&MM 8. A qualified biologist will be on site during all ground-disturbing activities to capture any MHJB observed in the construction areas and relocate them outside to intact sandhills habitat that supports appropriate soils and vegetation.

To provide compensation for impacts to Ben Lomond spineflower plants/seedbank and MHJB suitable habitat the District will implement the following restoration measures (RM):

RM 1. To quantify the incidental take at the end of the project, a qualified biologist will calculate the area of soil disturbance (and thus incidental take) and count the number of MHJB that were observed during tank installation.

RM 2. To compensate for impacts to MHJB habitat impacts at the Lewis tank site the District will set aside 28,850.64 ft2 (0.67-acre) of habitat within the 6.7-acre conservation area at the Olympia Wellfield. Setting aside 21,788.94 ft2 (0.51-acre) of habitat within the conservation area will offset the permanent habitat loss at a 3:1 ratio, which is appropriate given the moderate quality of habitat at the site. The temporary impacts of this project will be compensated for at a 1:1 ratio, which reflects the fact that the habitat to be impacted on site will be restored following the project. Prior to initiation of ground-disturbing activities associated with the project, the District will contribute $94,918.61 to the endowment that it will use to manage and monitor the 6.7-acre conservation area (Table 1).

Table 1. Endowment Contribution for the Lewis Tank Replacement Project

Project Component	**Habitat Impacts**	**Area of Impact**		**Mitigation Ratio**	**Area of Mitigation**		**Endowment Contribution**	
		Area (ac)	Area (ft^2)		Area (ac)	Area (ft^2)	Per Square Foot	Total
Lewis Tank Replacement	Permanent	0.17	7,262.98	3:1	0.51	21,788.94	$3.29	$71,685.61
Temporary Tank	Temporary	0.11	4,802.00	1:1	0.11	4,802.00	$3.29	$15,798.58
Staging/Construction Easement	Temporary	0.05	2,259.70	1:1	0.05	2,259.70	$3.29	$7,434.41
TOTAL		**0.33**	**14,324.68**		**0.67**	**28,850.64**		**$94,918.61**

RM 3. Following completion of the project, the District will restore the estimated 0.08-acre area of temporary disturbance that is outside of the existing fence line and access road, at the Lewis tank site. Restoration activities will occur for three years, to enable native plant regeneration to occur. The restoration is anticipated to include dispersal of any site-collected Ben Lomond

spineflower seed and salvaged topsoil (A&MM 3 and 5) into the non-road portions of the temporary disturbance area.

The District will work with a qualified biologist to develop a more detailed proposal for review by the Service that outlines the specific habitat restoration and monitoring activities. The proposal will also include updating the Sandhills Projects database that the District created to help the Service and others track Sandhills conservation and mitigation projects, to include this and other sandhills conservation and mitigation projects that have been conducted since the database was created and submitted to the Service in 2014.

Implementation of these avoidance, minimization, and restoration measures would reduce potential impacts to MHJB and Ben Lomond spineflower to a less than significant level under CEQA. In addition, implementation of these measures would also reduce or avoid potential impacts to silverleaf manzanita, SFDW, Santa Cruz kangaroo rat, Ben Lomond buckwheat, and raptors and other nesting birds. To further reduce impacts to raptors and other nesting birds, a pre-construction nesting bird survey should be conducted within the survey areas.

Depending on the project impact area and the construction methods used, the following regulatory permits may be required:

- Significant Tree Removal Permit from Santa Cruz County

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APPENDIX A

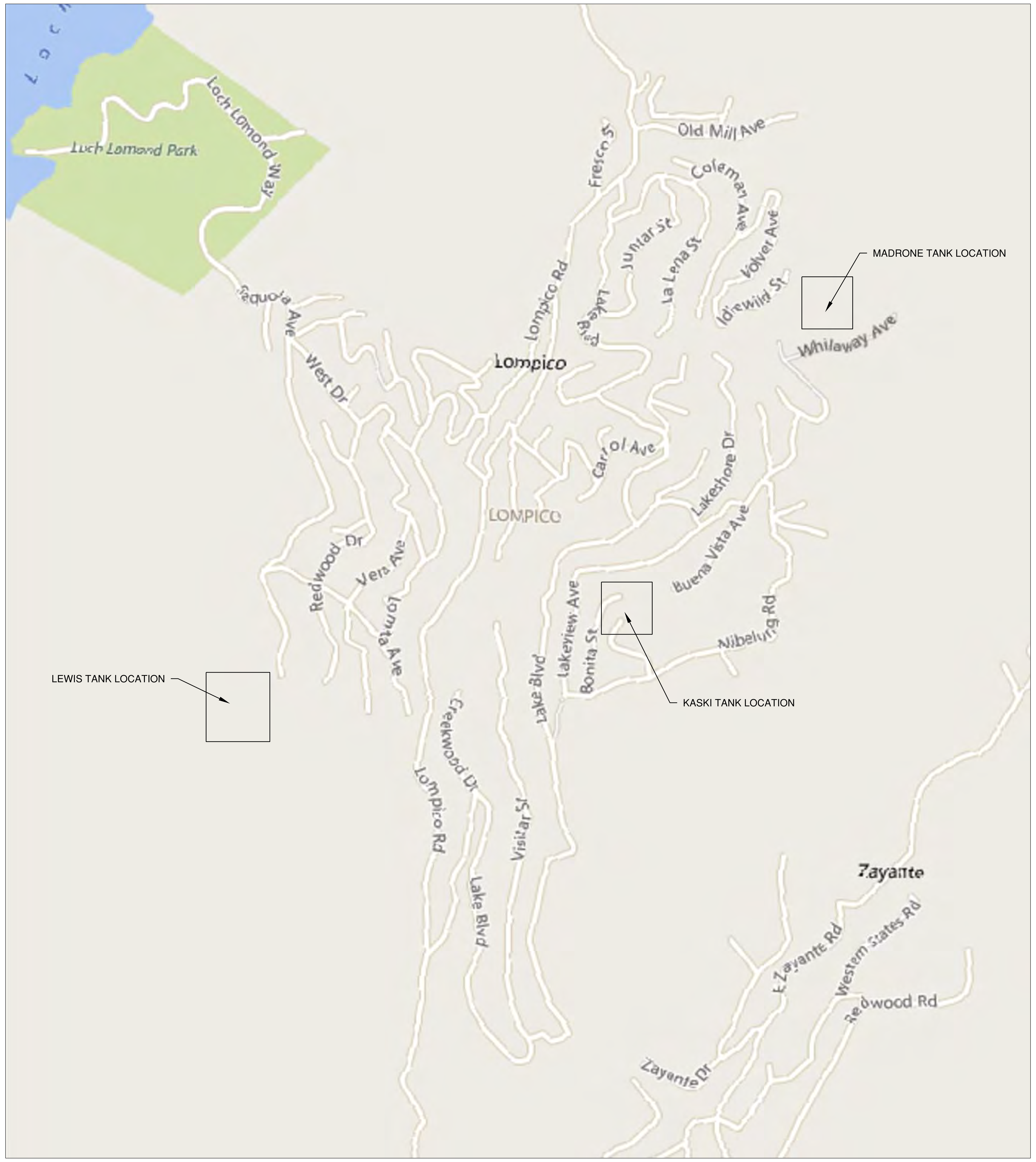
LOMPICO TANKS PROJECT PLANS

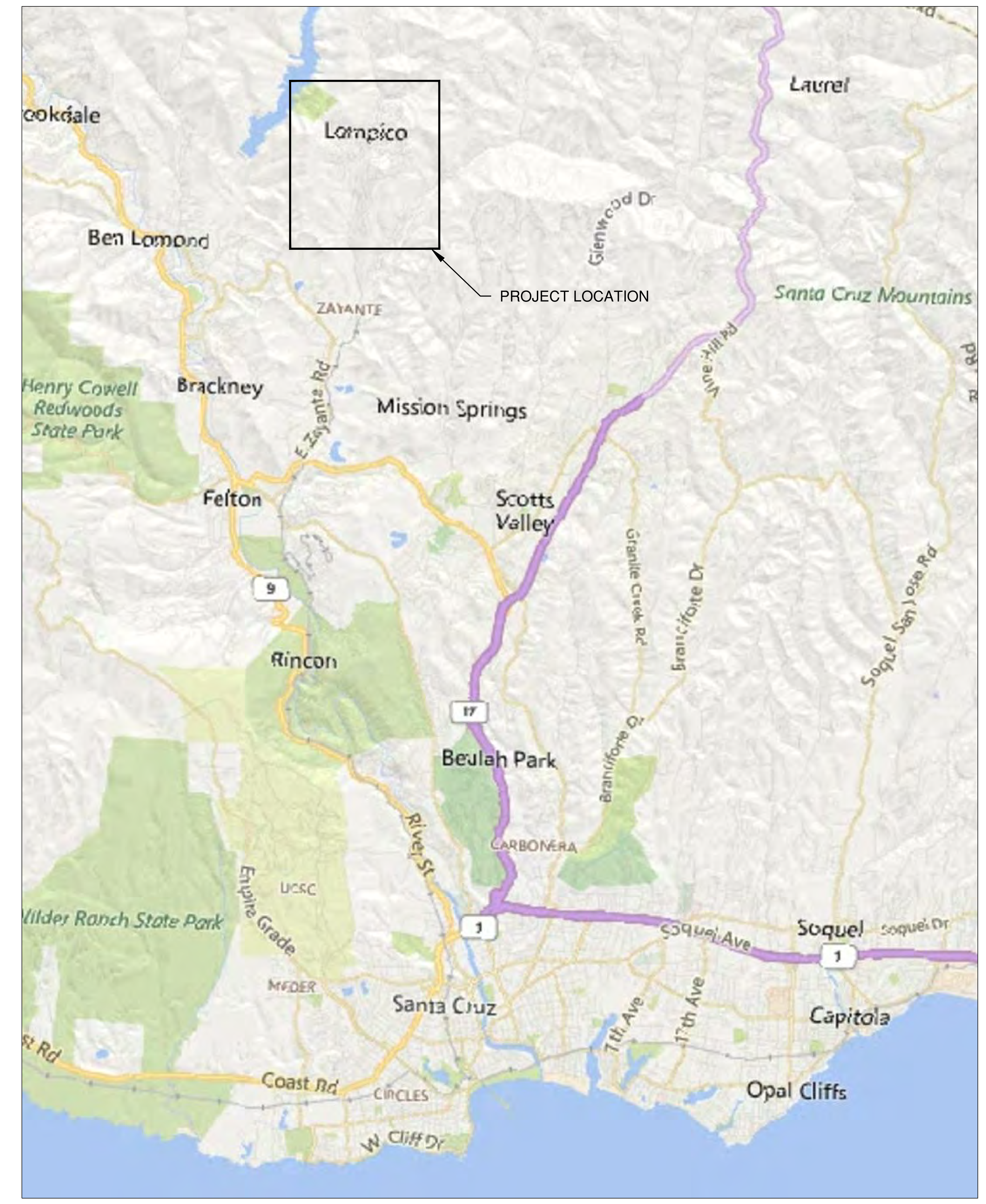
SAN LORENZO VALLEY WATER DISTRICT
LOMPICO TANKS REPLACEMENT

OWNER:
SAN LORENZO VALLEY WATER DISTRICT (SLVWD)
(831) 338-2153
13060 HIGHWAY 9
BOULDER CREEK, CA 95006

CIVIL ENGINEER:
SCHAAF & WHEELER
(831) 883-4848
3 QUAIL RUN CIRCLE, SUITE 101
SALINAS, CA 93907

GEOTECH ENGINEER:
PACIFIC CREST ENGINEERING INC.
(831) 722-9446
444 AIRPORT BLVD., SUITE 106
WATSONVILLE, CA 95076





VICINITY MAP

PRELIMINARY - NOT FOR CONSTRUCTION

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
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PRELIMINARY - NOT FOR CONSTRUCTION

TITLE SHEET
LOMPICO TANKS REPLACEMENT
SLVWD NO.______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: NO SCALE
SUBMITTAL: 60% SUBMITTAL

G1.0
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ABBREVIATIONS

AB	AGGREGATE BASE	LOC	LOCATION
AC	ASPHALT CONCRETE	MB	MAILBOX
APPROX	APPROXIMATE	MSB	MAIN SWITCHBOARD
AWWA	AMERICAN WATERWORKS ASSOC	MH	MANHOLE
BLDG	BUILDINGS	MAX	MAXIMUM
BLRDS	BOLLARDS	MJ	MECHANICAL JOINT
BTFLY	BUTTERFLY	MIN	MINIMUM
BTW	BETWEEN	MIP	MALE IRON PIPE
CL	CENTERLINE	MCC	MOTOR CONTROL CENTER
COM	COMMUNICATION	N	NORTH
CP	CONTROL POINT	(N)	NEW
CV	CHECK VALVE	N.I.C	NOT IN CONTRACT
CVR	COVER	NPT	NATIONAL PIPE THREAD
CLR	CLEAR	NSHT	NATIONAL STANDARD HOSE THREAD
CMP	CORRUGATED METAL PIPE	NTS	NOT TO SCALE
CONC	CONCRETE	O.C.	ON CENTER
CPT	CONTROL POINT	OD	OUTSIDE DIAMETER
CFS	CUBIC FEET PER SECOND	OH	OVERHEAD
CYC	CYCLONE	PNL	PANEL
DL	DAYLIGHT	PE	PLAIN END, POLYETHYLENE
DET	DETAIL	PVC	POLY-VINYL CHLORIDE
DIA	DIAMETER	PSI	POUNDS PER SQUARE INCH
DBL	DOUBLE	PP	POWER POLE
DWGS	DRAWINGS	(P)	PROPOSED
DWY	DRIVEWAY	RED	REDUCER
DI	DUCTILE IRON	RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE	R/W	RIGHT-OF-WAY
EA	EACH	RSR	RISER
EP	EDGE OF PAVEMENT	RD	ROAD
ESMT	EASEMENT	SCH	SCHEDULE
E	EAST	SPECS	SPECIFICATIONS
EP	EDGE OF PAVEMENT	SS	SANITARY SEWER
ELEC, ELECT	ELECTRICAL	SSCO	SANITARY SEWER CLEANOUT
EL,ELEV	ELEVATION	SSFM	SANITARY SEWER FORCE MAIN
ELL	ELBOW	SSMH	SANITARY SEWER MANHOLE
EQUIP	EQUIPMENT	SRVP	SERVICE POLE
(E)	EXISTING	SP	STATIC PRESSURE
(F)	FUTURE	STA	STATION
FIPT	FEMALE IRON PIPE THREAD	STD	STANDARD
FNPT	FEMALE NATIONAL PIPE THREAD	STL	STEEL
FEN	FENCE	SD	STORM DRAIN
FF	FINISH FLOOR	SL	STREET LIGHT
FLG, FL	FLANGE	STS	STREET NAME SIGN
FL, FLR	FLOW LINE	TCE	TEMPORARY CONSTRUCTION EASEMENT
GAL	GALLON(S)	TOD	TOP OF DITCH
GPM	GALLONS PER MINUTE	TOS	TOP OF SLOPE
GALV	GALVANIZED	TS	TRAFFIC SIGN
GV	GATE VALVE	TYP	TYPICAL
GB	GRADE BREAK	VLTS	VAULTS
GS	GALVANIZED STEEL	W	WATER
HW	HEADWALL	WM	WATER MAIN
HP	HORSEPOWER	W/	WITH
HDPE	HIGH-DENSITY POLYETHYLENE	WSP	WELDED STEEL PIPE
ID	INSIDE DIAMETER	WD	WOOD
INV	INVERT	WDFE	WOOD FENCE
IW	INDUSTRIAL WASTE		
IPS	IRON PIPE SIZE		

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	EASEMENT	
	TEMPORARY CONSTRUCTION EASEMENT	TCE
	PROPERTY LINE - R/W	
	LIMIT OF WORK	
	CYCLONE FENCE	X X
	WOOD FENCE	
W	WATER LINE	W W
	FUTURE WATER LINE	W W
OHE	(E) OVERHEAD ELECTRIC	OHE
181.44	SPOT ELEVATION	181.44
	DRAIN PIPE	
	REMOVE	
	EDGE OF (E) PAVEMENT	
	MAJOR CONTOUR LINE (TOPO)	
	MINOR CONTOUR LINE (TOPO)	
E	BURIED ELECTRIC	
T	TELEPHONE	
OH	OVERHEAD COMMUNICATION	
	VEGETATION	
SD	STORM DRAIN PIPE	SD
	VAULT	
	MANHOLE	
	CONTROL POINT	
	FOUND MONUMENT AS NOTED	
60"K	EXISTING TREE & TYPE	
4",6"K	TREE CLUSTER WITH SIZE	
CYP	CYPRESS	
K	OAK	
P	PINE	
RDWD	REDWOOD	
T	TREE (MISC)	

SCOPE OF WORK

1. PROVIDE TEMPORARY WATER TANKS AND ABOVE-GRADE PIPELINES AND VALVES
2. DEMOLISH AND REMOVE THE EXISTING REDWOOD WATER TANKS, CONCRETE FOUNDATIONS, FENCES, YARD PIPING AND SURFACE IMPROVEMENTS.
3. HARVEST AND REMOVE TREES AS NOTED ON THE PLANS.
4. DEMOLISH AND REMOVE THE EXISTING TREATMENT BUILDING AND EQUIPMENT AT THE LEWIS TANK SITE.
5. DESTROY LOMPICO WELL NO. 5 AT THE LEWIS TANK SITE.
6. GRADE AND COMPACT THE TANK SITES.
7. PROVIDE NEW BOLTED STEEL WATER TANKS ON CONCRETE RING FOUNDATIONS, WITH APPURTENANCES, YARD PIPING, SITE PAVING AND FENCING.
8. REMOVE AND RELOCATE THE TEMPORARY PIPELINES

CONSTRUCTION SEQUENCE

1. HARVEST AND REMOVE TREES AT THE MADRONE SITE.
2. INSTALL TEMPORARY TANKS AT THE MADRONE SITE.
3. DEMOLISH AND REMOVE EXISTING MADRONE TANKS.
4. CONSTRUCT NEW MADRONE TANKS AND ALL SITE WORK.
5. RELOCATE TEMPORARY TANKS TO KASKI SITE.
6. HARVEST AND REMOVE TREES AT THE KASKI SITE.
7. DEMOLISH AND REMOVE EXISTING KASKI TANKS.
8. CONSTRUCT NEW KASKI TANKS AND ALL SITE WORK.
9. DESTROY LOMPICO WELL NO. 5 (CONCURRENT WITH PRECEDING ITEMS)
10. RELOCATE TEMPORARY TANKS TO LEWIS SITE.
11. HARVEST AND REMOVE TREES AT THE LEWIS SITE.
12. DEMOLISH AND REMOVE EXISTING LEWIS TANKS, BUILDING AND SITE IMPROVEMENTS.
13. CONSTRUCT NEW LEWIS TANKS AND ALL SITE WORK.
14. REMOVE TEMPORARY TANKS AND PIPING.

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REGISTERED PROFESSIONAL ENGINEER · ANDREW A. STERBENZ · No. 69703 · CIVIL · STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION

LEGEND, ABBREVIATIONS, & SHEET INDEX

LOMPICO TANKS REPLACEMENT

SLVWD NO. ______

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PROJECT NO.:
SCALE: NO SCALE
SUBMITTAL: 60% SUBMITTAL

G1.1

SHEET 2 OF 25

GENERAL NOTES:

1. SHOULD IT APPEAR THAT THE WORK TO BE PERFORMED OR ANY MATTER RELATIVE THERETO, IS NOT SUFFICIENTLY DETAILED OR EXPLAINED ON THESE PLANS, THE CONTRACTOR SHALL CONTACT THE DISTRICT ENGINEER AT 831-338-2153 WITH ANY QUESTIONS OR DISCREPANCIES. ANY REVISIONS REQUIRE OWNER'S APPROVAL BEFORE PROCEEDING WITH REVISED PLANS.
2. UNAUTHORIZED CHANGES AND USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THESE PLANS MUST BE MADE IN WRITING AND APPROVED BY THE PREPARER OF THESE PLANS.
3. CONSTRUCTION CONTRACTOR AGREES THAT THE IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONSTRUCTION CONTRACTOR SHALL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY OF THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD THE CIVIL ENGINEER AND THE OWNER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE CIVIL ENGINEER.
4. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ACCEPTED WORKMANSHIP PRACTICE AND THESE PLANS. ORDERS GIVEN BY THE OWNER REPRESENTATIVE RELATING TO THE QUALITY OF MATERIALS AND WORKMANSHIP SHALL BE COMPLIED WITH PROMPTLY BY THE CONTRACTOR.
5. CONTRACTOR SHALL POSSESS A VALID CLASS A - GENERAL ENGINEERING CONTRACTOR LICENSE AT THE TIME THE CONTRACT IS AWARDED AND SHALL MAINTAIN THROUGHOUT THE LENGTH OF CONTRACT. SUB-CONTRACTORS SHALL POSSES VALID LICENSE(S) FOR THE PORTION(S) OF THE WORK THEY ARE PERFORMING.
6. THE CONTRACTOR SHALL POST EMERGENCY TELEPHONE NUMBERS AT THE JOB SITE FOR PUBLIC WORKS, AMBULANCE, POLICE AND FIRE DEPARTMENTS. CONTRACTOR SHALL POST SIGN AT JOB SITE BEARING OWNER'S NAME AND SITE ADDRESS. PROPERTY CORNERS SHALL BE CLEARLY MARKED.
7. THE CONTRACTOR SHALL OBTAIN ALL PERMITS AND LICENSES REQUIRED FOR THE CONSTRUCTION AND COMPLETION OF THE PROJECT.
8. CONTRACTOR SHALL CONFORM TO THE RULES AND REGULATIONS OF THE STATE CONSTRUCTION SAFETY ORDERS PERTAINING TO EXCAVATION AND TRENCHING. CONTRACTOR SHALL BEAR FULL RESPONSIBILITY FOR TRENCH SHORING DESIGN AND INSTALLATION.
9. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF THE DIVISION OF INDUSTRIAL SAFETY PERTAINING TO "CONFINED SPACES". ANY MANHOLE, CULVERT, DROP INLET OR TRENCH (WHICH COULD CONTAIN AIR) THAT IS NOT READILY VENTILATED MAY BE CONSIDERED A "CONFINED SPACE".
10. EXCAVATION SHALL BE ADEQUATELY SHORED, BRACED AND SHEETED SO THAT THE EARTH WILL NOT SLIDE OR SETTLE AND SO THAT ALL EXISTING IMPROVEMENTS OF ANY KIND WILL BE FULLY PROTECTED FROM DAMAGE. ANY DAMAGE RESULTING FROM A LACK OF ADEQUATE SHORING, BRACING AND SHEETING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND HE SHALL EFFECT NECESSARY REPAIRS OR RECONSTRUCTION AT HIS OWN EXPENSE. WHERE THE EXCAVATION FOR A CONDUIT TRENCH, STRUCTURE AND/OR BORING AND JACKING PIT IS REQUIRED, THE CONTRACTOR SHALL CONFORM TO THE APPLICABLE CONSTRUCTION SAFETY ORDERS OF THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA. THE CONTRACTOR SHALL ALWAYS COMPLY WITH OSHA REQUIREMENTS.
11. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. APPROVAL OF THESE PLANS BY THE AGENCY DOES NOT GUARANTEE THE ACCURACY, COMPLETENESS, LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS NECESSARY TO PROTECT EXISTING UTILITY LINES.
12. CONTRACTOR SHALL HAVE UTILITIES LOCATED BY CALLING UNDERGROUND SERVICE ALERT (USA) NORTH AT (800) 227-2600 OR 811 AT LEAST 48-HOURS PRIOR TO START OF CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE ENGINEER AND THE OWNER OF ANY DIFFERENCES IN THE LOCATIONS OF EXISTING UTILITIES SHOWN, OR ANY CONFLICTS WITH THE DESIGN, BEFORE CONTINUING WITH WORK IN THAT AREA.
13. SHOULD IT APPEAR THAT THE WORK TO BE DONE, OR ANY MATTER RELATIVE THERETO, IS NOT SUFFICIENTLY DETAILED OR EXPLAINED ON THESE PLANS, THE CONTRACTOR SHALL CONTACT THE ENGINEER AT (831) 883-4848 FOR SUCH FURTHER EXPLANATIONS AS MAY BE NECESSARY.
14. THE CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAGMEN AND OTHER DEVICES NECESSARY TO PROVIDE FOR PUBLIC SAFETY AND TO MAINTAIN TRAFFIC CONTROL AT ALL TIMES.
15. THE CONTRACTOR SHALL NOT DESTROY ANY PERMANENT SURVEY POINTS. ANY PERMANENT MONUMENTS OR POINTS DESTROYED SHALL BE REPLACED BY A LICENSED ENGINEER OR LICENSED SURVEYOR AT THE CONTRACTOR'S EXPENSE.
16. DURING GRADING OPERATIONS, THE CONTRACTOR SHALL IMPLEMENT DUST CONTROL MEASURES ON SITE AND ON HAUL ROUTES.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING AN AIRBORNE DUST NUISANCE FROM THE CONSTRUCTION SITE BY WATERING AND/OR TREATING THE SITE IN SUCH A MANNER TO LIMIT THE EXTENT OF AIRBORNE DUST PARTICLES.
18. SITE WORK HOURS ARE 8:00 A.M. TO 5:00 P.M. MONDAY THRU FRIDAY. NO SITE WORK SHALL BE PERFORMED ON SATURDAYS, SUNDAYS OR OBSERVED NATIONAL HOLIDAYS WITHOUT PRIOR WRITTEN CONSENT OF THE OWNER.
19. THE WORK SITE SHALL BE CONTINUALLY MAINTAINED AND KEPT FREE OF TRASH AND CLUTTER. SOLID WASTE SHALL BE STORED IN CLOSED CONTAINERS AND TRANSPORTED TO AN APPROVED DUMPSITE ON A REGULAR BASIS.
20. THESE PLANS SHOW EXISTING FEATURES INCLUDING BUT NOT LIMITED TO TREES, UTILITIES AND STRUCTURES THAT MAY BE AFFECTED BY THE CONSTRUCTION OR PLACEMENT OF THE PROPOSED ENGINEERED IMPROVEMENTS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE TO IMMEDIATELY NOTIFY THE ENGINEER IF THERE ARE ANY EXISTING FACILITIES, WHETHER SHOWN OR NOT SHOWN ON THESE PLANS, WHICH COULD IN ANY WAY BE IN POTENTIAL CONFLICT WITH THE DESIGN ON THESE PLANS. ALL WORK WITHIN THE VICINITY OF POTENTIAL CONFLICT SHALL CEASE UNTIL AN ADEQUATE AND APPROPRIATE SOLUTION IS DETERMINED BY THE ENGINEER/OWNER'S REPRESENTATIVE AND APPROVED BY THE OWNER.
21. CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTION SITE STORM WATER POLLUTION PREVENTION AND IMPLEMENTING NECESSARY BEST MANAGEMENT PRACTICES. EROSION CONTROL MEASURES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY. WET SEASON CONTROLS ARE REQUIRED (MINIMUM) BETWEEN OCTOBER 15 AND APRIL 15.
22. THE CONTRACTOR SHALL COMPLY WITH ALL RULES, REGULATIONS AND PROCEDURES OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) FOR MUNICIPAL, CONSTRUCTION AND INDUSTRIAL ACTIVITIES AS PROMULGATED BY THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD OR ANY OF ITS' REGIONAL WATER QUALITY CONTROL BOARDS. REFER TO THE FOLLOWING GENERAL PERMITS
    a. WQO 2009-0009-DWQ, GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES, WITH AMENDMENTS
    b. WQO 2013-0001-DWQ, GENERAL PERMIT FOR STORM WATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4S)
    c. WQO 2014-0194-DWQ, NPDES PERMIT FOR DRINKING WATER DISCHARGES TO WATERS OF THE UNITED STATES
18. IF ARCHAEOLOGICAL RESOURCES OR HUMAN REMAINS ARE DISCOVERED DURING CONSTRUCTION, THE COUNTY CORONER SHALL BE NOTIFIED AND WORK SHALL BE HALTED TO WITHIN 150-FEET OF THE FIND UNTIL IT CAN BE EVALUATED BY A QUALIFIED PROFESSIONAL ARCHAEOLOGIST. IF THE FIND IS SIGNIFICANT, APPROPRIATE MITIGATION MEASURES SHALL BE FORMULATED AND IMPLEMENTED.
19. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL CERTIFY THAT ALL WORK WAS PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL SUBMIT TWO SETS OF 'RED-LINE AS-BUILT PLANS SHOWING ALL CHANGES TO THE OWNER PRIOR TO FINAL ACCEPTANCE OF THE IMPROVEMENTS.
20. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO KEEP PUBLIC STREETS FREE FROM DIRT AND DEBRIS. SHOULD ANY DIRT OR DEBRIS BE DEPOSITED IN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL REMOVE IT IMMEDIATELY.
21. CONTRACTOR SHALL REPLACE, AT HIS EXPENSE, ALL TREES, SHRUBS, LAWNS, FENCES, IRRIGATION SYSTEMS AND IMPROVEMENTS WHICH ARE TO REMAIN INTACT BUT ARE REMOVED OR DAMAGED DURING CONSTRUCTION. CONTRACTOR SHALL NOT REMOVE OR DAMAGE IMPROVEMENTS LOCATED WITHIN THE PROPERTY WITHOUT WRITTEN PERMISSION FROM THE OWNER.
22. COORDINATE WITH THE OWNER FOR TEMPORARY CONSTRUCTION STORAGE AREAS .
23. MAINTAIN ONE-WAY TRAFFIC ON PUBLIC AND PRIVATE ROADS, PAVED OR UNPAVED, ON WHICH WORK IS BEING PERFORMED DURING WORKING HOURS, OR COORDINATE WITH OWNER TO PROVIDE AN ACCEPTABLE DETOUR ROUTE AROUND THE WORKING AREA. MAINTAIN NORMAL TRAFFIC TRAVEL WIDTH DURING NON-WORKING HOURS. REFER TO ENCROACHMENT PERMITS, LICENSES, EASEMENT CONDITIONS AND TRAFFIC PLANS, WHERE APPLICABLE, AS INCLUDED IN THE SPECIFICATIONS.
24. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE FOLLOWING LIST OF STANDARDS ARE/OR SPECIFICATIONS ARE INCORPORATED INTO THESE PLANS BY REFERENCE. DESIGN AND CONSTRUCTION OF ALL IMPROVEMENTS SHALL COMPLY WITH ALL APPLICABLE STANDARDS INCLUDING:
    a. CALIFORNIA WATER WORKS STANDARDS (CALIFORNIA CODE OF REGULATIONS, TITLES 17 AND 22)
    b. AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS
    c. STANDARD SPECIFICATIONS, STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION, 2018 EDITION
    d. STANDARD PLANS, STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), 2018 EDITION
    e. CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS (CAL OSHA)
32. ALL UNDERGROUND FACILITIES SHALL BE INSTALLED PRIOR TO THE FINAL PREPARATION OF SUBGRADE AND PLACEMENT OF BASE MATERIAL. VALVE BOX ELEVATIONS (IF SHOWN) ARE APPROXIMATE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING COVERS TO THE FINAL PAVEMENT GRADE.
33. WHEN REPLACING EXISTING PAVEMENT, THE EXISTING PAVEMENT SHALL BE CUT TO A NEAT LINE AND REMOVED BACK TO AN EXISTING ADEQUATE STRUCTURAL SECTION. AN EXPLORATORY TRENCH OR POTHOLING MAY BE REQUIRED TO DETERMINE THE LIMITS OF PAVEMENT REMOVAL.
34. CONTRACTOR IS RESPONSIBLE FOR FOR MATCHING EXISTING PAVEMENTS AND OTHER IMPROVEMENTS WITH A SMOOTH TRANSITION IN PAVING, CURBS, GUTTERS, GRADING, ETC. AND TO AVOID THE CREATION OF LOW SPOTS, HAZARDOUS CONDITIONS OR ABRUPT OR APPARENT CHANGES IN APPEARANCE, GRADES OR CROSS-SLOPES.
35. IMPROVEMENTS ARE SUBJECT TO INSPECTION AND APPROVAL BY OWNER'S ENGINEER AND THE OFFICE OF THE STATE FIRE MARSHAL. NOTIFY THE APPLICABLE JURISDICTION(S) AT LEAST 48-HOURS PRIOR TO THE START OF WORK TO ARRANGE FOR INSPECTION.
36. TREE REMOVAL...

GRADING NOTES:

1. THE WORK OF THIS PROJECT INCLUDES TANK FOUNDATION OVER-EXCAVATION AND RECOMPACTION, UTILITY TRENCH EXCAVATION AND BACKFILLING. TOTAL GRADING (CUT AND FILL) IS APPROXIMATELY 250 CUBIC YARDS AT LEWIS, 200 CUBIC YARDS AT KASKI, AND 40 CUBIC YARDS AT MADRONE.
2. ALL GRADING, EROSION CONTROL, SITE PREPARATION AND PLACING AND COMPACTION OF FILL SHALL BE DONE IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINED IN THE GEOTECHNICAL REPORT ENTITLED "GEOTECHNICAL INVESTIGATION", PREPARED BY PACIFIC CREST ENGINEERING INC., DATED DECEMBER 10, 2018. THIS WORK SHALL BE UNDER THE DIRECT SUPERVISION OF THE SOILS ENGINEER SUBSEQUENT TO COMPLETION OF THE WORK. THE GEOTECHNICAL ENGINEER SHALL SUBMIT A REPORT TO THE OWNER STATING THAT ALL WORK HAS BEEN DONE TO HIS OR HER SATISFACTION.
3. GEOTECHNICAL ENGINEER SHALL BE PRESENT DURING EARTHWORK. ONCE SITE IS ROUGH GRADED, GEOTECHNICAL ENGINEER SHALL DETERMINE ANY REVISIONS TO FOUNDATION AND OVEREXCAVATION PRIOR TO CO0NTRACTOR BEGINNING WORK ON STRUCTURAL FOUNDATIONS. GEOTECHNICAL ENGINEER SHALL PROVIDE WRITTEN GUIDANCE IF SOIL CONDITIONS DIFFER FROM WHAT IS PRESENTED IN THE GEOTECHNICAL INVESTIGATION REPORT.
4. THE CONTRACTOR SHALL PROVIDE THE CONSTRUCTION STAKES. THE NUMBER AND LOCATION OF STAKES REQUIRED SHALL BE DETERMINED BEFORE THE CONSTRUCTION BEGINS. ALL CONSTRUCTION STAKING SHALL BE DONE BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR.
5. ALL EXISTING ELEVATIONS SHOWN ARE AS MEASURED IN THE FIELD, UNLESS NOTED OTHERWISE.
6. ALL GRADES SHOWN ARE FINISHED GRADES, UNLESS OTHERWISE NOTED.
7. ALL STATIONING AND DISTANCES INDICATED ON THE DRAWINGS ARE BASED ON HORIZONTAL MEASURED FEET.
8. ALL GRADING, EROSION CONTROL, SITE PREPARATION, AND PLACING AND COMPACTION OF FILL SHALL BE DONE IN ACCORDANCE WITH CHAPTER 16.20 OF THE SANTA CRUZ COUNTY, CA CODE OF ORDINANCES.
9. CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE OWNER AT LEAST TWO WORKING DAYS PRIOR TO THE START OF WORK.
8. CLEAR SURFACE VEGETATION AND STRIP TOPSOIL TO BOTTOM OF ROOT ZONE WITHIN GRADING AREAS. STOCKPILE TOPSOIL ON-SITE FOR FUTURE USE. CHIP AND SPREAD REMOVED VEGETATION WITHIN THE LIMITS OF THE WORK.
9. STRUCTURAL FILL AREAS SHALL BE SCARIFIED TO A DEPTH OF 18-INCHES, MOISTURE CONDITIONED AND COMPACTED.
10. CLEAN NATIVE MATERIAL MEETING THE REQUIREMENTS LISTED IN THE GEOTECHNICAL REPORT MAY BE USED AS STRUCTURAL FILL. IMPORTED STRUCTURAL FILL, IF NEEDED, SHALL MEET THE REQUIREMENTS LISTED IN THE GEOTECHNICAL REPORT.
11. BEDDING FOR UNDERGROUND UTILITIES SHALL BE IMPORTED SAND MATERIAL (MINIMUM S.E. = 30) UNLESS OTHERWISE APPROVED BY THE ENGINEER. BEDDING SHALL BE COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95% AS BASED UPON ASTM TEST DESIGNATION D1557, MODIFIED PROCTOR.
12. BACKFILL FOR UTILITY TRENCHES UNDER PAVEMENTS SHALL BE CLEAN NATIVE MATERIAL OR CLASS 2 AGGREGATE BASE FOR FULL TRENCH DEPTH TO THE PAVEMENT SUBGRADE, COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%, MODIFIED PROCTOR. BACKFILL FOR UTILITY TRENCHES IN NON-PAVED AREAS SHALL BE CLEAN NATIVE MATERIAL OR IMPORTED SAND MATERIAL (MINIMUM S.E. = 30), UNLESS OTHERWISE APPROVED BY THE ENGINEER, COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 90%, MODIFIED PROCTOR.
13. ALL SURPLUS AND UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE SITE.
14. EXCESS NATIVE SOIL FROM TRENCHES SHALL REMAIN ON-SITE. COORDINATE WITH FAIRGROUNDS STAFF FOR STOCKPILE LOCATION.
15. CONTRACTOR SHALL NEITHER WASTE NOR DEPOSIT ANY HAZARDOUS MATERIALS ON THE GRADING SURFACES OR WITHIN THE GRADED CUT AND FILL AREAS OF THIS PROJECT, INCLUDING BUT NOT LIMITED TO GASOLINE OR DIESEL FUELS, MOTOR OILS OR TRANSMISSION FLUIDS, ANTIFREEZE, HYDRAULIC FLUIDS, LUBRICANTS, STARTING FLUIDS AND FILTERS, AND/OR CONTAINERS FOR THESE PRODUCTS. HAZARDOUS MATERIAL SPILLS THAT OCCUR AS A RESULT OF EITHER EQUIPMENT FAILURES OR VANDALISM, INCLUDING ALL ADJACENT CONTAMINATED SOILS, SHALL BE EXCAVATED AND PACKAGED FOR DISPOSAL AT AN ENVIRONMENTALLY APPROVED DISPOSAL SITE. MATERIALS SHALL NOT BE TRANSPORTED OFF THE SITE UNTIL THEY ARE CATALOGED AND APPROVED BY THE CONSTRUCTION MANAGER. ALL REMOVAL, PACKAGING, TRANSPORTATION AND DISPOSAL COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
16. ALL DISTURBED AREAS SHALL BE RE-SEEDED WITH THE FOLLOWING EROSION CONTROL MIX. APPLY 1 POUND PER 800 SQUARE FEET:

SPECIES	COMMON NAME
FESTUCA RUBRA 'MOLATE'	RED FESCUE
POA SECUNDA	SANDBERG BLUEGRASS
VULPIA MICROSTACHYS	SMALL FESCUE
NASELLA PULCHRA	PURPLE NEEEDLEGRASS
MELICA IMPERFECTA	SMALLFLOWER MELIC

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GENERAL NOTES

LOMPICO TANKS REPLACEMENT

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G1.2

SHEET 3 OF 25

MATERIALS SPECIFICATIONS:

1. GENERAL MATERIAL REQUIREMENTS
1.1. ALL PRODUCTS AND MATERIALS FURNISHED AS PART OF THE WORK INCLUDED IN THIS PLAN SET SHALL BE SUBMITTED TO OWNER REPRESENTATIVE FOR APPROVAL. SUBMITTALS SHALL INCLUDE BUT BE LIMITED TO: SHOP DRAWINGS, MATERIAL PROPERTIES, PRODUCT CUT SHEETS, INSTALLATION REQUIREMENTS AND OPERATION AND MAINTENANCE MANUALS. CONTRACTOR SHALL NOT PURCHASE NOR INSTALL ANY PRODUCTS OR MATERIALS WITHOUT PRIOR SATISFACTORY REVIEW DETERMINATION BY OWNER REPRESENTATIVE.
1.2. ALL MATERIALS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE OWNER REPRESENTATIVE, AND SHALL NOT BE USED BEFORE BEING INSPECTED AND APPROVED BY THE INSPECTOR. OWNER HAS THE RIGHT TO PERFORM ANY TESTING NECESSARY TO TO ENSURE COMPLIANCE OF THE MATERIALS WITH THE MATERIALS SPECIFICATIONS. FAILURE OR NEGLECT ON THE PART OF THE OWNERS REPRESENTATIVE TO CONDEMN OR REJECT WORK MATERIALS NOT IN ACCORDANCE WITH THE MATERIALS SPECIFICATIONS SHALL NOT BE CONSTRUED TO IMPLY ACCEPTANCE SHOULD THEIR INFERIORITY BECOME EVIDENT AT ANY TIME. MATERIALS REJECTED BY THE OWNER REPRESENTATIVE SHALL BE IMMEDIATELY REMOVED FROM THE JOBSITE.

2. REFERENCE STANDARDS
2.1. ANSI AMERICAN NATIONAL STANDARDS INSTITUTE
2.2. ASME - AMERICAN SOCIETY OF MECHANICAL ENGINEERS
2.3. ASTM AMERICAN SOCIETY FOR TESTING AND MATERIALS
2.4. AWWA - AMERICAN WATER WORKS ASSOCIATION
2.5. FM - FM GLOBAL (FACTORY MUTUAL)
2.6. HI - HYDRAULIC INSTITUTE
2.7. IEEE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
2.12. ISO INTERNATIONAL STANDARDS ORGANIZATION
2.13. NEMA NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
2.14. NEC NATIONAL ELECTRICAL CODE
2.15. NFPA - NATIONAL FIRE PROTECTION ASSOCIATION
2.16. NSF - NSF INTERNATIONAL (NATIONAL SANITATION FOUNDATION)
2.17. UL UNDERWRITERS LABORATORIES, INC.

3. CAST-IN-PLACE CONCRETE
3.1. CONCRETE SHALL BE PORTLAND CEMENT CONCRETE, 3000 PSI AT 28 DAYS, MAX 3-INCH SLUMP, PER CALTRANS STANDARD 90-1.
3.2. MAXIMUM AGGREGATE SIZE SHALL BE 1.5-INCH FOR FOUNDATIONS AND BASES AND 1-INCH FOR SLAB ON GRADE.
3.3. REBAR SHALL BE DEFORMED STEEL PER CALTRANS SECTION 52.
3.4. PLACE CONCRETE PER THE REQUIREMENTS OF CALTRANS SECTION 51.
3.5. SUBMIT MIX DESIGN FOR APPROVAL PROPER TO CONSTRUCTION.

4. CEMENT SLURRY
4.1. SAND-CEMENT SLURRY SHALL CONSIST OF ONE SACK (94-POUNDS) OF PORTALND CEMENT PER CUBIC YARD OF SAND, THOROUGHLY MIXED AND WITH SUFFICIENT MOISTURE FOR WORKABILITY.

5. GROUT
5.1. PRE-PROPORTIONED, PREPACKAGED NON-SHRINK GROUTS.
5.2. CEMENT GROUTS SHALL CONSIST OF PORTLAND CEMENT AND SAND, MIXED WITH WATER ON-SITE PER THE MANUFACTURER'S INSTRUCTIONS.
5.3. EPOXY GROUTS SHALL CONSIST OF TWO-COMPONENT THERMOSETTING EPOXY RESIN AND INERT AGGREGATE, MIXED ON-SITE PER THE MANUFACTURER'S INSTRUCTIONS.

6. PRE-CAST CONCRETE STRUCTURES
6.1. ALL PRECAST CONCRETE STRUCTURES SHALL BE DESIGNED TO WITHSTAND H20 LOADING. GRATES, LIDS AND FRAMES SHALL BE DESIGNED TO WITHSTAND H20 TRAFFIC LOADING.

7. EPOXIES
7.1. WATER-INSENSITIVE TWO-PART TYPE EPOXY ADHESIVE MATERIAL CONTAINING 100 PERCENT SOLIDS, MEETING THE REQUIREMENTS OF CALTRANS STANDARD 95.

8. BASE AND SUBBASE
8.1. CLASS 2 AGGREGATE BASE, ¾-INCH MAXIMUM, PER CALTRANS SECTION 26.

9. ASPHALT PAVING AND SEALS
9.1. ASPHALT CONCRETE SHALL BE TYPE A HOT MIX ASPHALT, ¾" AGGREGATE GRADATION, PER SECTION 39.2.02 OF THE CALTRANS STANDARD SPECIFICATIONS.
9.2. PAINT BINDER (TACK COAT) AND PRIME COAT SHALL BE TYPE RS1 ASPHALTIC EMULSION PER SECTION 94 OF THE CALTRANS STANDARD SPECIFICATIONS.

10. POLYVINYL CHLORIDE (PVC) PIPE.
10.1. POLYVINYL CHLORIDE (PVC) PIPE SHALL BE PRESSURE CLASS 235, DIMENSION RATION 18 PER AWWA STANDARD C900.
10.2. INSTALL PVC PIPE PER AWWA STANDARD C605.
10.3. PROVIDE A LOCATOR WIRE FOR ALL PVC PIPE.
10.4. PVC WATER MAINS SHALL BE RESTRAINED USING THRUST BLOCKS OR MECHANICAL JOINT RESTRAINTS. MECHANICAL JOINT RESTRAINTS SHALL BE MEGALUG BY EBAA IRON, INC.
10.5. DISINFECT INSTALLED PIPE USING SODIUM HYPOCHLORITE SOLUTION PER AWWA STANDARD C651.
10.6. PRESSURE TEST INSTALLED PIPE TO 150 PSI PER AWWA STANDARD C605.

11. DUCTILE IRON PIPE
11.1. DUCTILE IRON PIPE SHALL BE PER AWWA STANDARD C151, PRESSURE CLASS 350.
11.2. ABOVE-GRADE PIPE SHALL BE CEMENT-MORTAR LINED AND EPOXY-COATED.
11.3. BURIED PIPE SHALL BE CEMENT-MORTAR LINED AND BITUMINOUS COATED.
11.4. INSTALL PER AWWA STANDARD C600. PRESSURE TEST INSTALLED PIPE TO 150 PSI.

12. DUCTILE IRON FITTINGS.
12.1. DUCTILE IRON FITTINGS SHALL BE PER AWWA STANDARD C110.
12.2. DUCTILE IRON FITTINGS SHALL BE CEMENT MORTAR LINED AND EPOXY-COATED.
12.3. GASKETS SHALL BE VULCANIZED BUTADIENE RUBBER (SBR).
12.4. BOLTS AND NUTS SHALL BE TYPE 316 STAINLESS STEEL CONFORMING TO ASTM F593.

13. TAPPING SLEEVES
13.1. CONNECTIONS TO EXISTING WATER MAINS 6-INCH AND LARGER SHALL BE BY HOT TAPPING.
13.2. TAPPING SLEEVES SHALL BE FULL-CIRCLE STAINLESS STEEL SLEEVES PER AWWA STANDARD A223, MUELLER MODEL H-304, JCM MODEL 432 OR EQUAL.
13.3. TAPPING SLEEVE SHALL HAVE FLANGED FITTING ON THE TEE.
13.4. POTHOLE TO VERIFY EXISTING PIPELINE SIZE AND MATERIAL BEFORE PURCHASING TAPPING SADDLES.

14. GATE VALVES
14.1. RESILIENT WEDGE GATE VALVES PER AWWA C509, U.L.LISTED, CLOW MODEL 2639 OR EQUAL.
14.2. BURIED VALVES SHALL HAVE 2-INCH SQUARE OPERATING NUT. ABOVE GRADE VALVES SHALL HAVE OPEN STEM AND YOKE (OS&Y) UNLESS NOTED OTHERWISE.
14.3. INTERIOR AND EXTERIOR METAL SURFACES SHALL BE FACTORY-COATED WITH EPOXY MEETING NSF 61.
14.4. END CONNECTIONS AS INDICATED ON THE DRAWINGS.
14.5. BOLTS AND NUTS SHALL BE TYPE 316 STAINLESS STEEL.
14.6. VALVE BOXES SHALL BE TRAFFIC-RATED PRE-CAST CONCRETE WITH IRON LID, CHRISTY MODEL G05T OR EQUAL.

15. PIPE EXPANSION JOINT
15.1. DOUBLE-BALL FLEXIBLE EXPANSION JOINT, CAPABLE OF RELIEVING BOTH LATERAL AND LONGITUDINAL MOVEMENTS, EBAA FLEX-TEND SERIES OR APPROVED EQUAL.

16. DISMANTLING JOINT
16.1. TELESCOPING FLANGED PIPE FITTING DESIGNED FOR WORKING PRESSURES UP TO 200 PSIG, ROMAC SERIES DJ400 OR EQUAL.

17. FLANGED COUPLING ADAPTER
17.1. TELESCOPING FLANGE BY MECHANICAL JOINT FITTING, DESIGNED FOR WORKING PRESSURES UP TO 200 PSIG, ROMAC SERIES RFCA OR EQUAL.

18. CHECK VALVE
18.1. CHECK VALVE SHALL BE GLOBE-TYPE WITH ANSI CLASS 250 FLANGES, FACTORY MUTUAL APPROVED FOR FIRE SERVICE.
18.2. CLA-VAL SERIES 581, VAL-MATIC SERIES 1800, OR EQUAL.

19. COMBINATION AIR VALVE
19.1. COMBINATION AIR RELEASE AND VACUUM BREAKER VALVE, SUITABLE FOR POTABLE WATER SERVICE, PER AWWA STANDARD C512.
19.2. APCO SERIES 140C, VAL-MATIC SERIES 201-C, OR EQUAL.

20. BALL VALVES
20.1. THREADED END BALL VALVES, 1 INCH AND SMALLER, FULL PORT BALL TYPE WITH LEVER OPERATOR, RATED FOR 150 PSI SERVICE.
20.2. VALVES SHALL HAVE STAINLESS STEEL BALL AND BODY. SEALS AND STEM SHALL BE NSF 61 COMPLIANT.

21. LOCATOR WIRE
21.1. LOCATOR WIRE SHALL BE 10-GAUGE STRANDED COPPER WIRE.
21.2. WIRE SHALL BE PLACED CONTINUOUSLY ON TOP OF INSTALLED PIPE AND BROUGHT TO THE SURFACE AT EACH VALVE. ATTACHED WIRE TO PIPE USING PLASTIC ADHESIVE TAPE AT 10-FT INTERVALS.
21.3. WIRE SHALL BE BROUGHT UP THE OUTSIDE OF THE VALVE RISER AND FOLDED OVER BETWEEN THE INSIDE OF THE VALVE BOX AND THE VALVE RISER. WIRE SHALL BE BROUGHT TO WITHIN 6-INCHES OF FINISHED GRADE.

22. BACKFLOW PREVENTION VALVE
22.1. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY PER AWWA STANDARD C511.
22.2. ASSEMBLY SHALL INCLUDE ISOLATING GATE VALVES.
22.3. VALVE SHALL BE LEAD-FREE, FEBCO MODEL LF825Y, ZURN-WILKINS MODEL 975XL OR EQUAL.
22.4. INSTALL BACKFLOW PREVENTION VALVE MINIMUM 12-INCHES ABOVE FINISHED GRADE.

23. CHAIN LINK FENCES AND GATES
23.1. CHAIN LINK FENCES AND GATES SHALL BE PER CALTRANS STANDARD 80-3.
23.2. FABRIC SHALL BE GALVANIZED STEEL WIRE, WITH KNUCKLED TOP AND TWISTED BOTTOM SELVAGES.
23.3. FENCE SHALL HAVE TOP RAIL AND BOTTOM TENSION WIRE.
23.4. FENCE POSTS, BRACES AND RAILS SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE. LINE POSTS SHALL BE 2.5 INCHES IN DIAMETER. CORNER AND END POSTS SHALL BE 3 INCHES IN DIAMETER. GATE POSTS SHALL BE A MINIMUM OF 6 INCHES IN DIAMETER. BRACES AND TOP RAILS SHALL BE 1.67 INCHES IN DIAMETER. POSTS SHALL HAVE GALVANIZED CAPS TO EXCLUDE MOISTURE. TRUSS RODS SHALL BE $\frac{3}{8}$ INCH DIAMETER GALVANIZED STEEL. TURN-BUCKLES, TENSION WIRES, TIE WIRES AND HOG RINGS SHALL CONFORM TO CALTRANS STANDARD 80-3.
23.5. ALL POSTS AND HARDWARE SHALL BE HOT DIP GALVANIZED.
23.6. BARBED WIRE SHALL BE 12.5 GAUGE WIRE WITH 4-POINT ROUND BARBS, PER ASTM A121, CLASS 3.
23.7. GATES SHALL BE OF THE SAME HEIGHT AS THE ADJACENT FENCE. GATES SHALL BE PROVIDED WITH ALL NECESSARY HARDWARE, INCLUDING HINGES, LATCHES AND STOPS.
23.8. SWINGING GATE PANELS SHALL BE CROSS-TRUSSED WITH $\frac{3}{8}$ INCH DIAMETER TRUSS RODS AND TURNBUCKLES. GATES SHALL BE HINGED TO OPEN 180-DEGREES. GATE SHALL BE FURNISHED WITH A A KEEPER AND PLUNGER-BAR TYPE LATCH WITH PROVISION FOR A PADLOCK. THE PLUNGER BAR SHALL DROP INTO A BURIED CENTER STOP WHEN THE GATE IS CLOSED.

24. PRESSURE TRANSDUCER
24.1. PROVIDE PRESSURE TRANSDUCERS WITH RANGE AND LOCATION AS INDICATED ON THE DRAWINGS.
24.2. PRESSURE TRANSDUCER SHALL BE MADE OF 316 STAINLESS STEEL.
24.3. TRANSDUCER ACCURACY SHALL BE ± 1.0% WITH HYSTERESIS AND REPEATABILITY OF NO GREATER THAN 1% FULL SCALE.
24.4. OUTPUT SIGNAL SHALL BE 4-20 mA WITH A SUPPLY VOLTAGE RANGE OF 9-32 VDC.

25. PRESSURE GAUGES
25.1. BOURDON TUBE PRESSURE GAUGE, 2.5 INCH DIAMETER FACE, RANGE AND INSTALLATION LOCATION AS SHOWN ON DRAWINGS.
25.2. GAUGE SHALL BE LIQUID-FILLED, WITH COPPER-ALLOY INTERNAL PARTS IN A STAINLESS STEEL CASE.
25.3. GAUGE ACCURACY SHALL BE ± 2.5 %.
25.4. GAUGE SHALL BE CAPABLE OF EXPERIENCING A PRESSURE 30% ABOVE ITS MAXIMUM SPAN WITHOUT REQUIRING RECALIBRATION.

26. PRESSURE SWITCH
26.1. PROVIDE PUMP CONTROL PRESSURE SWITCH, DPST, WITH ADJUSTABLE SET POINTS, CLOSE ON FALLING PRESSURE AND OPEN ON RISING PRESSURE.
26.2. REQUIRED OPERATING RANGE:
26.2.1. LEWIS TANKS: 0 TO 18.75 FEET (0 TO 8.12 PSIG), OPERATING DIFFERENTIAL 1 TO 2 PSIG.
26.2.2. KASKI TANKS: 0 TO 17.75 FEET (0 TO 7.68 PSIG), OPERATING DIFFERENTIAL 1 TO 2 PSIG.
26.2.3. MADRONE TANKS: 0 TO 18.75 FEET (0 TO 8.12 PSIG), OPERATING DIFFERENTIAL 1 TO 2 PSIG.
26.3. CONNECTION SHALL BE $\frac{1}{4}$ INCH FNPS.
26.4. ALL WETTED PARTS SHALL BE STAINLESS STEEL OR NSF 61 COMPLIANT.
26.5. SQUARE-D PUMPTROL, SERIES 9013FS OR EQUAL.

27. PIPE SUPPORTS
27.1. PROVIDE PREFORMED CHANNEL PIPE SUPPORTS (PIPE STANDS) AS SHOWN ON THE DRAWINGS.
27.2. PIPE SUPPORTS SHALL BE OF MANUFACTURER'S STANDARD DESIGN. MATERIAL SHALL BE GALVANIZED STEEL.
27.3. ANCHOR THE SUPPORT INTO THE FOUNDATION SLAB PER THE MANUFACTURER'S RECOMMENDATION.

28. CONDUIT
28.1. PVC CONDUIT SHALL CONFORM TO UL 651.

29. CONDUCTORS (WIRES)
29.1. SIGNAL WIRE
29.2. POWER WIRE

30. MIXING SYSTEM
30.1. TANK MIXING SYSTEM SHALL BE GRIDBEE GS-9 BY MEDORA CORP, OR EQUAL, EQUIPPED WITH THE FOLLOWING ACCESSORIES:
30.1.1. $\frac{1}{2}$" DIAMETER CHLORINE BOOSTING LINE
30.1.2. CHLORINE BOOST SYSTEM WITH THE FOLLOWING:
30.1.2.1. AN AIR OPERATED DOUBLE DIAPHRAGM PUMP WITH DISCHARGE RATE OF 0 TO 4 GPM.
30.1.2.2. 20 GALLON CHLORINE HOLDING TANK AND 5 GALLON RINSE WATER HOLDING TANK
30.1.2.3. 316 STAINLESS STEEL BASE AND SKID FRAME WITH SECONDARY CONTAINMENT BUILT IN.
30.1.2.4. FLOW INDICATOR AND REGULATING VALVE.
30.1.2.5. ALL COMPONENTS RATED FOR CONTACT WITH 12.5% SODIUM HYPOCHLORITE SOLUTION.
30.1.3. LOW ELEVATION INTAKE
30.1.4. RESTRAINT SYSTEM
30.1.5. AN ELECTRIC CONTROL BOX INCLUDING MOTOR CURRENT INDICATOR IN A 4-20mA ANALOG OUTPUT AND REMOTE ON/OFF CONTROL VIA 24VDC RELAY

31. DUCKBILL CHECK VALVES
31.1. DUCKBILL CHECK VALVES SHALL BE TIDEFLEX SERIES 35 OR EQUAL

32. FLAP CHECK VALVES
32.1. FLAP CHECK VALVES SHALL BE WATERFLEX SERIES W-3 BY TIDEFLEX TECHNOLOGIES

33. TEMPORARY WATER TANKS
33.1. TEMPORARY WATER TANKS SHALL BE NORWESCO 10,000 GALLON VERTICAL TANKS OR EQUAL.

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
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5			

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
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Salinas, CA 93907-2348
(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER ANDREW A. STERBENZ No. 69703 CIVIL STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION

MATERIALS SPECIFICATIONS
LOMPICO TANKS REPLACEMENT
SLVWD NO.____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM	DATE: 05/29/2019
DRAWN BY: CJM	DATE: 05/29/2019
QC CHECKED BY: AAS	DATE: 05/29/2019
PROJECT NO.:	
SCALE: NO SCALE	
SUBMITTAL: 60% SUBMITTAL	

G1.3
SHEET 4 OF 25

STEEL WATER TANK SPECIFICATIONS:

1. **GENERAL**

1.1. PROVIDE A STEEL POTABLE WATER STORAGE TANK, AS SHOWN ON THE PLANS AND SPECIFIED HEREIN. TANK SHALL BE BOLTED STEEL PER AWWA STANDARD D103. TANK SHALL MEET THE REQUIREMENTS OF TITLE 22, DIVISION 4, CHAPTER 16, ARTICLE 6, SECTION 64585 OF THE CALIFORNIA CODE OF REGULATIONS.

1.2. SUBMITTALS

1.2.1. SHOP DRAWINGS OF TANK AND ACCESSORIES, SHOWING ALL DIMENSIONS AND REQUIRED THICKNESSES.

1.2.2. DESIGN CALCULATIONS, SIGNED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.

1.2.3. VENT SIZING CALCULATIONS.

1.2.4. FABRICATION AND ERECTION DRAWINGS AND DETAILS FOR THE RESERVOIR AND ALL ACCESSORIES.

1.2.5. CERTIFIED MILL TESTS ON STEEL PLATE AND STRUCTURAL MEMBERS DEMONSTRATING THAT THE PHYSICAL AND CHEMICAL REQUIREMENTS OF THIS SPECIFICATION HAVE BEEN MET.

1.2.6. CERTIFIED TEST DATA ON THE COATING THICKNESS.

1.2.7. TANK TESTING AND DISINFECTION SCHEDULE.

1.3. QUALIFICATIONS

1.3.1. TANK MANUFACTURER SHALL BE A SPECIALIST IN THE DESIGN OF WELDED STEEL OR BOLTED STEEL TANKS CONFORMING TO THE REQUIREMENTS OF THIS SPECIFICATION. SUPPLIER SHALL HAVE A MINIMUM OF TEN (10) YEARS OF DOCUMENTED EXPERIENCE MANUFACTURING AND INSTALLING STEEL TANKS FOR WATER STORAGE.

1.4. REFERENCES

1.4.1. AMERICAN SOCIETY FOR CIVIL ENGINEERS (ASCE):

1.4.1.1. 7 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES

1.4.2. AMERICAN WATER WORKS ASSOCIATION (AWWA):

1.4.2.1. D103-09 - FACTORY-COATED BOLTED STEEL TANKS FOR WATER STORAGE.

1.4.3. CALIFORNIA BUILDING CODE (CBC), 2019 EDITION

1.4.4. CALIFORNIA STATE DEPARTMENT OF INDUSTRIAL RELATIONS DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (CAL/OSHA)

1.4.5. FM GLOBAL (FACTORY MUTUAL)

1.4.5.1. CLASS NUMBER 4020 - APPROVAL STANDARD FOR STEEL TANKS FOR FIRE PROTECTION

1.4.6. NSF INTERNATIONAL

1.4.6.1. NSF/ANSI 61 - DRINKING WATER SYSTEM COMPONENTS

1.4.7. SOCIETY FOR PROTECTIVE COATINGS (SSPC)

1.5. DESIGN DATA. THE FOLLOWING DATA AND INFORMATION ARE SUPPLIED AS A BASIS FOR DESIGN AND ERECTION OF THE TANK AND APPURTENANCES:

1.5.1. TANK CAPACITY & DIMENSIONS

1.5.1.1.	LEWIS TANKS (PER TANK)	
1.5.1.1.1.	NOMINAL CAPACITY	114,300 GAL
1.5.1.1.2.	USABLE CAPACITY	88,730 GAL
1.5.1.1.3.	INSIDE DIAMETER	32'
1.5.1.1.4.	TANK HEIGHT	25'
1.5.1.1.5.	REQUIRED FREEBOARD	4.88'
1.5.1.1.	KASKI TANKS (PER TANK)	
1.5.1.1.1.	NOMINAL CAPACITY	42,300 GAL
1.5.1.1.2.	USABLE CAPACITY	32,310 GAL
1.5.1.1.3.	INSIDE DIAMETER	20'
1.5.1.1.4.	TANK HEIGHT	23'
1.5.1.1.5.	REQUIRED FREEBOARD	4.09'
1.5.1.1.	MADRONE TANKS (PER TANK)	
1.5.1.1.1.	NOMINAL CAPACITY	75,460 GAL
1.5.1.1.2.	USABLE CAPACITY	58,580 GAL
1.5.1.1.3.	INSIDE DIAMETER	26'
1.5.1.1.4.	TANK HEIGHT	25'
1.5.1.1.5.	REQUIRED FREEBOARD	4.90'

1.5.2. SEISMIC DESIGN CRITERIA

1.5.2.1.	LEWIS TANKS	
1.5.2.1.1.	SEISMIC USE GROUP	III
1.5.2.1.2.	SEISMIC IMPORTANCE FACTOR, IE	1.50
1.5.2.1.3.	SITE CLASS	D
1.5.2.1.4.	SS	1.50 g
1.5.2.1.5.	S1	0.67 g
1.5.2.1.6.	Fa	1.00
1.5.2.1.7.	FV	1.50
1.5.2.1.	KASKI TANKS	
1.5.2.1.1.	SEISMIC USE GROUP	III
1.5.2.1.2.	SEISMIC IMPORTANCE FACTOR, IE	1.50
1.5.2.1.3.	SITE CLASS	D
1.5.2.1.4.	SS	1.54 g
1.5.2.1.5.	S1	0.70 g
1.5.2.1.6.	Fa	1.00
1.5.2.1.7.	FV	1.50
1.5.2.1.	MADRONE TANKS	
1.5.2.1.1.	SEISMIC USE GROUP	III
1.5.2.1.2.	SEISMIC IMPORTANCE FACTOR, IE	1.50
1.5.2.1.3.	SITE CLASS	D
1.5.2.1.4.	SS	1.62 g
1.5.2.1.5.	S1	0.74 g
1.5.2.1.6.	Fa	1.00
1.5.2.1.7.	FV	1.50

1.5.3. DESIGN WIND LOADING

1.5.3.1.	DESIGN WIND SPEED, V	115 MPH
1.5.3.2.	GUST FACTOR, G	1.0
1.5.3.3.	IMPORTANCE FACTOR, I	1.15
1.5.3.4.	EXPOSURE CATEGORY	C
1.5.4.	ROOF DESIGN LOADING	
1.5.4.1.	ROOF LIVE LOAD	25 PSF
1.5.4.2.	GROUND SNOW LOAD	NONE
1.5.5.	LIQUID TO BE STORED	POTABLE WATER
1.5.6.	ALLOWABLE SOIL BEARING PRESSURE	2,000 PSF

1.6. FOUNDATION

1.6.1. TANK FOUNDATION TO BE CONCRETE RINGWALL FOUNDATION PER AWWA D103 SECTION 13.4.1, AS APPLICABLE. MANUFACTURER'S ENGINEER TO DESIGN FOUNDATION PER FINAL TANK DIMENSIONS AND RECOMMENDATIONS OF THE SOILS REPORT.

1.7. ACCESSORIES

1.7.1. SHELL MANHOLES: PROVIDE TWO (2) 30 INCH, MINIMUM, HINGED SHELL MANHOLES LOCATED AS SHOWN ON THE DRAWINGS. THE CENTER OF THE MANHOLE SHALL BE LOCATED 30 INCHES ABOVE THE BOTTOM OF THE TANK.

1.7.2. PIPE CONNECTIONS:

1.7.2.1. PROVIDE INLET NOZZLE, OUTLET NOZZLE WITH ANTIVORTEX PLATE, AND OVERFLOW AND DRAIN OUTLETS AS SHOWN ON THE PLANS.

1.7.2.2. PROVIDE A 1-INCH NPT TANK CONNECTION AS SHOWN ON THE PLANS FOR SAMPLING CONNECTION.

1.7.2.3. OVERFLOW PIPE: PROVIDE STEEL INTERNAL OR EXTERNAL OVERFLOW PIPE, INTERNAL WEIR BOX, IF REQUIRED, AND PIPE SUPPORTS. OVERFLOW PIPE SHALL BE DESIGNED FOR A TANK FILL RATE OF 750 GPM. OVERFLOW OUTLET SHALL HAVE A WATERMAN PF-25 CHECK FLAP VALVE AND #24 MESH STAINLESS STEEL SCREEN.

1.7.2.4. PIPES SHALL BE EPOXY LINED AND COATED, MATCHING THE TANK COATING METHOD.

1.7.3. LADDERS:

1.7.3.1. PROVIDE A GALVANIZED STEEL WELDED EXTERIOR LADDER WITH BACKGUARD CAGE AND SAFE-T-CLIMB ASSEMBLY AS SHOWN ON THE PLANS. THE LADDER SHALL HAVE LOCKABLE CLOSURES AT THE BOTTOM OF CAGE AND ACROSS THE UNCAGED PORTION OF THE LADDER.

1.7.3.2. PROVIDE A GALVANIZED STEEL WELDED INTERIOR LADDER.

1.7.4. ROOF OPENINGS:

1.7.4.1. PROVIDE A CIRCULAR-SHAPED ROOF VENT. THE VENT SHALL BE SIZED SO THAT 2,500 GPM PUMPING RATE DOES NOT PRODUCE A DIFFERENTIAL PRESSURE BEYOND WHICH THE TANK IS DESIGNED. AN EFFECTIVE AREA OF 75% OF SCREEN OPENING SHALL BE ASSUMED. THE VENT SHALL BE PROTECTED WITH A #24 MESH STAINLESS STEEL SCREEN. VENT SHALL HAVE REMOVABLE COVER. HARDWARE SHALL BE TYPE 316 STAINLESS STEEL.

1.7.4.2. PROVIDE A CURBED, UPWARD OPENING MANWAY HATCH LOCATED NEAR THE LADDER, NOMINAL 36-INCHES SQUARE. THE CURB SHELL EXTEND AT LEAST 4 INCHES ABOVE THE TANK. THE HATCH COVER SHALL BE HINGED AND SHALL HAVE LOCKING PROVISIONS. THE HATCH COVER LIP SHALL EXTEND FOR A DISTANCE OF 2-INCHES DOWN ON THE OUTSIDE OF THE CURB. PROVIDE NSF 61 COMPLIANT RUBBER GASKET SEALANT WHERE THE HATCH COVER CONTACTS THE HATCH OPENING.

1.7.5. PROVIDE A HOT-DIPPED GALVANIZED STEEL PIPE RAILING ON THE ROOF AS SHOWN ON THE DRAWINGS.

1.7.6. PROVIDE A LIQUID LEVEL INDICATOR COMPLETE WITH FLOAT AND TARGET BOARD ASSEMBLY. MATERIALS INSIDE THE TANK SHALL BE TYPE 316 STAINLESS STEEL.

1.7.7. GASKETS AND SEALANTS SHALL MEET OR EXCEED AWWA, NSF AND EPA STANDARDS FOR POTABLE WATER.

1.7.8. ANCHOR BOLTS AND STIRRUPS, IF REQUIRED, TO BE FURNISHED BY THE TANK MANUFACTURER.

1.8. TESTING AND DISINFECTION

1.8.1. A TESTING AND DISINFECTION SCHEDULE, INCLUDING PROPOSED PLANS FOR WATER CONVEYANCE, CONTROL, DISINFECTION, AND DISPOSAL SHALL BE SUBMITTED IN WRITING FOR APPROVAL A MINIMUM OF 14 DAYS BEFORE TESTING IS TO COMMENCE. THE SUBMITTAL SHALL INCLUDE CONTRACTOR'S PLAN FOR THE RELEASE OF WATER FROM STRUCTURES AFTER TESTING AND DISINFECTION HAS BEEN COMPLETED.

1.8.2. AFTER CONSTRUCTION IS COMPLETED AND PRIOR TO TESTING, THE INTERIOR OF THE RESERVOIR SHALL BE COMPLETELY HOSED OUT AND CLEANED OF ALL DIRT AND LOOSE MATERIAL. ALL WATER, DIRT, AND FOREIGN MATERIAL ACCUMULATED IN THIS CLEANING OPERATION SHALL BE DISCHARGED FROM THE RESERVOIR OR OTHERWISE REMOVED.

1.8.3. TANK SHALL BE LEAK TESTED IN ACCORDANCE WITH AWWA D103 SECTION 11.2, AS APPLICABLE.

1.8.4. AFTER COMPLETION OF THE INTERIOR COATINGS, PROPER CURING PROCEDURES SHALL BE FOLLOWED. ADEQUATE CURE TIME SHALL BE ALLOWED PRIOR TO PERFORMING DISINFECTION AND LEAK TESTING.

1.8.5. TANK SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C652-11 (DISINFECTION OF WATER STORAGE FACILITIES). PIPING SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651-14.

1.8.6. DISINFECTION SHALL USE HYPOCHLORITE SOLUTION PER AWWA B300. COMPLIANCE WITH NSF/ANSI 60, DRINKING WATER TREATMENT CHEMICALS IS REQUIRED.

1.8.7. LEAK TESTING AND DISINFECTING OF THE RESERVOIR SHALL BE A COMBINED OPERATION. DISINFECTION SHALL BE ACCOMPLISHED BY CHLORINATION. ALL CHLORINATING AND TESTING OPERATIONS SHALL BE DONE IN THE PRESENCE OF A REPRESENTATIVE OF THE OWNER. DISINFECTION OPERATIONS SHALL BE SCHEDULED BY THE CONTRACTOR AS LATE AS POSSIBLE DURING THE CONTRACT TIME PERIOD SO AS TO ASSURE THE MAXIMUM DEGREE OF STERILITY OF THE FACILITIES AT THE TIME THE WORK IS ACCEPTED BY THE OWNER.

1.8.8. DISINFECTED WATER STORAGE FACILITIES SHALL BE SAMPLED AND TESTED BY THE OWNER IN ACCORDANCE WITH ANSI/AWWA C652. BACTERIOLOGICAL AND VOLATILE ORGANIC COMPOUND (VOC) TESTING WILL BE PERFORMED BY A CERTIFIED TESTING LABORATORY APPOINTED AND PAID FOR BY THE OWNER. RESULTS OF THE TESTING SHALL BE SATISFACTORY TO THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD'S DIVISION OF DRINKING WATER (DDW) AND THE OWNER. THE NEW FACILITIES SHALL REMAIN ISOLATED AND OUT OF SERVICE UNTIL SATISFACTORY TEST RESULTS HAVE BEEN OBTAINED WHICH MEET THE REQUIREMENTS OF DDW AND THE OWNER. IF UNSATISFACTORY OR DOUBTFUL RESULTS ARE OBTAINED FROM THE INITIAL SAMPLING, CONTRACTOR SHALL REPEAT THE DISINFECTION PROCESS UNTIL ACCEPTABLE TEST RESULTS ARE REPORTED. THE FOLLOW-UP SAMPLING COSTS SHALL BE BORNE BY THE CONTRACTOR.

1.8.9. AFTER DISINFECTION, THE TANK SHALL BE DRAINED AND REFILLED TO THE OVERFLOW LEVEL AND ALLOWED TO STAND FOR 5 DAYS, MINIMUM. AFTER 5 DAYS, THE OWNER SHALL TAKE WATER SPECIMENS FOR V.O.C. TEST PER EPA 502.2. THE TANK MAY BE PLACED INTO SERVICE ONCE ACCEPTABLE TEST RESULTS ARE RECEIVED.

1.8.10. IF VOC LEVELS EXCEED DRINKING WATER STANDARDS, CONTRACTOR SHALL PREPARE A VOC REMOVAL PLAN, AT THE CONTRACTOR'S EXPENSE, FOR THE OWNER APPROVAL.

1.8.11. SUFFICIENT WATER WILL BE PROVIDED FREE OF CHARGE BY THE OWNER FOR ONE FILLING OF THE RESERVOIR TO BE USED FOR DISINFECTION AND TESTING, AND TESTING OF ALL VALVES AND PIPING. HOWEVER, THE CONTRACTOR SHALL MAKE ALL NECESSARY PROVISIONS FOR CONVEYING THE WATER FROM THE OWNER-DESIGNATED SOURCE TO THE POINTS OF USE. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A BACKFLOW DEVICE FOR CONNECTION TO THE EXISTING SYSTEM.

1.8.12. ALL WATER USED IN RETESTING THE RESERVOIR SHALL BE DISPOSED OF BY THE CONTRACTOR AT HIS SOLE EXPENSE. WATER MAY BE DISCHARGED INTO STORM DRAINS WHERE WRITTEN PERMISSION IS GIVEN BY THE GOVERNMENTAL AGENCY HAVING JURISDICTION. CONTRACTOR SHALL APPLY A REDUCING AGENT TO THE SOLUTION TO NEUTRALIZE RESIDUAL CHLORINE REMAINING IN THE WATER. THE DISPOSAL OF WATER SHALL, IN ALL CASES, BE CARRIED OUT IN STRICT OBSERVANCE OF THE WATER POLLUTION CONTROL REQUIREMENTS OF THE CALIFORNIA STATE REGIONAL WATER QUALITY CONTROL BOARD. THE FLOW OF WATER FROM THE TANK SHALL BE CONTROLLED TO PREVENT EROSION OF SURROUNDING SOIL, DAMAGE TO VEGETATION, AND ALTERING OF ECOLOGICAL CONDITIONS IN THE AREA.

1.8.13. RELEASE OF WATER FROM STRUCTURES, AFTER TESTING AND DISINFECTION HAVE BEEN COMPLETED, SHALL ONLY BE DONE WITH APPROVAL FROM THE OWNER.

1.8.14. ANY WATER USED FOR TESTING OR DISINFECTING, REQUIRED TO BE REMOVED FROM THE TANK AT THE DIRECTION OF THE OWNER, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR WHO SHALL FURNISH THE NECESSARY LABOR, TOOLS AND EQUIPMENT, INCLUDING PUMPS, WITHOUT ADDITIONAL COMPENSATION.

2. **BOLTED STEEL TANK**

2.1. PROVIDE FACTORY COATED BOLTED CARBON STEEL TANK COMPLETE WITH CONCRETE RINGWALL FOUNDATION AND ALL PIPE CONNECTIONS, ACCESSORIES AND APPURTENANCES AS SHOWN ON THE PLANS AND AS REQUIRED BY APPLICABLE STANDARDS REFERENCED HEREIN. BOLTED STEEL TANK SHALL CONFORM TO THE REQUIREMENTS OF AWWA D103-09, STANDARD FOR FACTORY-COATED BOLTED CARBON STEEL TANKS FOR WATER STORAGE.

2.2. THE MANUFACTURER SHALL FURNISH, ERECT AND TEST THE TANK, AS REQUIRED BY AWWA D103. THE MANUFACTURER SHALL BE COMPLETELY RESPONSIBLE FOR THE CONSTRUCTION AND SATISFACTORY PERFORMANCE OF THE TANK DURING THE GUARANTEE PERIOD. THE TANK SHALL CONFORM TO AWWA D103 TO THE LATEST EDITION BUILDING CODE, AND TO THE REQUIREMENTS OF THE PLANS AND THESE SPECIFICATIONS.

2.3. MATERIALS

2.3.1. PLATES AND SHEETS. PLATES AND SHEETS SHALL CONFORM TO APPROPRIATE ASTM DESIGNATION AS SET FORTH IN SECTION 4.4, AWWA D103-09, AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 30,000 PSI.

2.3.2. STRUCTURAL SHAPES. STRUCTURAL SHAPES SHALL CONFORM TO THE REQUIREMENTS AND ASTM DESIGNATIONS OF AWWA D103-09 SECTION 4.5

2.3.3. BOLTS. TANK JOINT BOLTING SHALL BE MINIMUM ½ DIAMETER, SHALL MEET THE REQUIREMENTS OF AWWA D103-09 SECTION 4.2.1. AND HAVE TENSILE STRENGTH OF AT LEAST 120,000 POUNDS PER SQUARE INCH.

2.3.4. GASKETS AND SEALANT. ALL GASKETS AND SEALANTS USED ON THIS TANK SHALL CONFORM TO THE REQUIREMENTS OF AWWA D103-09 SECTION 4.10.

2.4. PROTECTIVE COATING

2.4.1. GENERAL: ALL METAL PLATES, SUPPORTS, MEMBERS AND MISCELLANEOUS PARTS, EXCEPT BOLTS, SHALL BE FACTORY COATED IN ACCORDANCE WITH AWWA D103, SECTION 12.6 AND THIS SECTION. FIELD COATING, OTHER THAN TOUCH-UP, WILL NOT BE PERMITTED.

2.4.2. SURFACE PREPARATION:

2.4.2.1. ALL STEEL SURFACES SHALL BE SHOT BLASTED TO EQUIVALENT OF A SP 10 OR BETTER NEAR WHITE METAL FINISH. THE SURFACE ANCHOR PATTERN SHALL BE NO LESS THAN 1.5 MILS.

2.4.2.2. SPRAY A FINAL DEIONIZED WATER RINSE WITH SILICA-ZIRCONIUM (SI-ZR) SEALER TO PREVENT RUSTING PRIOR TO THE POWDER COATING APPLICATION AND PROVIDE ADDITIONAL LEVEL OF CORROSION PROTECTION

2.4.2.3. ALL STEEL SURFACES SHALL DRIP DRY FOR SEVEN (7) MINUTES PRIOR TO ENTERING THE DRY OFF OVEN FOR EIGHT (8) MINUTES AT 425 DEGREES F.

2.4.3. COATING:

2.4.3.1. ALL INTERIOR STEEL SURFACES, SUPPORT MEMBERS AND MISCELLANEOUS PARTS SHALL RECEIVE 5 MILS MINIMUM AVERAGE DRY FILM THICKNESS USING AN NSF 61 APPROVED, THERMAL SET EPOXY POWDER COATING.

2.4.3.2. ALL EXTERIOR STEEL SURFACES, SUPPORT MEMBERS AND MISCELLANEOUS PARTS SHALL RECEIVE MINIMUM 2 MILS AVERAGE DRY FILM THICKNESS TANK TAN PRIMER UNDER 3 MILS MINIMUM AVERAGE DRY FILM THICKNESS USING A THERMAL SET TGIC-POLYESTER POWDER COATING, FOR A TOTAL OF 5 MILS.

2.5. FIELD ERECTION OF FACTORY COATED BOLTED STEEL TANKS SHALL BE IN STRICT COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS AND PERFORMED BY MANUFACTURER'S EMPLOYEES OR CERTIFIED ERECTION CREW TO ALLEVIATE ANY POTENTIAL DISPUTES IN COATING QUALITY OR ERECTION THEREOF. PARTICULAR CARE SHALL BE EXERCISED IN HANDLING AND BOLTING OF THE TANK PLATES, SUPPORTS, AND MEMBERS TO AVOID ABRASION OR SCRATCHING THE COATING. PRIOR TO PLACING WATER IN THE TANK, A "HOLIDAY" INSPECTION OF THE ENTIRE TANK, CORNERS INCLUDED, WILL BE PROVIDED AND PERFORMED BY THE MANUFACTURER IN THE PRESENCE OF THE OWNER. TOUCH-UP COATING SHALL BE DONE

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REGISTERED PROFESSIONAL ENGINEER ANDREW A. STERRENZ No. 69785 CIVIL STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION

STEEL WATER TANK SPECIFICATIONS

LOMPICO TANKS REPLACEMENT

SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: NO SCALE
SUBMITTAL: 60% SUBMITTAL

G1.4

PER THE MANUFACTURER'S RECOMMENDATIONS WHERE NEEDED AND AS DIRECTED TO ACHIEVE 100% HOLIDAY-FREE SURFACE.

2.6. TESTING AND INSPECTION

2.6.1. GENERAL: TEST STORAGE TANK AFTER ERECTION. FLOOR SHALL BE CLEAN AND FREE FROM DIRT, FOREIGN SUBSTANCE AND DEBRIS.

2.6.2. BOTTOM: VACUUM TEST SEAMS IN FLOOR PLATES.

2.6.3. SHELL: TEST BY FILLING WITH WATER TO ELEVATION OF OVERFLOW. COMPLETED STORAGE TANK SHALL SHOW NO LEAKS AT END OF 24 HOUR TEST PERIOD.

2.7. WARRANTY

2.7.1. THE TANK MANUFACTURER SHALL WARRANT THE TANK AGAINST ANY DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SHIPMENT. IN THE EVENT ANY SUCH DEFECT SHOULD APPEAR, IT SHOULD BE REPORTED IN WRITING TO THE MANUFACTURE DURING THE WARRANTY PERIOD.

2.7.2. THE TANK SHALL BE DEEMED ACCEPTED WHEN THE RESERVOIR HAS BEEN PROVEN FREE FROM LEAKS AND OTHER DEFECTS TO THE SATISFACTION OF THE OWNER. THE ACCEPTANCE BY THE OWNER OF THE COMPLETED WORK AS HEREIN SPECIFIED IS SUBJECT TO THE CONTRACTOR'S WARRANTY FOR THE COMPLETED WORK AGAINST DEFECTS IN MATERIALS OR WORKMANSHIP FURNISHED BY THE CONTRACTOR FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE OF THE WORK.

CODE SECTION	INSPECTION	FREQUENCY
1705.2.1, STEEL	1. Material verification of high-strength bolts, nuts, and washers.	Periodic
	a. Identification markings to conform to ASTM stds specified in the approved construction documents.	
	b. Manufacturer's certificate of compliance required.	
1705.2.1, STEEL	2. Inspection of high-strength bolting:	
	a. Bearing-type connections.	a. Periodic
	b. Slip-critical connections	b. Continuous
1705.2.1, STEEL	3. Material verification of structural steel:	One time
	a. Identification markings to conform to ASTM stds specified in the approved construction documents.	
	b. Manufacturer's mill test reports	
1705.2.1, STEEL	4. Material verification of weld filler materials:	One time
	a. Identification markings to conform to AWS designation listed in the WPS.	
	b. Manufacturer's certificate of compliance required.	
1705.2.1, STEEL	5. Inspection of welding for Structural steel	
	a. Complete and partial penetration groove welds.	a. Continuous
	b. Multi-pass fillet welds.	b. Continuous
	c. Single-pass fillet welds > 5/16"	c. Continuous
	d. Single-pass fillet welds under 5/16"	d. Periodic
	e. Floor and roof deck welds.	e. Periodic
1705.2.1, STEEL	6. Inspection of steel frame joint details for compliance with approved construction documents:	Continuous
	a. Details such as bracing and stiffening.	
	b. Member locations.	
	c. Application of joint details at each connection.	
Table 1705.3	1. Inspection of reinforcing steel, including pre-stressing tendons and placement.	1. Periodic
	4. Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.	2. One time
	5. Verifying use of required design mix.	3. Continuous
	6. At time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests and determine the temperature of the concrete.	4. Continuous
	7. Inspection of concrete and shotcrete placement for proper application techniques.	5. Continuous
	8. Inspection for maintenance of specified curing temperature and techniques.	6. Periodic
	12. Inspect formwork for shape, location, and dimensions of the concrete member being formed.	7. Periodic
Table 1705.6 SOILS	1. Verify materials below footings are adequate to achieve the desired bearing capacity.	1. Periodic
	2. Verify excavations are extended to proper depth and have reached proper material.	2. Periodic
	3. Perform classification and testing of controlled fill materials.	3. Periodic
	4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	4. Continuous
	5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.	5. Periodic
1705.11 WIND	1. Roof cladding and roof framing connections.	1. One Time
	2. Wall connections to roof and floor diaphragms and framing.	2. One Time
	3. Roof and floor diaphragm systems, including collectors, drag struts and boundary elements	3. One Time
	4. Vertical wind-force-resisting systems, including braced frames, moment frames, and shear walls.	4. One Time
	5. Wind-force-resisting system connections to the foundation.	5. One Time
	6. Fabrication and installation of systems or components required to meet the impact resistance requirements of Section 1609.1.2.	6. One Time
1705.12.1	Special inspection for welding in accordance with AISC 341.	Continuous
1705.11 COLD-FORMED STEEL FRAMING	1. Welding of elements of the seismic-force-resisting system.	1. Periodic
	2. Inspection of screw attachments, bolting, anchoring, and other fastening of components within the seismic-force-resisting system including struts, braces, and hold-downs.	2. Periodic
1705.12.6 MECHANICAL AND ELECTRICAL COMPONENTS	1. Inspect anchorage of electrical equipment for emergency or stand-by power systems.	1. Periodic
	2. Inspect anchorage of non-emergency electrical equipment.	2. Periodic
	3. Inspect installation of vibration isolation systems where required by Section 1707.8.	3. Periodic
1705.12.8	Verify that the equipment label and anchorage or mounting conforms to the certificate of compliance when mechanical and electrical equipment must be seismically qualified.	One time
1705.12.8	Seismic isolation system: Inspection of isolation system per ASCE 7 – Section 17.2.4.8	Periodic

PRELIMINARY - NOT FOR CONSTRUCTION

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(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER — ANDREW A. STERRENZ — No. 68703 — CIVIL — STATE OF CALIFORNIA — NOT FOR CONSTRUCTION

STEEL WATER TANK SPECIFICATIONS (CONTINUED) & INSPECTIONS

LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	NO SCALE		
SUBMITTAL:	60% SUBMITTAL		

G1.5

SITE ACCESS NOTES:

LEWIS TANK SITE:

FROM SANTA CRUZ:
- HEAD NORTH ON GRAHAM HILL ROAD
- TURN RIGHT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN LEFT TO HEAD WEST ON WEST DRIVE
- KEEP LEFT ON WEST DRIVE AT SEQUOIA AVENUE TO HEAD SOUTH
- FOLLOW WEST DRIVE END TO REACH LEWIS TANK SITE

FROM SCOTTS VALLEY:
- HEADING SOUTH ON HIGHWAY 17 TAKE EXIT 3 FOR MOUNT HERMON ROAD
- TURN LEFT TO HEAD EAST ON GRAHAM HILL ROAD
- TURN LEFT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN LEFT TO HEAD WEST ON WEST DRIVE
- KEEP LEFT ON WEST DRIVE AT SEQUOIA AVENUE TO HEAD SOUTH
- FOLLOW WEST DRIVE END TO REACH LEWIS TANK SITE

WELL DESTRUCTION:

1. WELL DESTRUCTION SHALL BE PERFORMED BY A WELL DRILLING CONTRACTOR WITH A VALID C-57 LICENSE.
2. OBTAIN A WELL DESTRUCTION PERMIT FROM THE SANTA CRUZ COUNTY DIVISION OF ENVIRONMENTAL HEALTH.
3. REMOVE THE EXISTING SUBMERSIBLE WELL PUMP AND CASING. REMOVED EQUIPMENT MAY BE SALVAGED BY THE CONTRACTOR OR DISPOSED OF AT THE APPLICABLE RECYCLING FACILITY.
4. DESTROY THE WELL BY COMPLETELY FILLING THE CASING WITH NEAT CEMENT, PLACED FROM THE BOTTOM UPWARDS USING METHODS THAT WILL AVOID SEGREGATION OR DILUTION OF MATERIAL.
5. COMPLY WITH THE REQUIREMENTS OF CALIFORNIA DEPARTMENT OF WATER RESOURCES BULLETIN 74-81 AND 74-90, AND SANTA CRUZ COUNTY CODE CHAPTER 7.70.
6. NOTIFY OWNER A MINIMUM OF 5 DAYS BEFORE THE WORK TO COORDINATE SITE ACCESS AND WATER SUPPLY.
7. CUT OFF THE CASING AT 5-FEET BELOW THE FINAL GRADE FOR THE SITE (6-FEET BELOW TOP OF EXISTING CONCRETE PAD). BACKFILL WITH CLEAN NATIVE MATERIAL.
8. SUBMIT COMPLETE RECORDS OF THE WELL DESTRUCTION PROCEDURE TO PROVIDE A RECORD THAT THE HOLE WAS PROPERLY SEALED. THE RECORDS SHALL INCLUDE TYPE, DEPTH, AND QUANTITY OF SEALING MATERIAL; MEASUREMENTS OF STATIC WATER LEVELS; AND ANY CHANGES IN THE WELL MADE DURING THE ABANDONMENT PROCEDURE SUCH AS PERFORATING CASING.

ORIGINAL
File with DWR

CONFIDENTIAL LOG
Water Code Sec. 13752

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

CONFIDENTIAL LOG
Water Code Sec. 13752

Do Not Fill In
No 74341
State Well No. 10S/2W-3A5
Other Well No.

(2) LOCATION OF WELL:
County Santa Cruz Owner's number, if any #5
Township, Range, and Section
Distance from cities, roads, railroads, etc. End of West Drive

(3) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic [ ] Industrial [ ] Municipal [X]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [X]
Cable [ ]
Other [ ]

(6) CASING INSTALLED:
STEEL: ✓ OTHER:
SINGLE [X] DOUBLE [ ]

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
~~0~~	~~80~~	~~8¾~~		13½	50	400
0	50	14	¼	20		
0	400	8¾	¼			

Size of shoe or well ring: Cone Size of gravel: #8 sand
Describe joint Welded collar

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen Johnson Type 304

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
70	80			.040 slot
90	100			
225	235			
390	400			

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 50 ft.
Were any strata sealed against pollution? Yes [X] No [ ] If yes, note depth of strata
From 0 ft. to 50 ft.
From ft. to ft.
Method of sealing Cement

(9) WATER LEVELS:
Depth at which water was first found, if known 70 ft.
Standing level before perforating, if known 70 ft.
Standing level after perforating and developing 178 ft.

(10) WELL TESTS:
Was pump test made? Yes [ ] No [X] If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]
Was electric log made of well? Yes [ ] No [X] If yes, attach copy

(11) WELL LOG:
Total depth 410 ft. Depth of completed well 400 ft.
Formation: Describe by color, character, size of material, and structure

ft. to ft.	
0 — 76'	White Sand
76 — 225	Brown shale
225 - 235	Fractured shale
235 - 320	Brown Shale
320 - 350	Fractured shale
350 - 410	Fractured shale

Work started 8/26 1975 Completed 9/18 1975
WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME LANDINO Const & Well DRILLING
(Person, firm, or corporation) (Typed or printed)
Address 5360 Coast Road
Santa Cruz, California 95060
[SIGNED] Tony Landino
(Well Driller)
License No. 201380 Dated 10/6, 1975

SKETCH LOCATION OF WELL ON REVERSE SIDE ✓

DWR 188 (REV. 9-68) 25179-950 9-68 50M TRIP OSP

SOURCE: USGS TOPO FELTON QUADRANGLE-CALIFORNIA-SANTA CRUZ CO. 7.5-MINUTE SERIES

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REGISTERED PROFESSIONAL ENGINEER · STATE OF CALIFORNIA · CIVIL · PRELIMINARY NOT FOR CONSTRUCTION

LEWIS SITE SPECIFIC NOTES

LOMPICO TANKS REPLACEMENT

SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=500'		
SUBMITTAL:	60% SUBMITTAL		

G1.6
SHEET 7 OF 25

SITE ACCESS NOTES:

KASKI TANK SITE:

FROM SANTA CRUZ:
- HEAD NORTH ON GRAHAM HILL ROAD
- TURN RIGHT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN SHARP RIGHT ONTO LAKE BOULEVARD
- TURN LEFT ONTO LAKE SHORE DRIVE
- TURN RIGHT ONTO LAKEVIEW AVENUE
- TURN LEFT ONTO OCEANVIEW AVENUE
- TURN LEFT TO HEAD NORTH ON TROMBA ROAD
- TURN LEFT TO HEAD WEST ON TROMBA ROAD

FROM SCOTTS VALLEY:
- HEADING SOUTH ON HIGHWAY 17 TAKE EXIT 3 FOR MOUNT HERMON ROAD
- TURN LEFT TO HEAD EAST ON GRAHAM HILL ROAD
- TURN LEFT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN SHARP RIGHT ONTO LAKE BOULEVARD
- TURN LEFT ONTO LAKE SHORE DRIVE
- TURN RIGHT ONTO LAKEVIEW AVENUE
- TURN LEFT ONTO OCEANVIEW AVENUE
- TURN LEFT TO HEAD NORTH ON TROMBA ROAD
- TURN LEFT TO HEAD WEST ON TROMBA ROAD

SOURCE: USGS TOPO FELTON QUADRANGLE-CALIFORNIA-SANTA CRUZ CO. 7.5-MINUTE SERIES

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KASKI SITE SPECIFIC NOTES

LOMPICO TANKS REPLACEMENT

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San Lorenzo Valley WATER DISTRICT

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DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=500'
SUBMITTAL: 60% SUBMITTAL

G1.7
SHEET 8 OF 25

SITE ACCESS NOTES:

MADRONE TANK SITE:

FROM SANTA CRUZ:
- HEAD NORTH ON GRAHAM HILL ROAD
- TURN RIGHT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN SHARP RIGHT ONTO LAKE BOULEVARD
- TURN LEFT ONTO LAKESHORE DRIVE
- TURN RIGHT ONTO LAKEVIEW AVENUE
- TURN SHARP LEFT ONTO EDGEWOOD DRIVE
- EDGEWOOD DRIVE TURNS RIGHT AND BECOMES GLADYS AVENUE
- TURN RIGHT ONTO CANYON VIEW AVENUE
- CANYON VIEW AVENUE TURNS LEFT AND BECOMES MADRONE AVENUE
- TURN RIGHT ONTO WILAWAY AVENUE

FROM SCOTTS VALLEY:
- HEADING SOUTH ON HIGHWAY 17 TAKE EXIT 3 FOR MOUNT HERMON ROAD
- TURN LEFT TO HEAD EAST ON GRAHAM HILL ROAD
- TURN LEFT TO HEAD NORTH ONTO E ZAYANTE ROAD
- AT FORK KEEP LEFT TO HEAD NORTH ON LOMPICO ROAD
- TURN SHARP RIGHT ONTO LAKE BOULEVARD
- TURN LEFT ONTO LAKESHORE DRIVE
- TURN RIGHT ONTO LAKEVIEW AVENUE
- TURN SHARP LEFT ONTO EDGEWOOD DRIVE
- EDGEWOOD DRIVE TURNS RIGHT AND BECOMES GLADYS AVENUE
- TURN RIGHT ONTO CANYON VIEW AVENUE
- CANYON VIEW AVENUE TURNS LEFT AND BECOMES MADRONE AVENUE
- TURN RIGHT ONTO WILAWAY AVENUE

SOURCE: USGS TOPO FELTON QUADRANGLE-CALIFORNIA-SANTA CRUZ CO. 7.5-MINUTE SERIES

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
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Salinas, CA 93907-2348
(831) 883-4848

PRELIMINARY NOT FOR CONSTRUCTION

MADRONE SITE SPECIFIC NOTES

LOMPICO TANKS REPLACEMENT

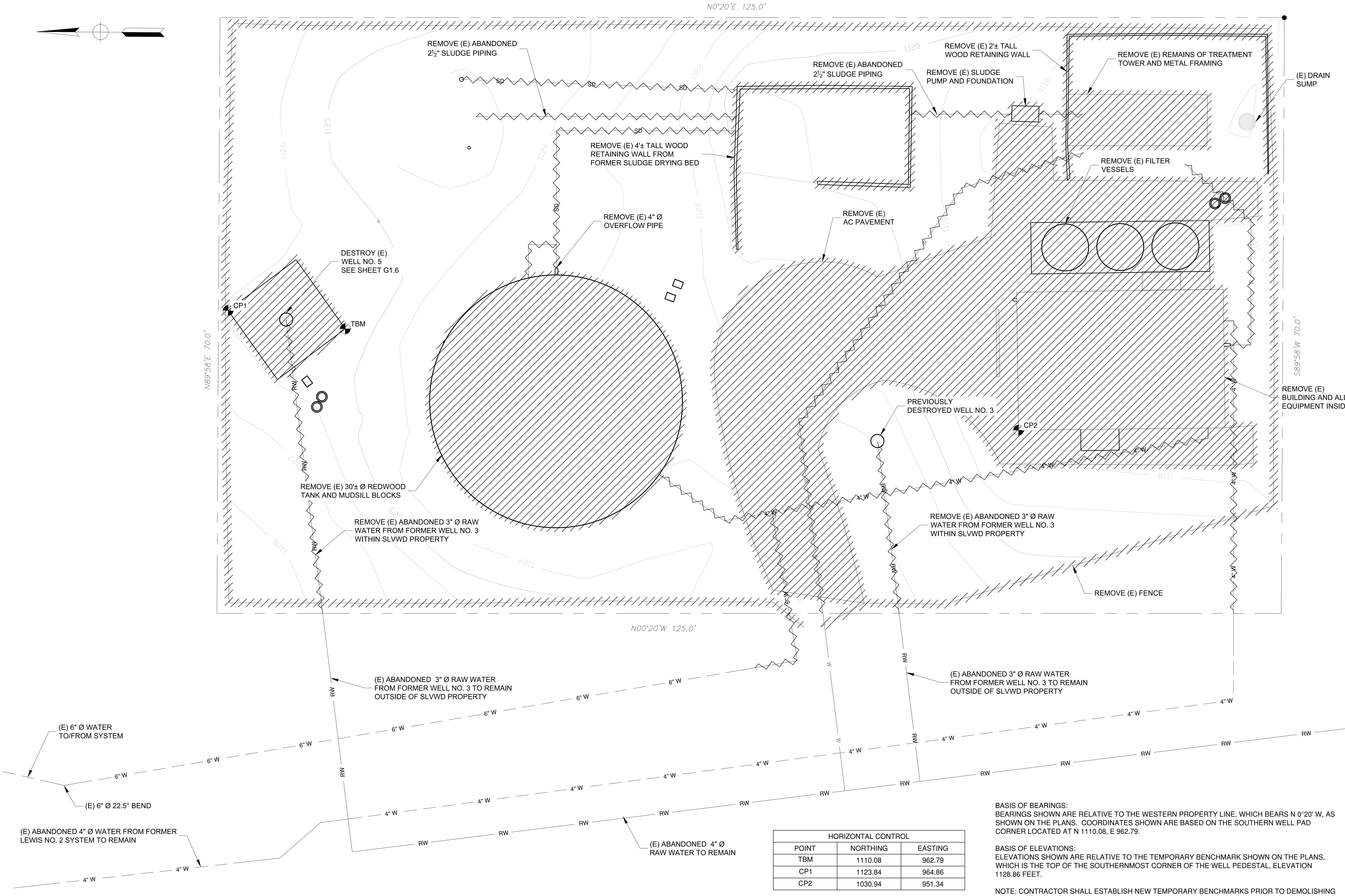
SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=500'
SUBMITTAL: 60% SUBMITTAL

G1.8

SHEET 9 OF 25



HORIZONTAL CONTROL		
POINT	NORTHING	EASTING
TBM	1110.08	962.79
CP1	1123.84	964.86
CP2	1030.94	951.34

BASIS OF BEARINGS:
BEARINGS SHOWN ARE RELATIVE TO THE WESTERN PROPERTY LINE, WHICH BEARS N 0°20' W, AS SHOWN ON THE PLANS. COORDINATES SHOWN ARE BASED ON THE SOUTHERN WELL PAD CORNER LOCATED AT N 1110.08, E 962.79.

BASIS OF ELEVATIONS:
ELEVATIONS SHOWN ARE RELATIVE TO THE TEMPORARY BENCHMARK SHOWN ON THE PLANS, WHICH IS THE TOP OF THE SOUTHERNMOST CORNER OF THE WELL PEDESTAL, ELEVATION 1128.86 FEET.

NOTE: CONTRACTOR SHALL ESTABLISH NEW TEMPORARY BENCHMARKS PRIOR TO DEMOLISHING EXISTING TEMPORARY BENCHMARKS.

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER – ANDREW A. STERBENZ – No. 69705 – CIVIL – STATE OF CALIFORNIA – PRELIMINARY NOT FOR CONSTRUCTION

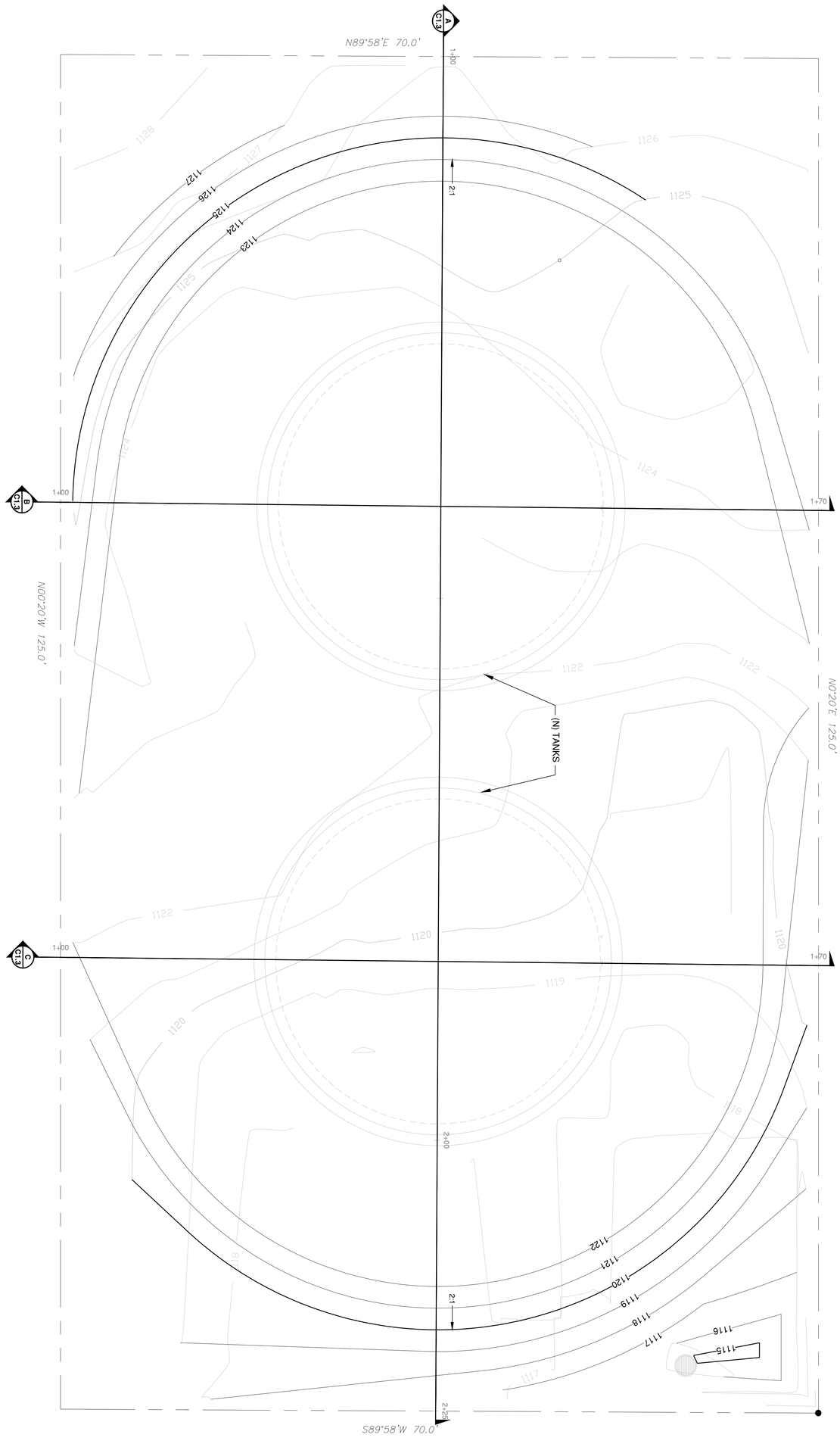
LEWIS
SITE DEMOLITION PLAN
LOMPICO TANKS REPLACEMENT
SLVWD NO. ____

San Lorenzo Valley Water District

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=5'
SUBMITTAL: 60% SUBMITTAL

C1.1
SHEET 10 OF 25

PRELIMINARY - NOT FOR CONSTRUCTION



0 5 10
SCALE IN FEET

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=5'		
SUBMITTAL:	60% SUBMITTAL		

San Lorenzo Valley WATER DISTRICT

LEWIS
SITE GRADING PLAN

LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

REGISTERED PROFESSIONAL ENGINEER
ANDREW A. STERGULZ
No. 66703
CIVIL
STATE OF CALIFORNIA

PRELIMINARY
NOT FOR CONSTRUCTION

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REV. NO.	DESCRIPTION	BY	DATE
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2			
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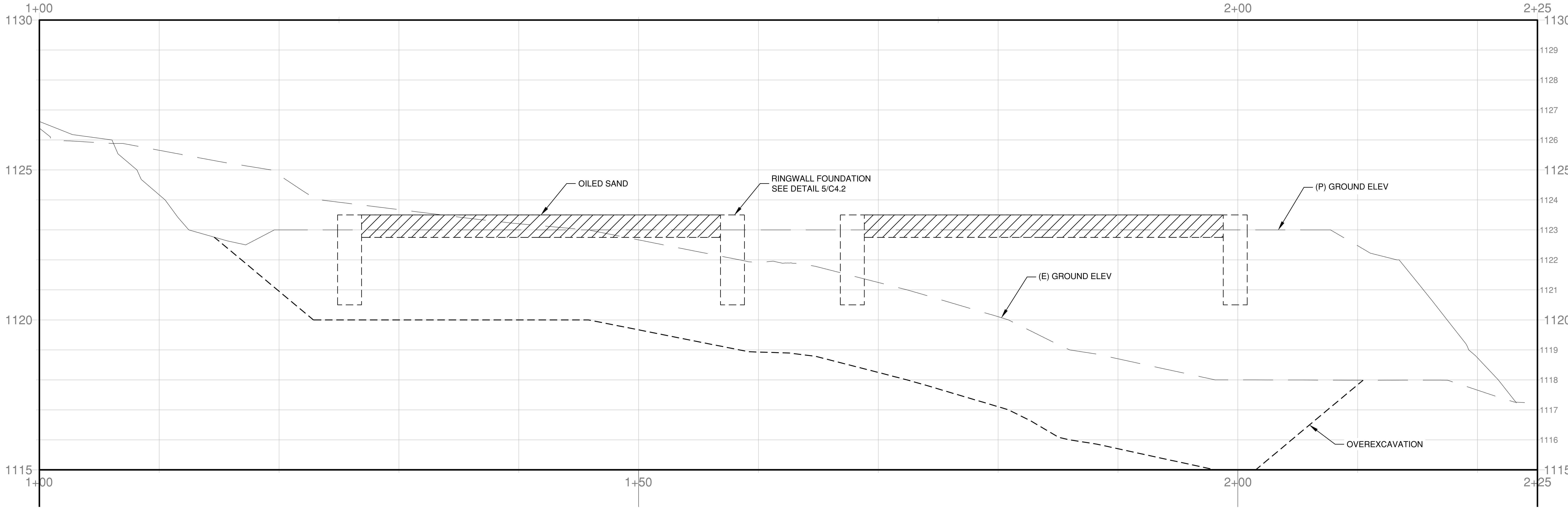
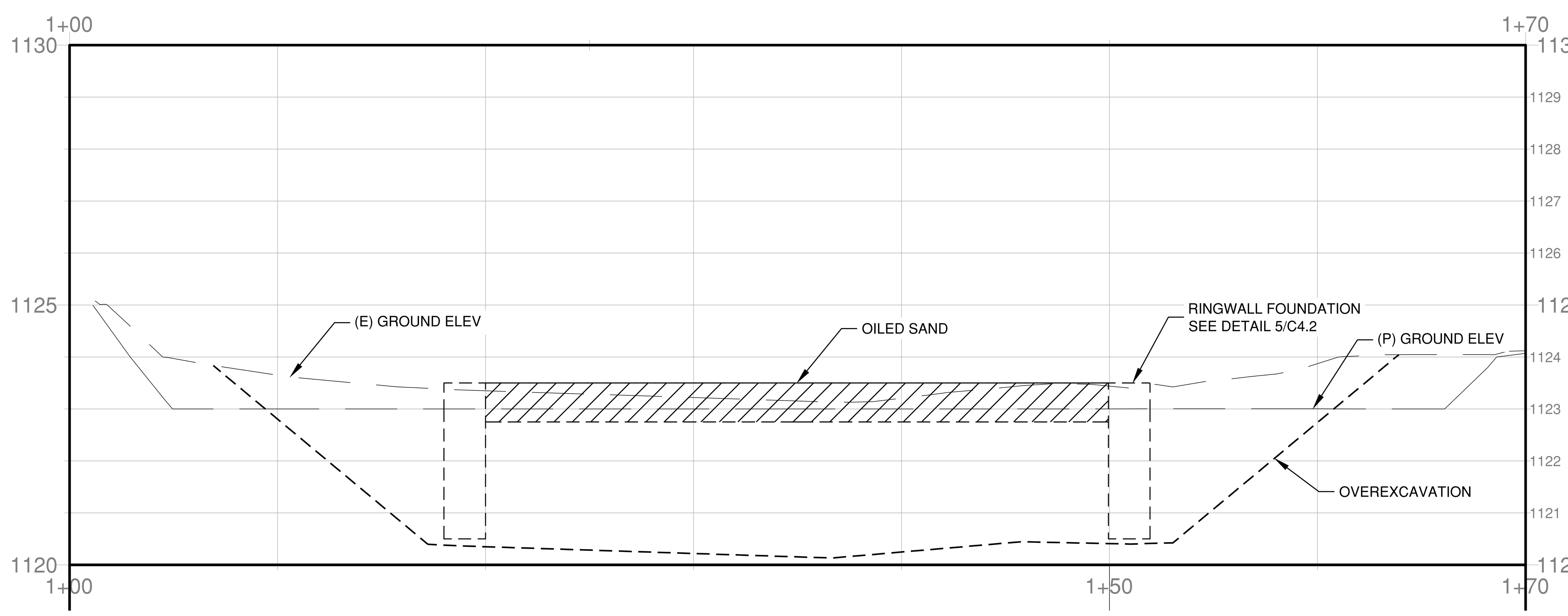
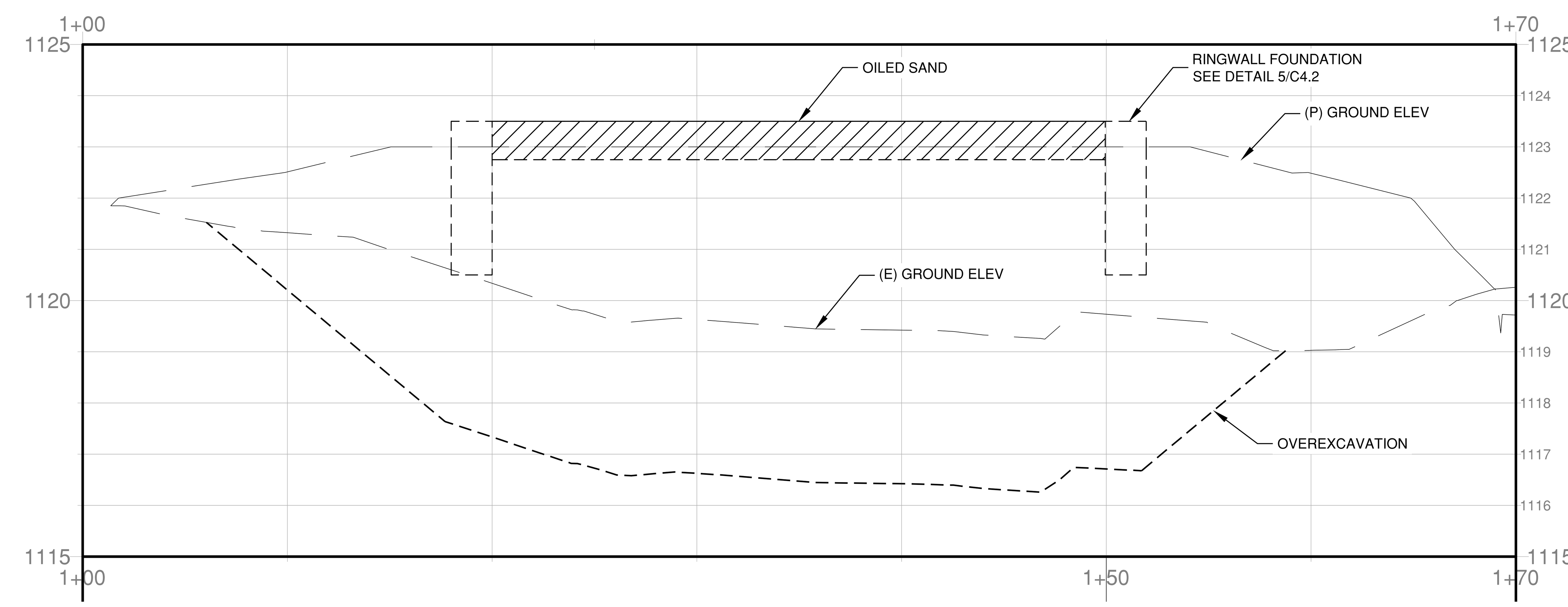
SHEET 11 OF 25
C1.2



SECTION A
HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION B
HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION C
HORIZONTAL 1"=5'
VERTICAL 1"=2'

NOTES:
OVEREXCAVATE AND RECOMPACT EXISTING SUBGRADE PER GEOTECH REPORT. LIMIT OF OVER-EXCAVATION IS NOMINALLY 3-FEET, SUBJECT TO FIELD APPROVAL BY THE GEOTECHNICAL ENGINEER, OR WHERE SANDSTONE/SILTSTONE IS ENCOUNTERED.

0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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4			
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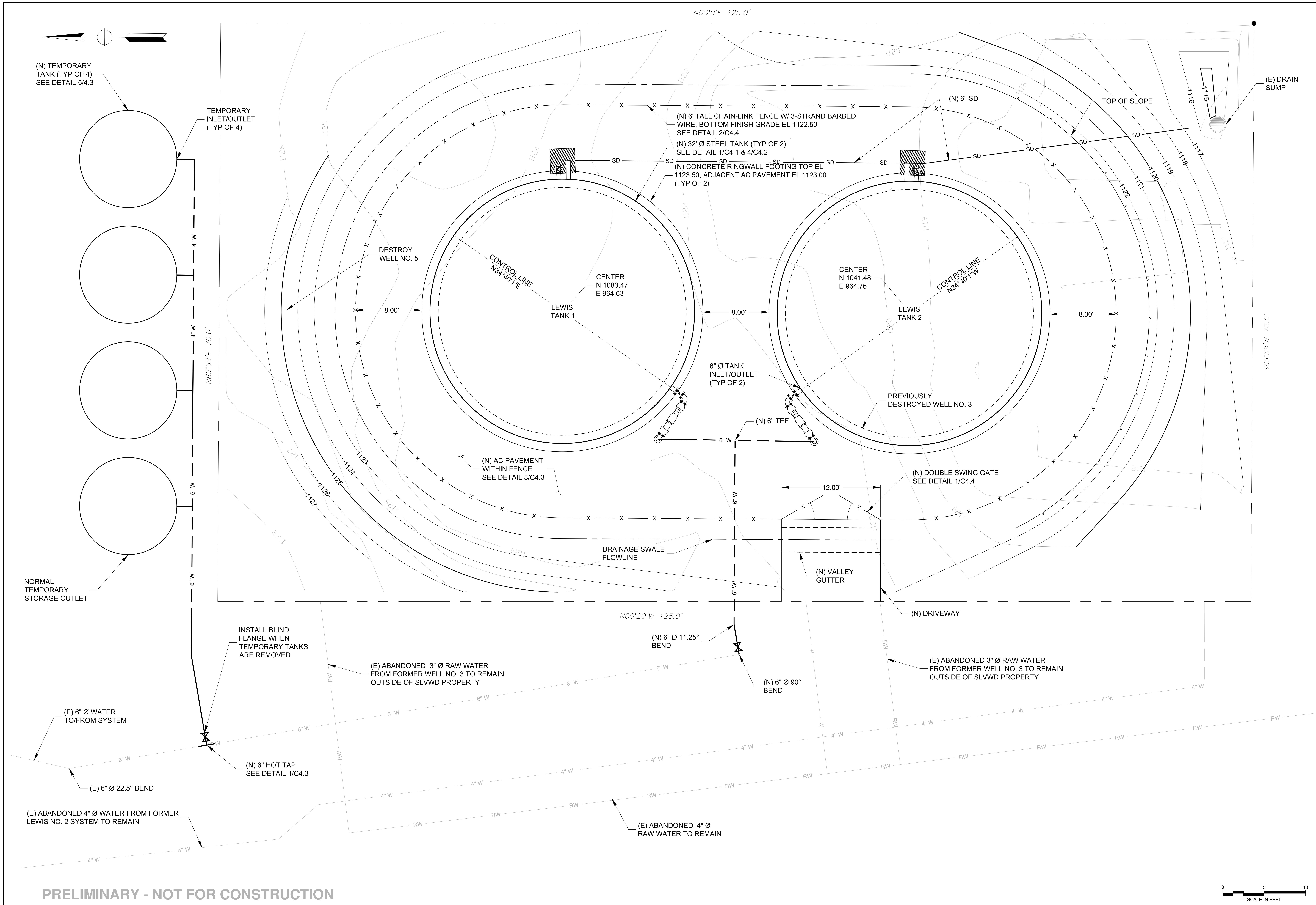
LEWIS
SITE GRADING SECTIONS
LOMPICO TANKS REPLACEMENT
SLVWD NO.

San Lorenzo Valley Water District

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: AS SHOWN
SUBMITTAL: 60% SUBMITTAL

C1.3
SHEET 12 OF 25



N0°20'E 125.0'
N89°58'E 70.0'
S89°58'W 70.0'
N00°20'W 125.0'
(N) TEMPORARY TANK (TYP OF 4) SEE DETAIL 5/4.3
TEMPORARY INLET/OUTLET (TYP OF 4)
NORMAL TEMPORARY STORAGE OUTLET
4" W
6" W
DESTROY WELL NO. 5
(N) 6' TALL CHAIN-LINK FENCE W/ 3-STRAND BARBED WIRE, BOTTOM FINISH GRADE EL 1122.50 SEE DETAIL 2/C4.4
(N) 32' Ø STEEL TANK (TYP OF 2) SEE DETAIL 1/C4.1 & 4/C4.2
(N) CONCRETE RINGWALL FOOTING TOP EL 1123.50, ADJACENT AC PAVEMENT EL 1123.00 (TYP OF 2)
(N) 6" SD
TOP OF SLOPE
(E) DRAIN SUMP
SD
CONTROL LINE N34°40'1"E
CENTER N 1083.47 E 964.63
LEWIS TANK 1
CENTER N 1041.48 E 964.76
CONTROL LINE N34°40'1"W
LEWIS TANK 2
8.00'
8.00'
8.00'
6" Ø TANK INLET/OUTLET (TYP OF 2)
PREVIOUSLY DESTROYED WELL NO. 3
(N) 6" TEE
(N) AC PAVEMENT WITHIN FENCE SEE DETAIL 3/C4.3
(N) DOUBLE SWING GATE SEE DETAIL 1/C4.4
12.00'
DRAINAGE SWALE FLOWLINE
(N) VALLEY GUTTER
(N) DRIVEWAY
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
INSTALL BLIND FLANGE WHEN TEMPORARY TANKS ARE REMOVED
(N) 6" Ø 11.25° BEND
(N) 6" Ø 90° BEND
(E) ABANDONED 3" Ø RAW WATER FROM FORMER WELL NO. 3 TO REMAIN OUTSIDE OF SLVWD PROPERTY
(E) ABANDONED 3" Ø RAW WATER FROM FORMER WELL NO. 3 TO REMAIN OUTSIDE OF SLVWD PROPERTY
(E) 6" Ø WATER TO/FROM SYSTEM
(N) 6" HOT TAP SEE DETAIL 1/C4.3
(E) 6" Ø 22.5° BEND
(E) ABANDONED 4" Ø WATER FROM FORMER LEWIS NO. 2 SYSTEM TO REMAIN
(E) ABANDONED 4" Ø RAW WATER TO REMAIN
RW
0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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(831) 883-4848

LEWIS
SITE IMPROVEMENT PLAN
LOMPICO TANKS REPLACEMENT
SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=5'		
SUBMITTAL:	60% SUBMITTAL		

C1.4
SHEET 13 OF 25

PROTECT IN PLACE

HARVEST AND REMOVE

REMOVE (E) 24'± Ø REDWOOD TANK AND 26'± Ø CONCRETE FOUNDATION TOP OF FOUNDATION = EL 1259.00± (TYP OF 2)

REMOVE (E) WATER PIPING WITHIN SITE AREA (TYP)

REMOVE (E) 4" Ø TANK INLET PIPE

REMOVE (E) 6" Ø TANK OUTLET PIPE

REMOVE (E) FENCE

TOE OF SLOPE

TOP OF SLOPE

FOUND ½" IRON PIPE

N24°25'35"W 171.15'

N67°40'25"E 254.12'

PROTECT IN PLACE

HORIZONTAL CONTROL		
POINT	NORTHING	EASTING
TBM	3003.54	2879.45
CP1	3000.00	3000.00
CP2	3014.48	2902.56

BASIS OF BEARINGS:
BEARINGS SHOWN ARE RELATIVE TO EASTERN PROPERTY LINE, WHICH BEARS N 24°25'35" W AS SHOWN ON THE PLANS. COORDINATES SHOWN ARE BASED ON THE ¾" IRON PIPE AT THE EASTERN PROPERTY CORNER, LOCATED AT N 3000.00, E 3000.00.

BASIS OF ELEVATIONS:
ELEVATIONS SHOWN ARE RELATIVE TO THE TEMPORARY BENCHMARK SHOWN ON THE PLANS, WHICH IS A POINT ON THE NORTHERN TANK FOUNDATION, ELEVATION 1259.00 FEET.

NOTE: CONTRACTOR SHALL ESTABLISH NEW TEMPORARY BENCHMARKS PRIOR TO DEMOLISHING EXISTING TEMPORARY BENCHMARKS.

0 6 12
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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Schaaf & Wheeler
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(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER ANDREW A. STERLING JR. CIVIL STATE OF CALIFORNIA

KASKI
SITE DEMOLITION PLAN

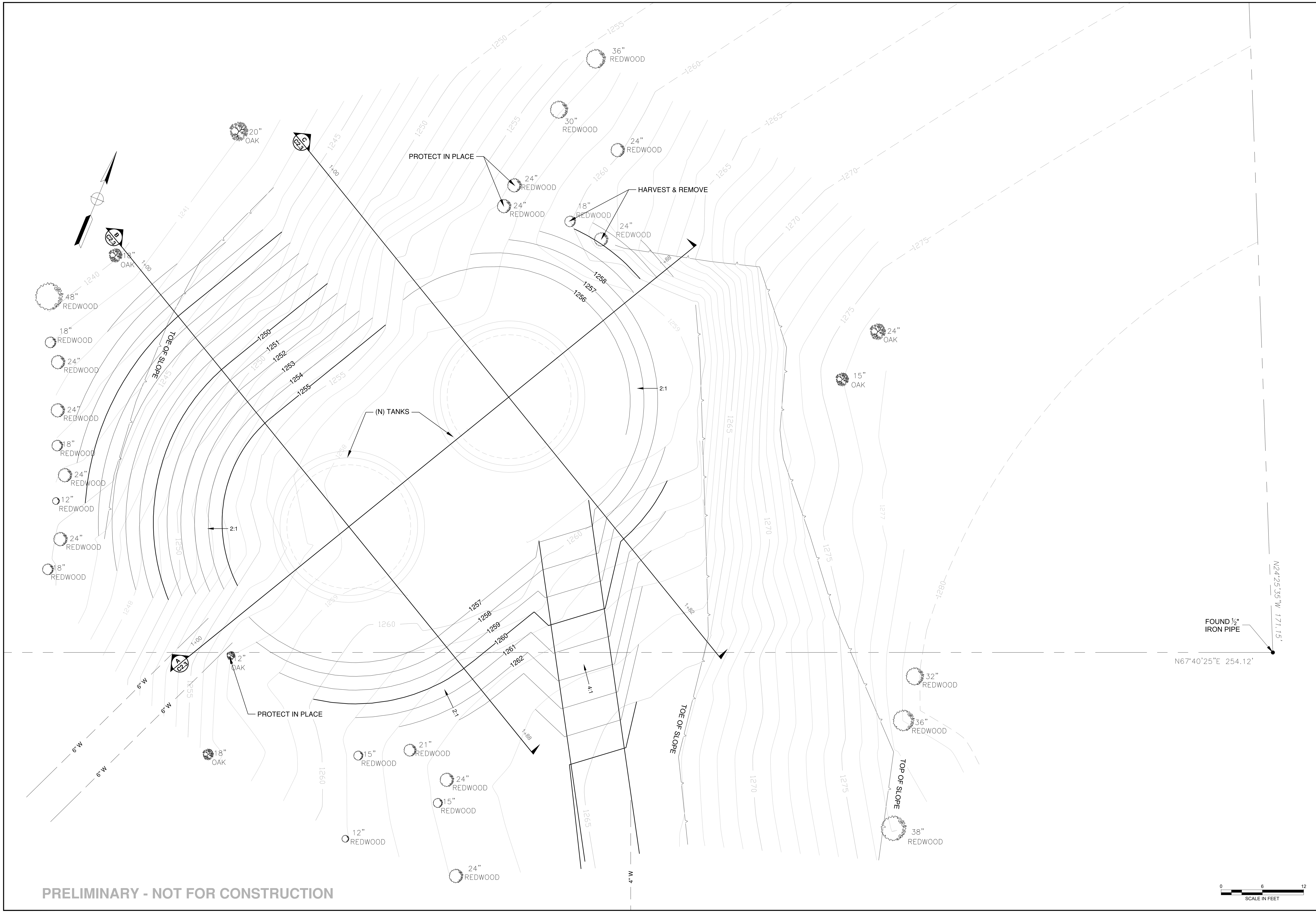
LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=6'		
SUBMITTAL:	60% SUBMITTAL		

C2.1
SHEET 14 OF 25



PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
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Salinas, CA 93907-2348
(831) 883-4848

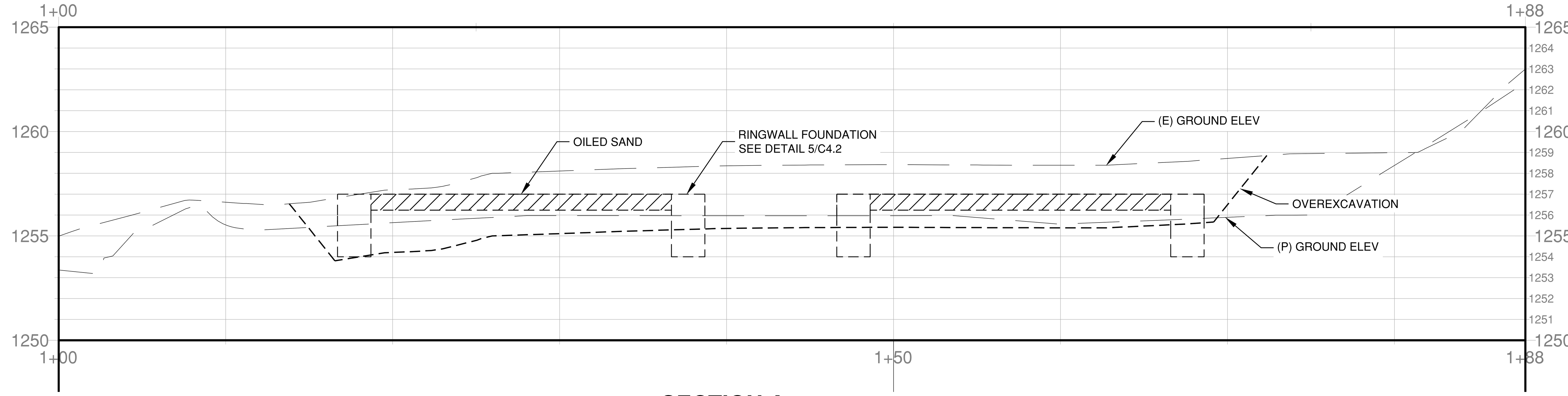
KASKI
SITE GRADING PLAN
LOMPICO TANKS REPLACEMENT

SLVWD NO. ____________

San Lorenzo Valley WATER DISTRICT

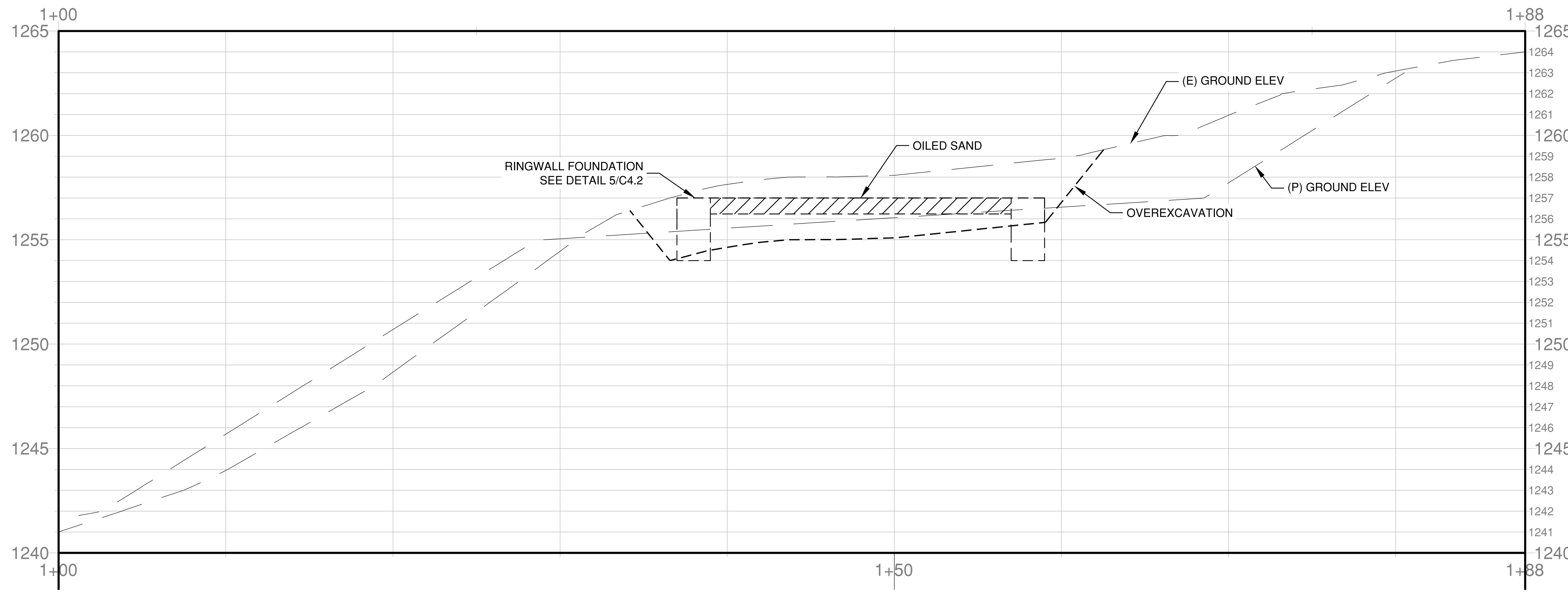
DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=6'		
SUBMITTAL:	60% SUBMITTAL		

C2.2
SHEET 15 OF 25



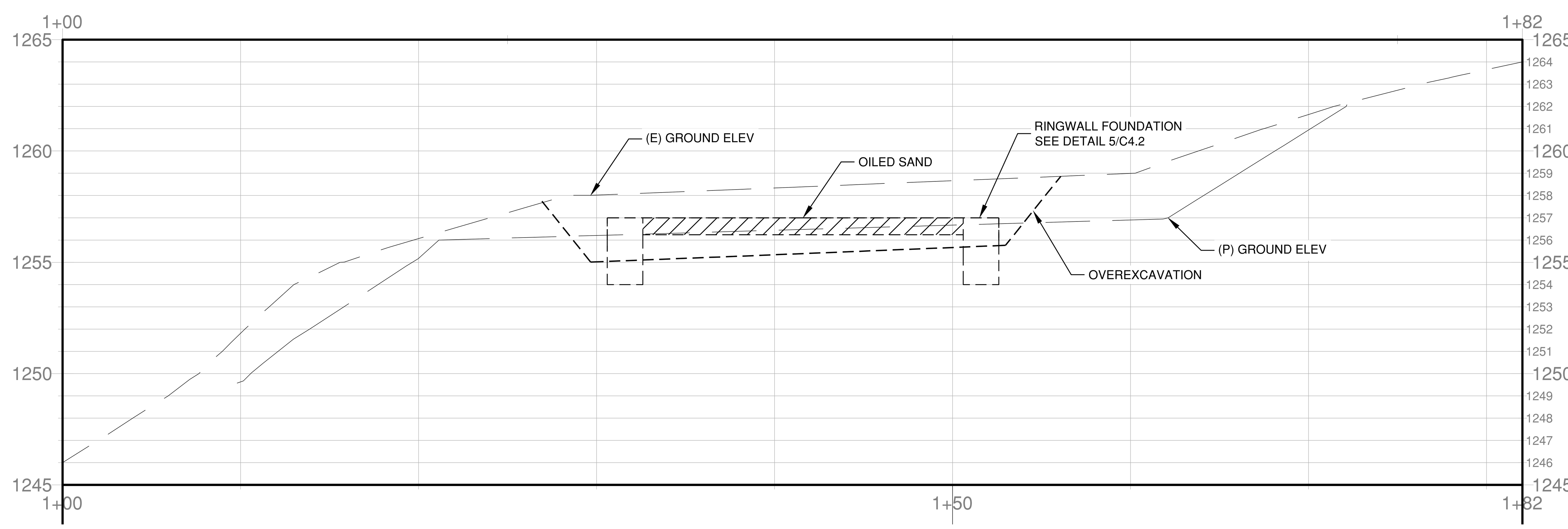
SECTION A

HORIZONTAL 1"=5'
VERTICAL 1"=4'



SECTION B

HORIZONTAL 1"=5'
VERTICAL 1"=4'



SECTION C

HORIZONTAL 1"=5'
VERTICAL 1"=4'

NOTES:
OVEREXCAVATE AND RECOMPACT EXISTING SUBGRADE PER GEOTECH REPORT. LIMIT OF OVER-EXCAVATION IS NOMINALLY 3-FEET, SUBJECT TO FIELD APPROVAL BY THE GEOTECHNICAL ENGINEER, OR WHERE SANDSTONE/SILTSTONE IS ENCOUNTERED.

0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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Schaaf & Wheeler
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Salinas, CA 93907-2348
(831) 883-4848

KASKI
SITE GRADING SECTIONS
LOMPICO TANKS REPLACEMENT
SLVWD NO. ________

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: AS SHOWN
SUBMITTAL: 60% SUBMITTAL

C2.3
SHEET 16 OF 25

(N) 20' Ø BOLTED STEEL TANK (TYP OF 2) SEE DETAIL 1/C4.1

(N) CONCRETE RINGWALL FOOTING EL 1257.00, ADJACENT AC PAVEMENT EL 1256.50 TYP OF 2

(N) 6" PVC

(N) 6' TALL CHAIN-LINK FENCE W/ 3-STRAND BARBED WIRE SEE DETAIL 2/C4.4

TOE OF SLOPE

KASKI TANK 1 CONTROL LINE S71°12'4"W

CENTER N 2992.22 E 2883.16

(N) 8"x6" TEE

(N) 8" 45° ELL

CONTROL LINE N0°44'46"E

KASKI TANK 2 CENTER N 2965.85 E 2868.79

(N) AC PAVEMENT WITHIN FENCE SEE DETAIL 3/C4.3

(N) AC CURB SEE DETAIL 1/C2.4

(N) DOUBLE SWING GATE SEE DETAIL 1/C4.4

(N) 4"x8"x8" TEE

(N) 4" 45° ELL

(N) 8" 45° ELL

VALVE TO HAVE BLIND FLANGE AT TIME WHEN TEMPORARY TANKS ARE REMOVED

TOE OF SLOPE

(N) DRIVEWAY

TOP OF SLOPE

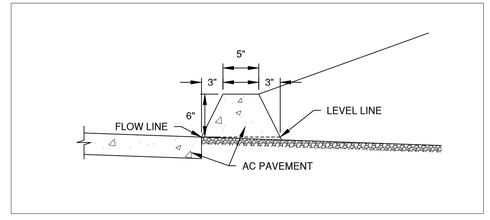
TEMPORARY INLET/OUTLET (TYP OF 4)

(N) TEMPORARY TANK (TYP OF 4) SEE DETAIL 5/4.3

FOUND ½" IRON PIPE

N24°25'35"W 171.15'

N67°40'25"E 254.12'



AC CURB 1
NTS -

SCALE IN FEET 0 6 12

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
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REGISTERED PROFESSIONAL ENGINEER ANDREW A. STERLING NO. 69703 CIVIL STATE OF CALIFORNIA

KASKI
SITE IMPROVEMENT PLAN

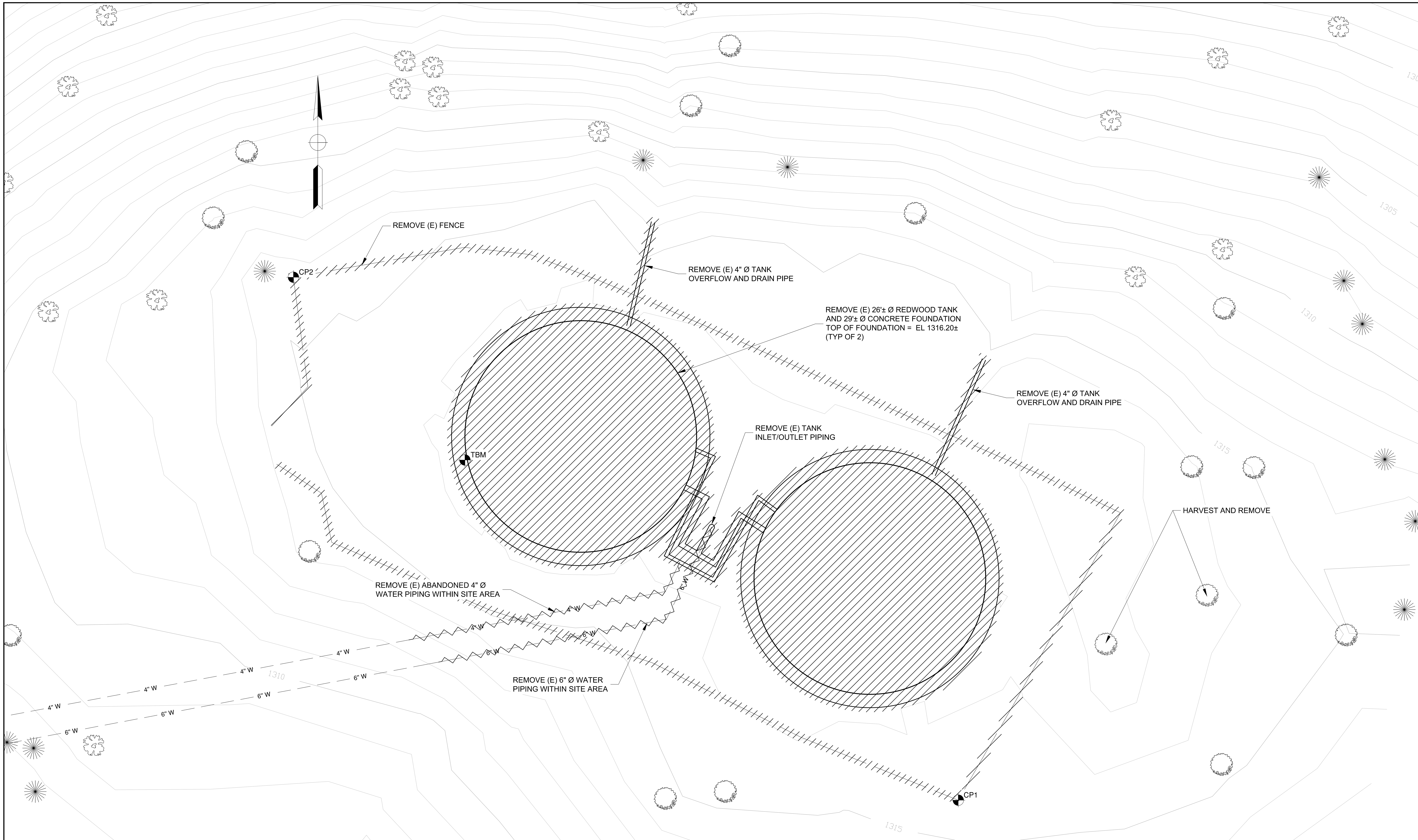
LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=6'		
SUBMITTAL:	60% SUBMITTAL		

C2.4
SHEET 17 OF 25



HORIZONTAL CONTROL		
POINT	NORTHING	EASTING
TBM	9988.00	10036.63
CP1	9949.80	10092.00
CP2	10008.53	10017.37

BASIS OF BEARINGS:
BEARINGS SHOWN ARE RELATIVE TO THE WESTERN FENCE LINE, WHICH BEARS N 29°26'35"E AS SHOWN ON THE PLANS. COORDINATES SHOWN ARE BASED ON THE SOUTHERNMOST FENCE CORNER, LOCATED AT N 9949.80, E 10092.00.

BASIS OF ELEVATIONS:
ELEVATIONS SHOWN ARE RELATIVE TO THE TEMPORARY BENCHMARK SHOWN ON THE PLANS, WHICH IS A POINT ON THE EXISTING TANK FOUNDATION, ELEVATION 1316.20 FEET.

NOTE: CONTRACTOR SHALL ESTABLISH NEW TEMPORARY BENCHMARKS PRIOR TO DEMOLISHING EXISTING TEMPORARY BENCHMARKS.

0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
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2			
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Schaaf & Wheeler
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REGISTERED PROFESSIONAL ENGINEER · ANDREW A. STERBENZ · CIVIL · STATE OF CALIFORNIA · PRELIMINARY NOT FOR CONSTRUCTION

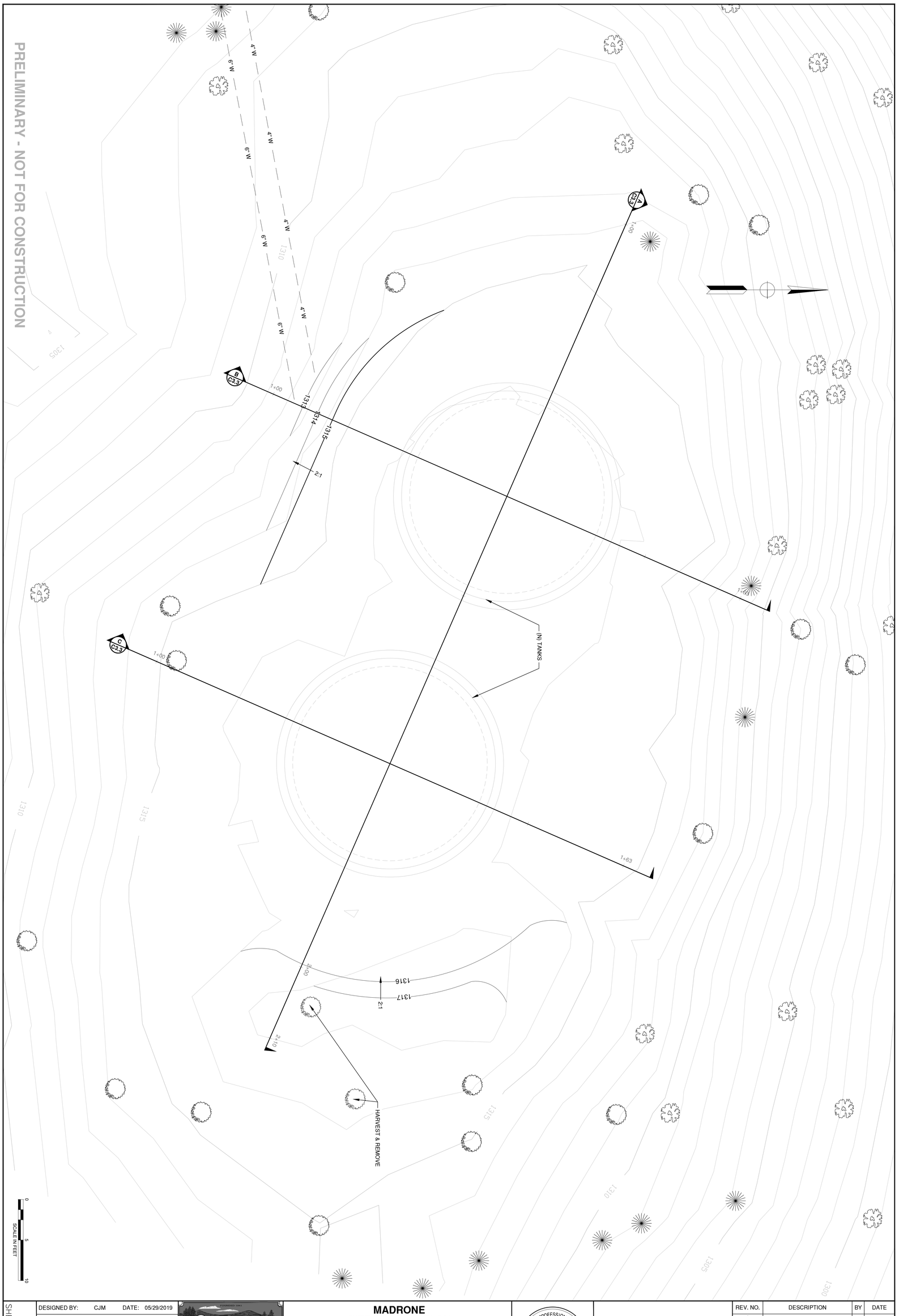
MADRONE
SITE DEMOLITION PLAN
LOMPICO TANKS REPLACEMENT
SLVWD NO. ________

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=5'
SUBMITTAL: 60% SUBMITTAL

C3.1
SHEET 18 OF 25

PRELIMINARY - NOT FOR CONSTRUCTION



SCALE IN FEET: 0, 5, 10

DESIGNED BY: CJM	DATE: 05/29/2019		MADRONE SITE GRADING PLAN		
DRAWN BY: CJM	DATE: 05/29/2019				
QC CHECKED BY: AAS	DATE: 05/29/2019		LOMPICO TANKS REPLACEMENT		
PROJECT NO.:					
SCALE: 1"=5'			SLVWD NO. _____		
SUBMITTAL: 60% SUBMITTAL					

San Lorenzo Valley WATER DISTRICT

REGISTERED PROFESSIONAL ENGINEER — ANDREW A. STERGULZ — No. 68705 — CIVIL — STATE OF CALIFORNIA

PRELIMINARY NOT FOR CONSTRUCTION

Schaaf & Wheeler
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REV. NO.	DESCRIPTION	BY	DATE
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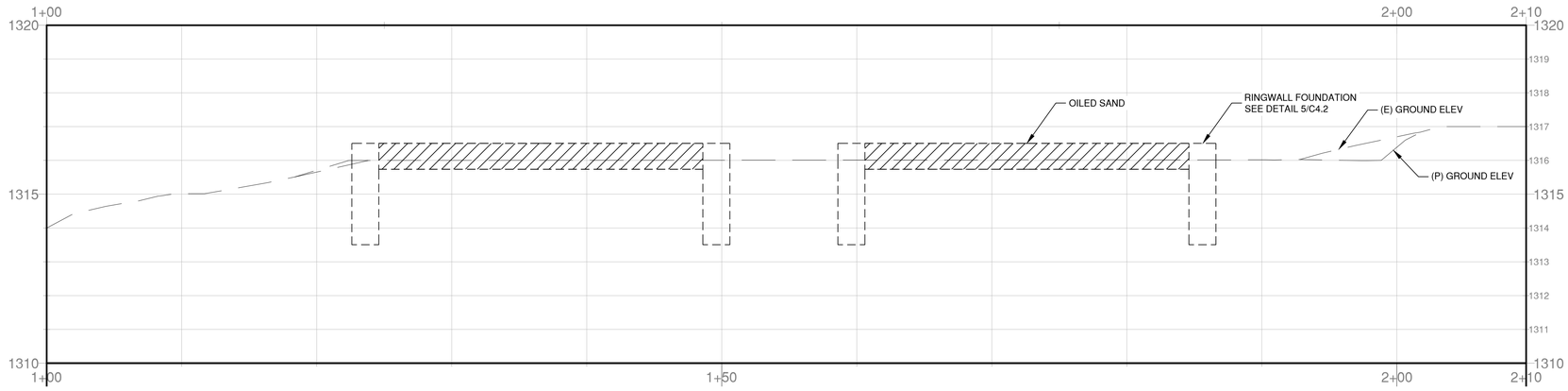
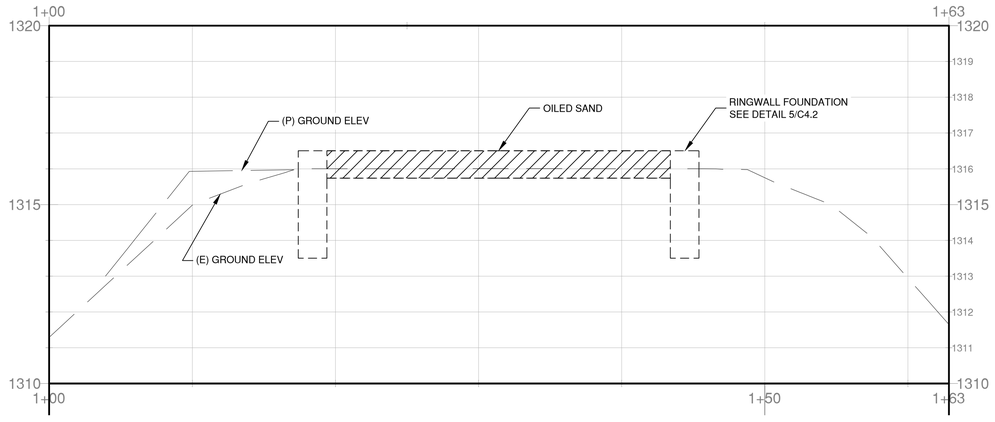
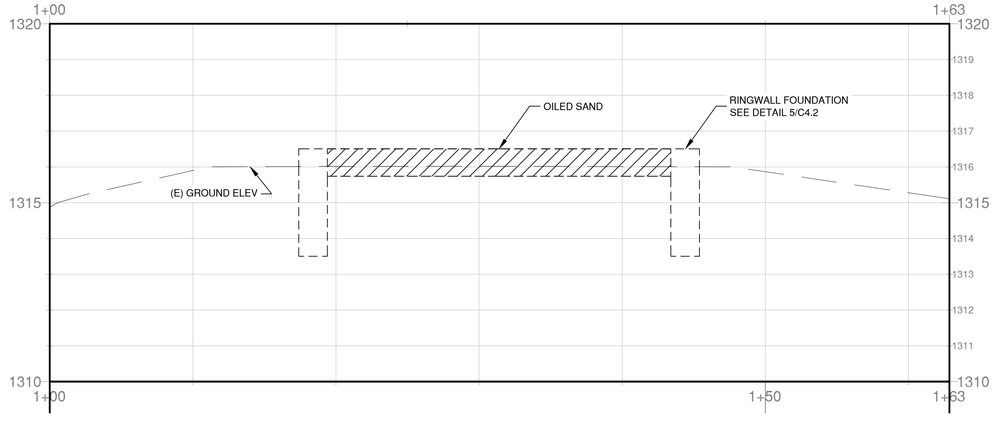


SECTION A
HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION B
HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION C
HORIZONTAL 1"=5'
VERTICAL 1"=2'

NOTES:
OVEREXCAVATE AND RECOMPACT EXISTING SUBGRADE PER GEOTECH REPORT. LIMIT OF OVER-EXCAVATION IS NOMINALLY 3-FEET, SUBJECT TO FIELD APPROVAL BY THE GEOTECHNICAL ENGINEER, OR WHERE SANDSTONE/SILTSTONE IS ENCOUNTERED.

0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
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(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER ANDREW A. STERLING No. 86703 CIVIL STATE OF CALIFORNIA
NOT FOR CONSTRUCTION

MADRONE
SITE GRADING SECTIONS

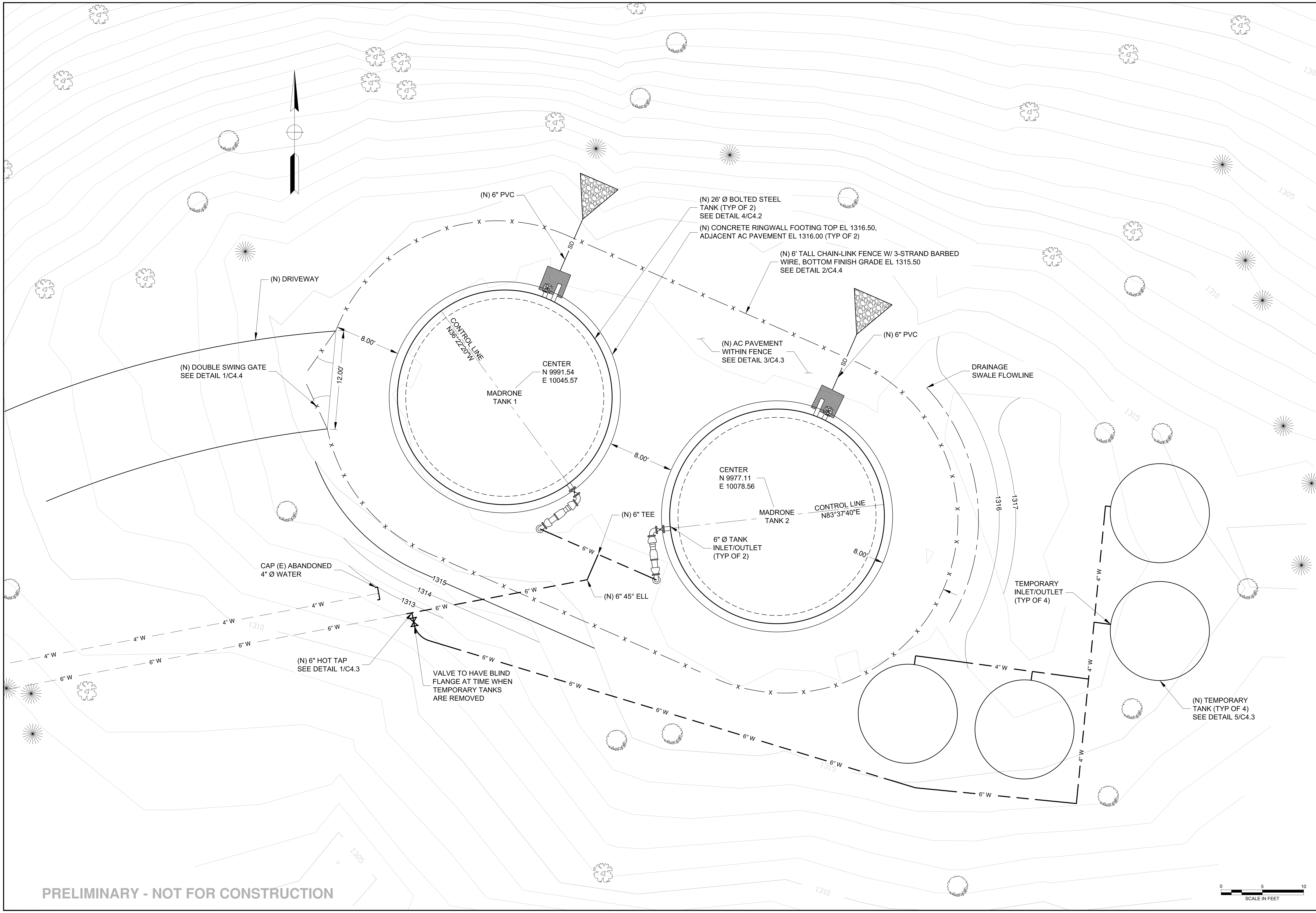
LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	AS SHOWN		
SUBMITTAL:	60% SUBMITTAL		

C3.3
SHEET 20 OF 25


(N) 6" PVC
(N) 26' Ø BOLTED STEEL TANK (TYP OF 2) SEE DETAIL 4/C4.2
(N) CONCRETE RINGWALL FOOTING TOP EL 1316.50, ADJACENT AC PAVEMENT EL 1316.00 (TYP OF 2)
(N) 6' TALL CHAIN-LINK FENCE W/ 3-STRAND BARBED WIRE, BOTTOM FINISH GRADE EL 1315.50 SEE DETAIL 2/C4.4
(N) DRIVEWAY
(N) DOUBLE SWING GATE SEE DETAIL 1/C4.4
8.00'
12.00'
CONTROL LINE N36°22'20"W
CENTER N 9991.54 E 10045.57
MADRONE TANK 1
(N) AC PAVEMENT WITHIN FENCE SEE DETAIL 3/C4.3
(N) 6" PVC
DRAINAGE SWALE FLOWLINE
CENTER N 9977.11 E 10078.56
MADRONE TANK 2
CONTROL LINE N83°37'40"E
(N) 6" TEE
6" Ø TANK INLET/OUTLET (TYP OF 2)
(N) 6" 45° ELL
CAP (E) ABANDONED 4" Ø WATER
TEMPORARY INLET/OUTLET (TYP OF 4)
(N) TEMPORARY TANK (TYP OF 4) SEE DETAIL 5/C4.3
(N) 6" HOT TAP SEE DETAIL 1/C4.3
VALVE TO HAVE BLIND FLANGE AT TIME WHEN TEMPORARY TANKS ARE REMOVED
4" W
6" W
1300
1305
1310
1313
1314
1315
1316
1317
SCALE IN FEET
0 5 10
PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
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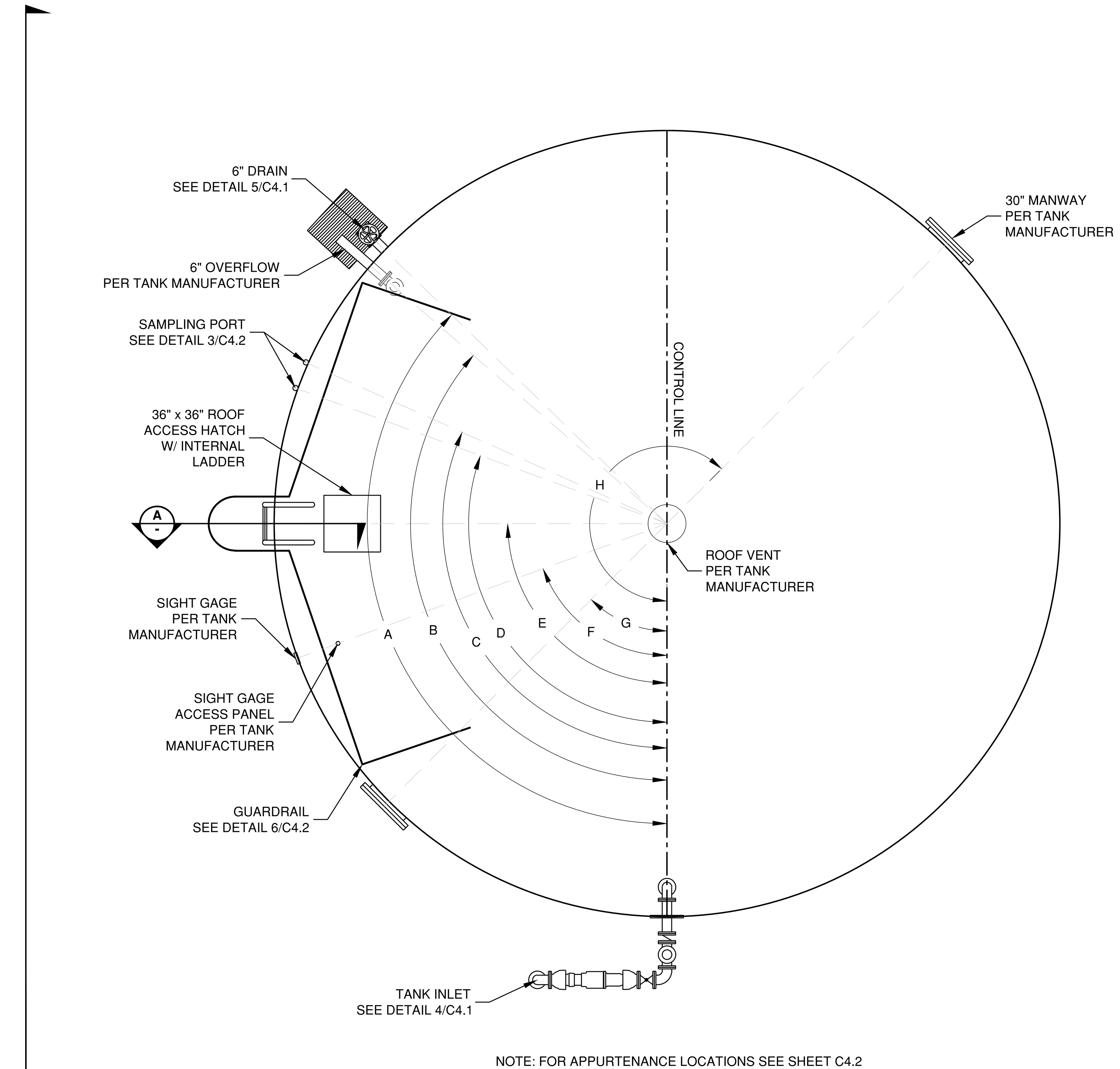
MADRONE
SITE GRADING PLAN
LOMPICO TANKS REPLACEMENT
SLVWD NO. ____________

San Lorenzo Valley WATER DISTRICT

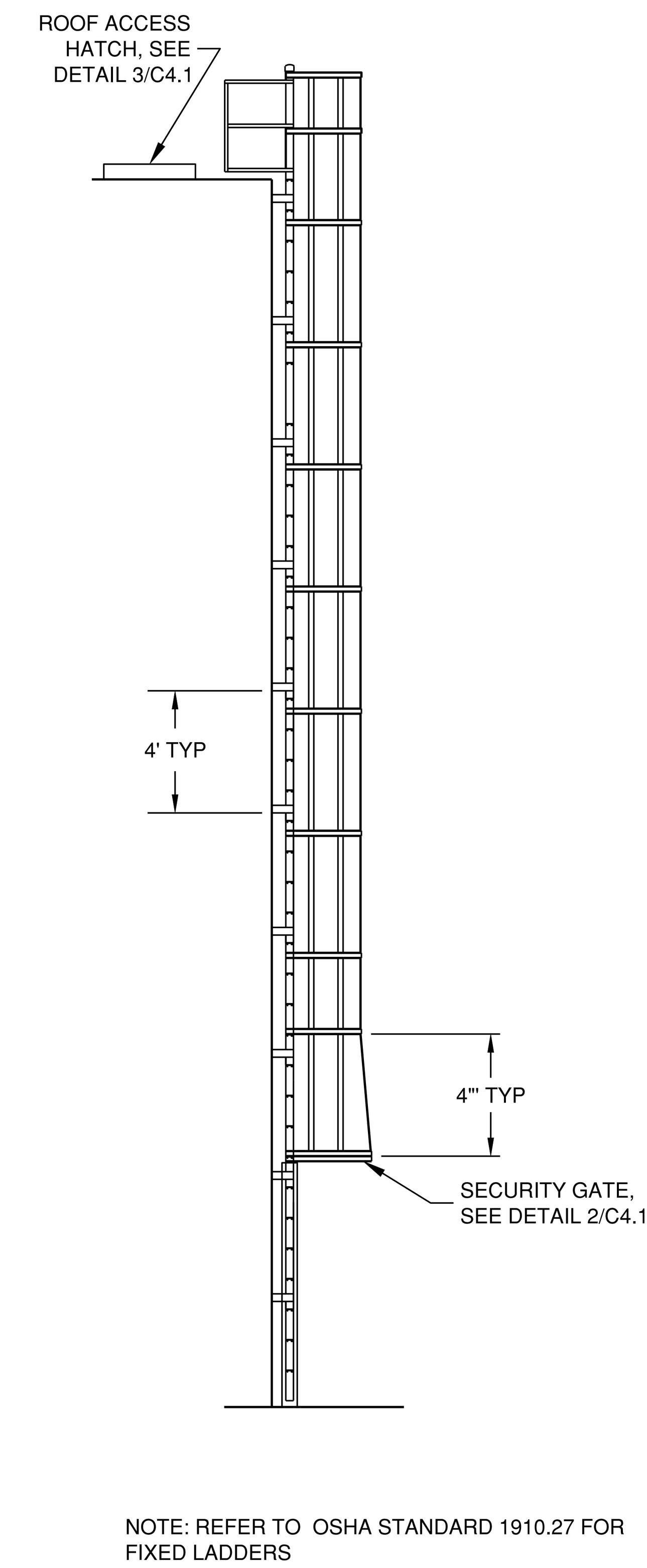
DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=5'
SUBMITTAL: 60% SUBMITTAL

C3.4
SHEET 21 OF 25



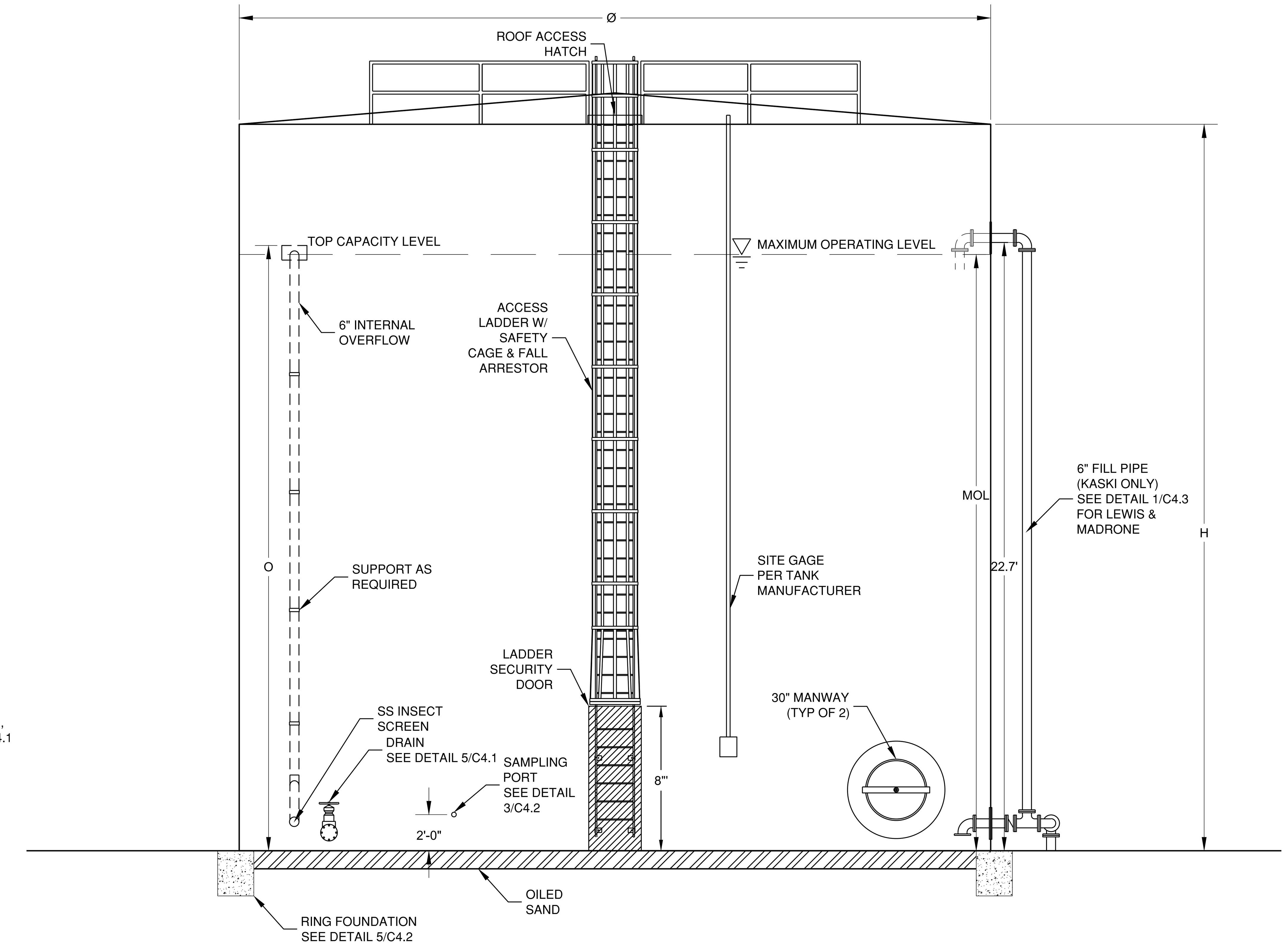
NOTE: FOR APPURTENANCE LOCATIONS SEE SHEET C4.2

KASKI TANK PLAN 1/-
NTS

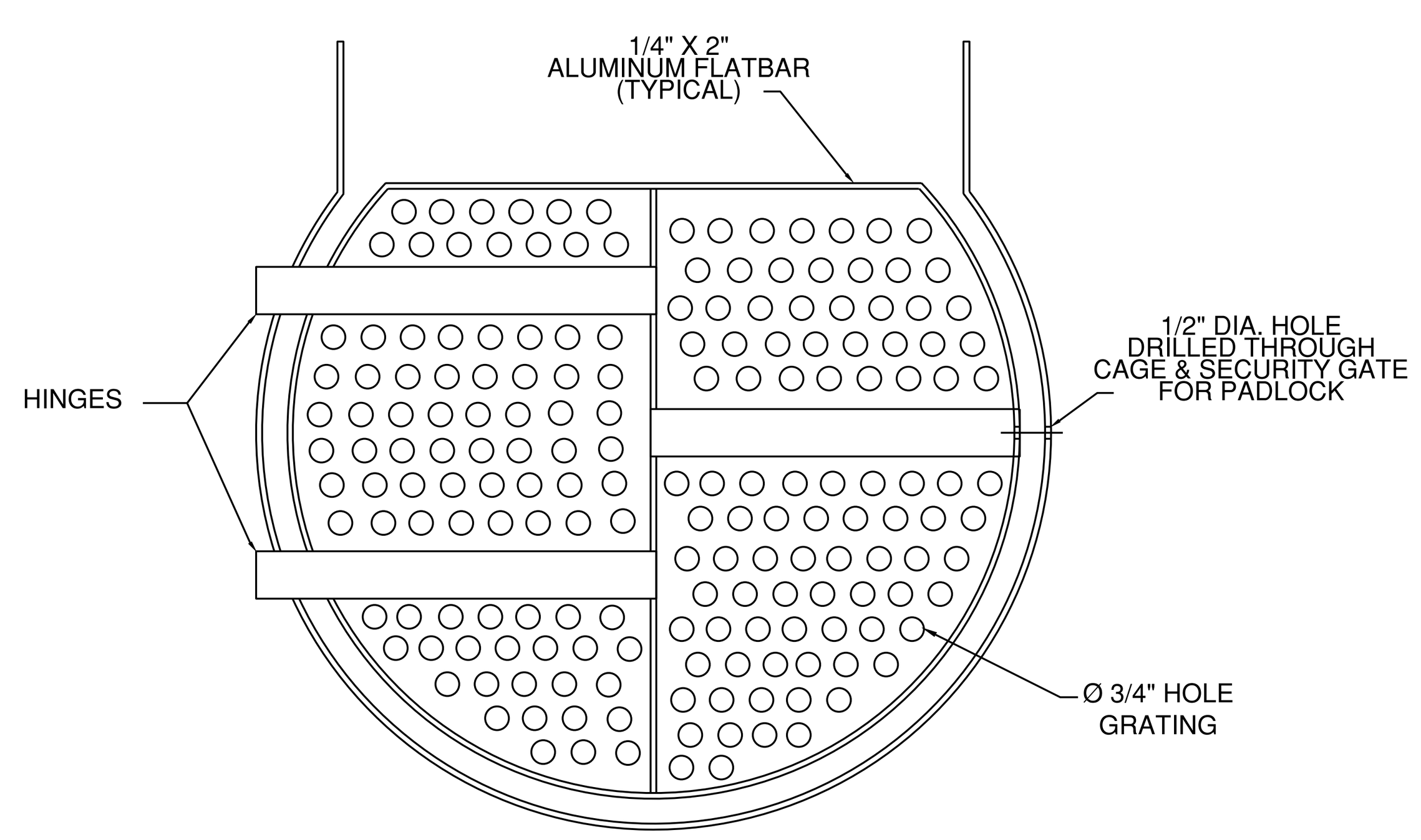


NOTE: REFER TO OSHA STANDARD 1910.27 FOR FIXED LADDERS

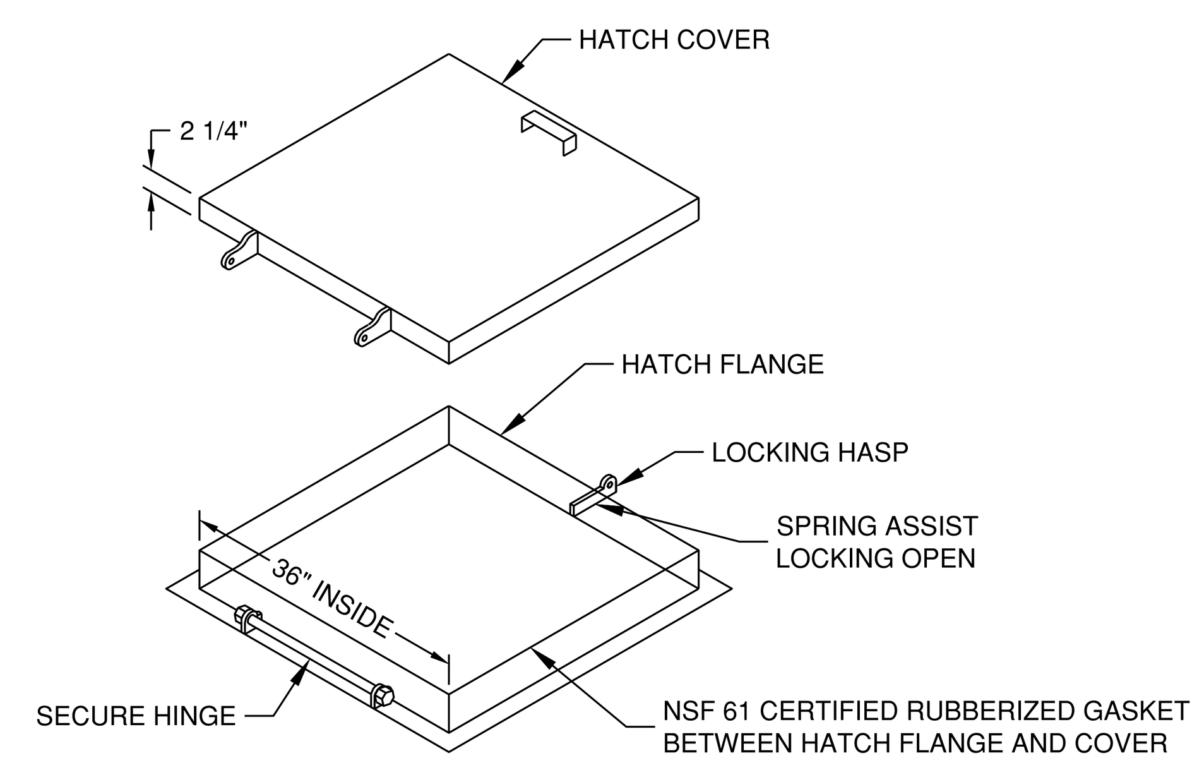
LADDER SECTION A/-
NTS



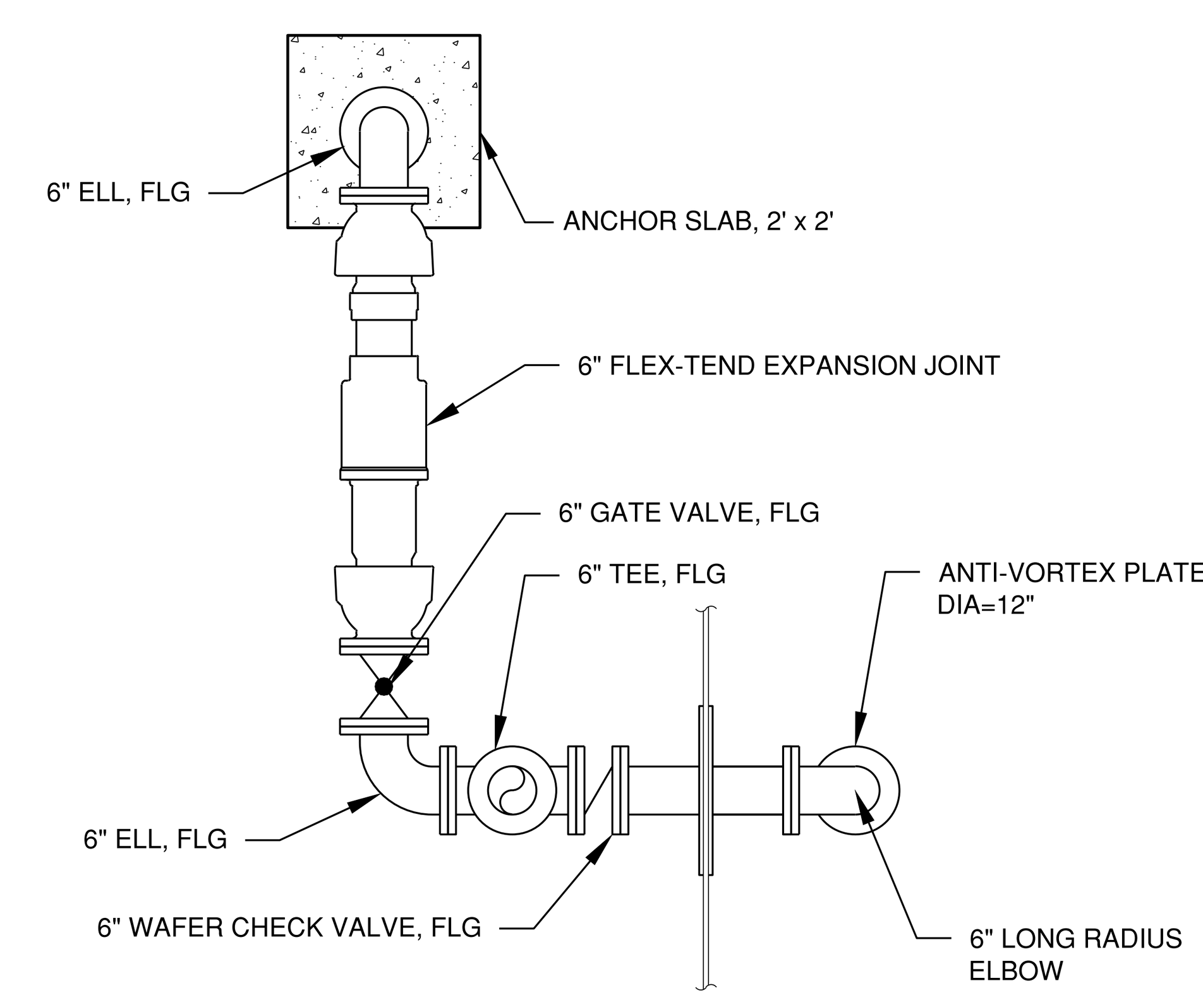
TYPICAL TANK SECTION B/-
NTS



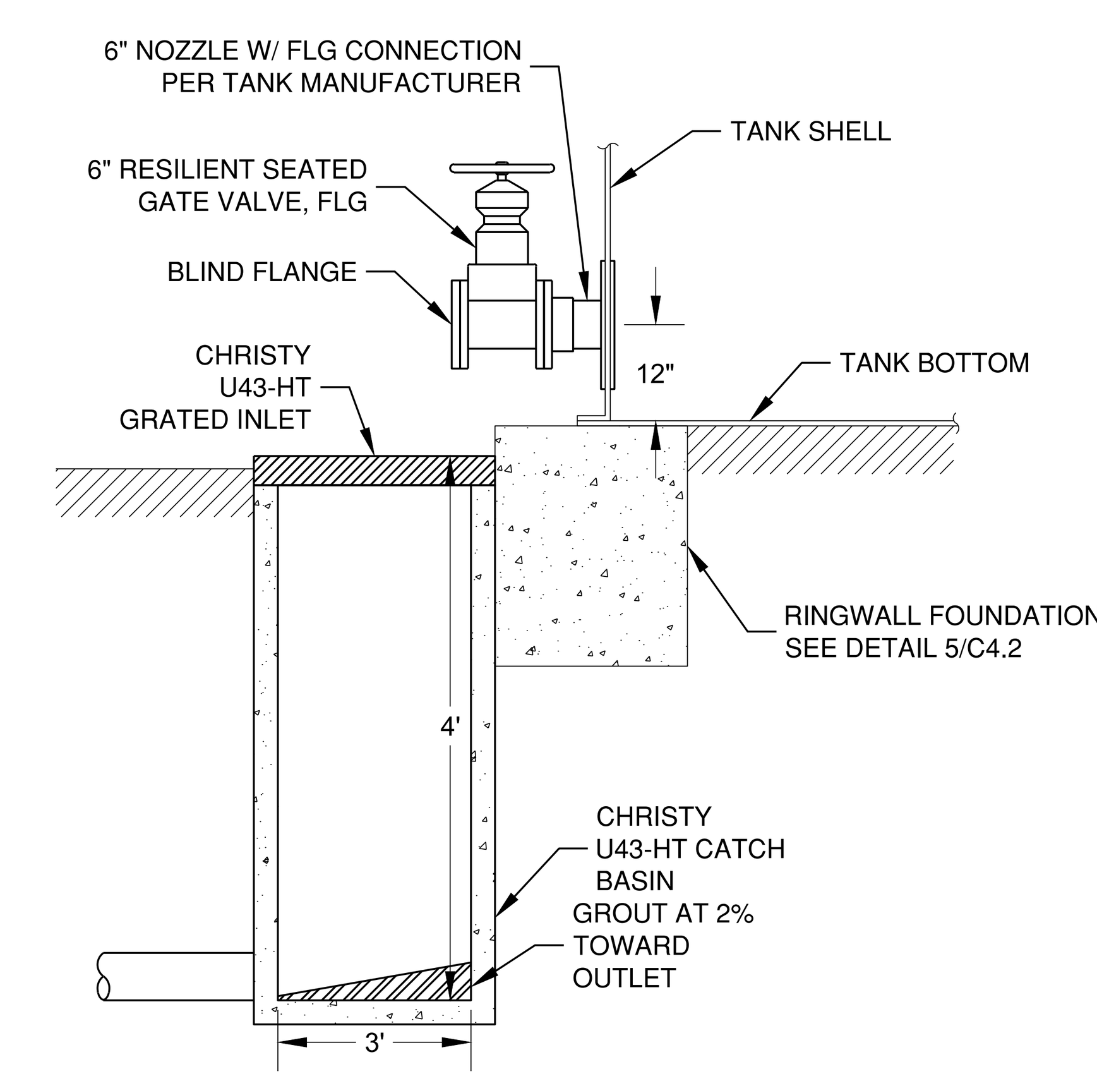
SECURITY GATE 2/-
NTS



ACCESS HATCH 3/-
NTS



KASKI TANK OUTLET PLAN 4/-
1/2"=1'



TANK DRAIN 5/-
1/2"=1'

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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4			
5			

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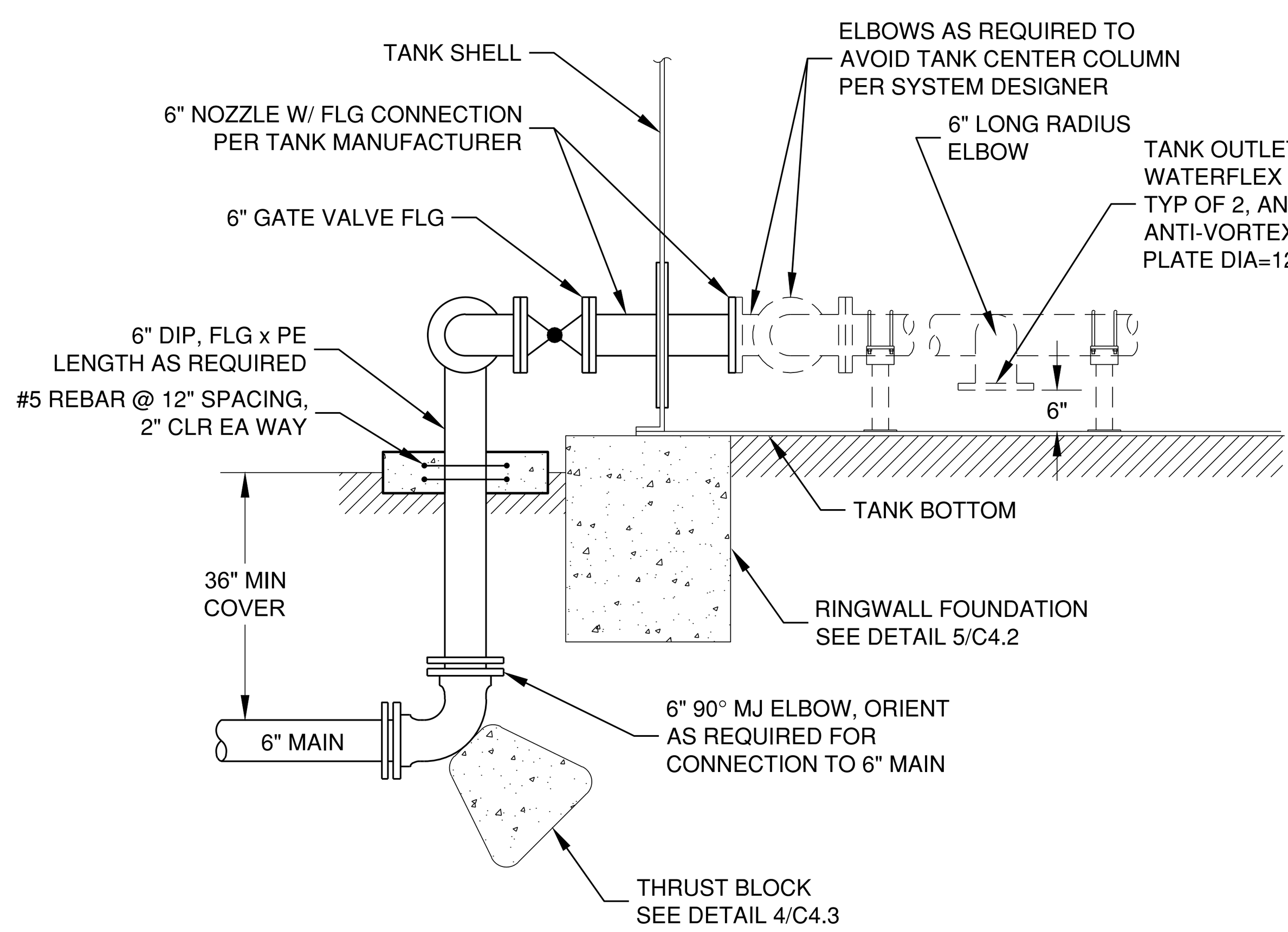
TANK DETAILS
LOMPICO TANKS REPLACEMENT
SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

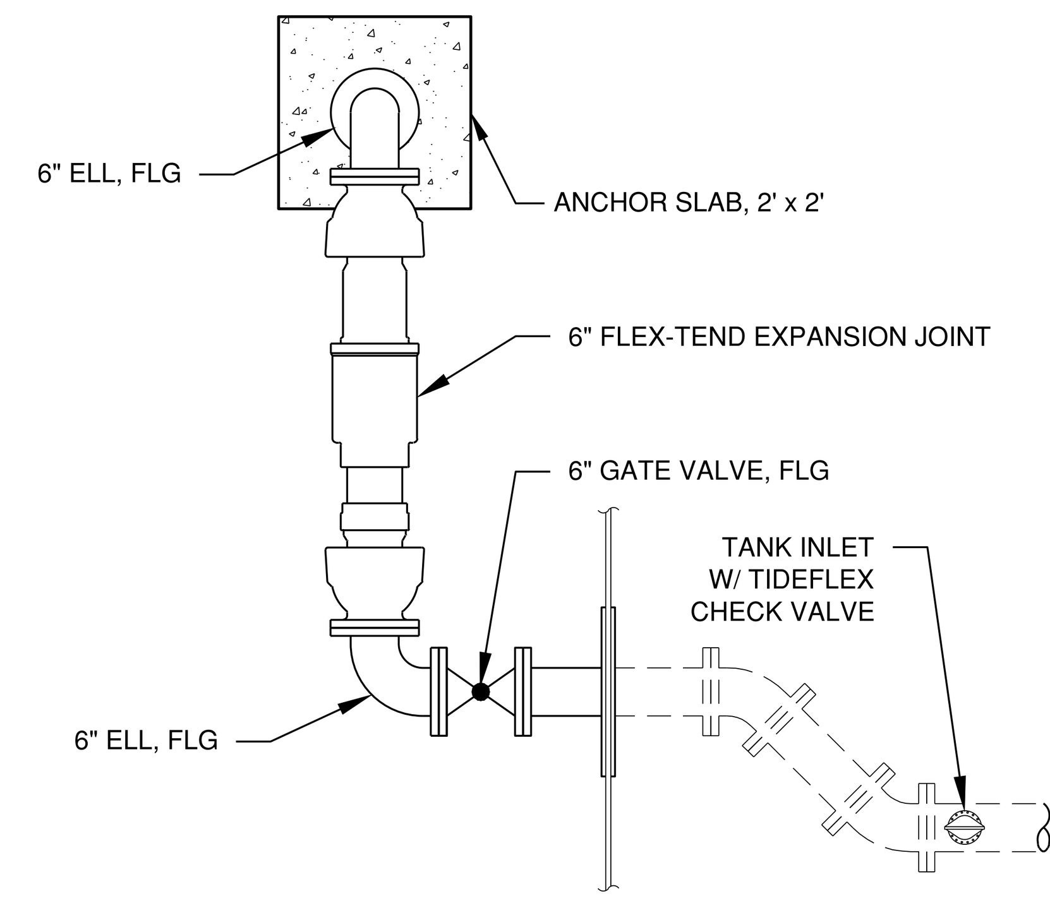
DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: AS SHOWN
SUBMITTAL: 60% SUBMITTAL

C4.1
SHEET 22 OF 25

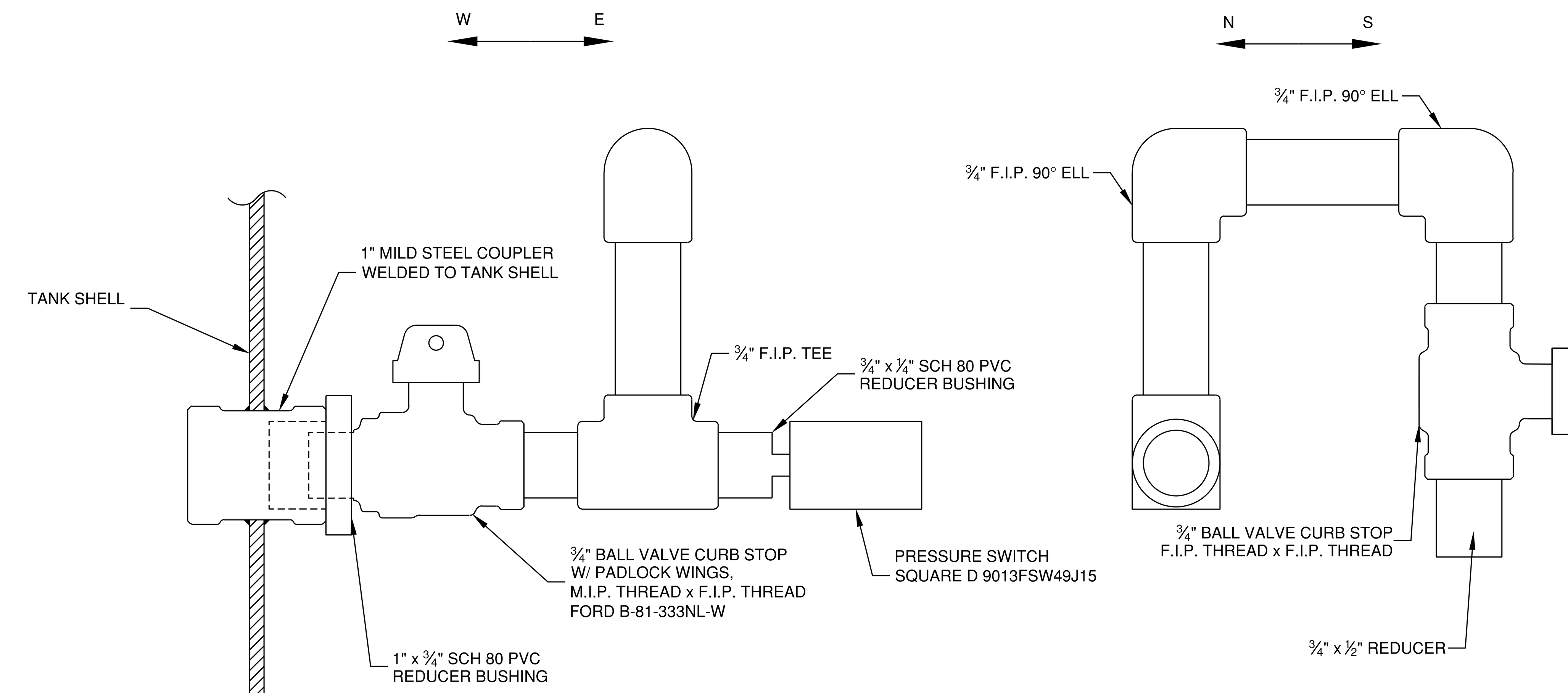


NOTE:
FOR PLAN VIEW SEE DETAIL 2/C4.2

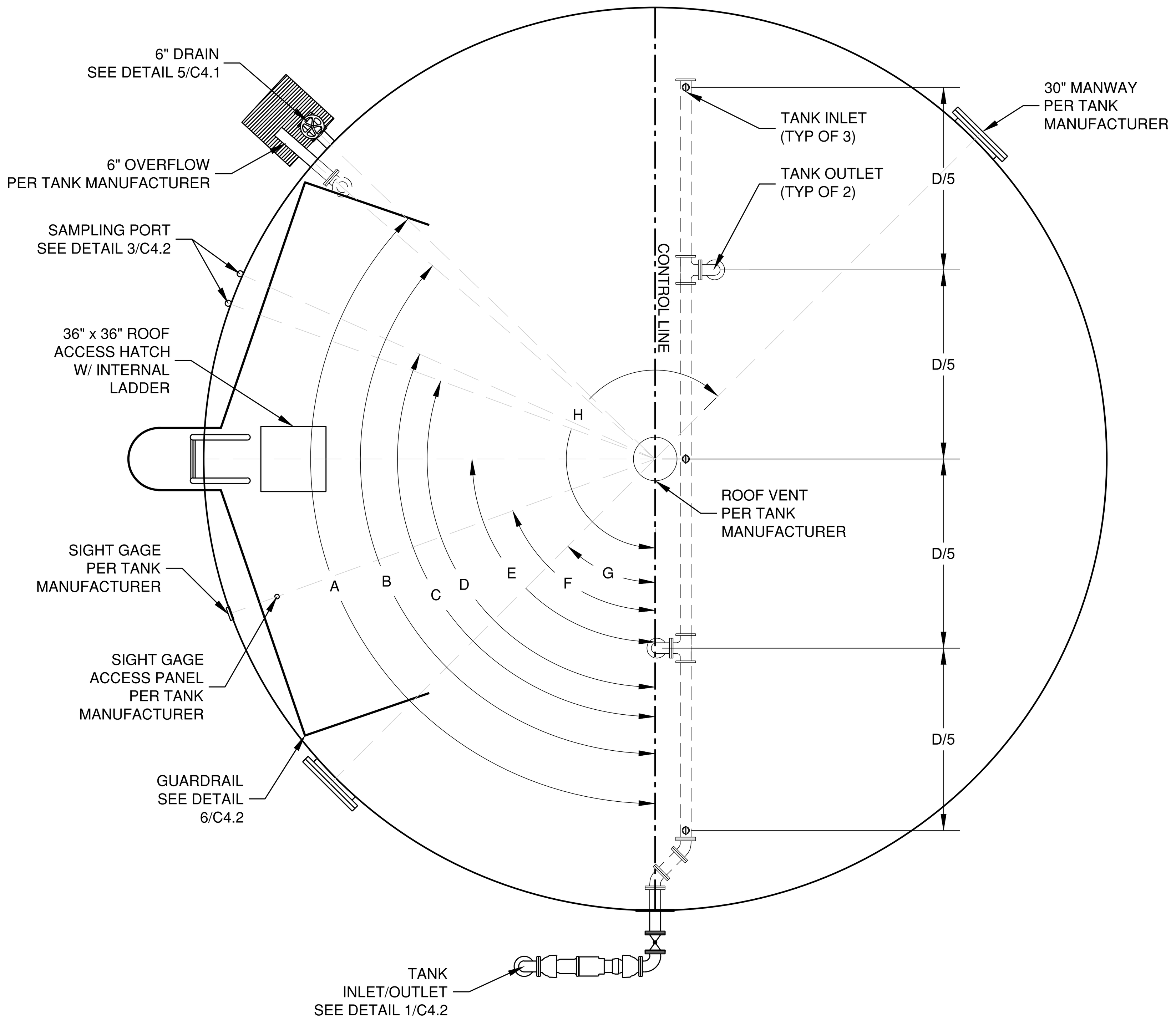
INLET/OUTLET DETAIL 1 -
NTS



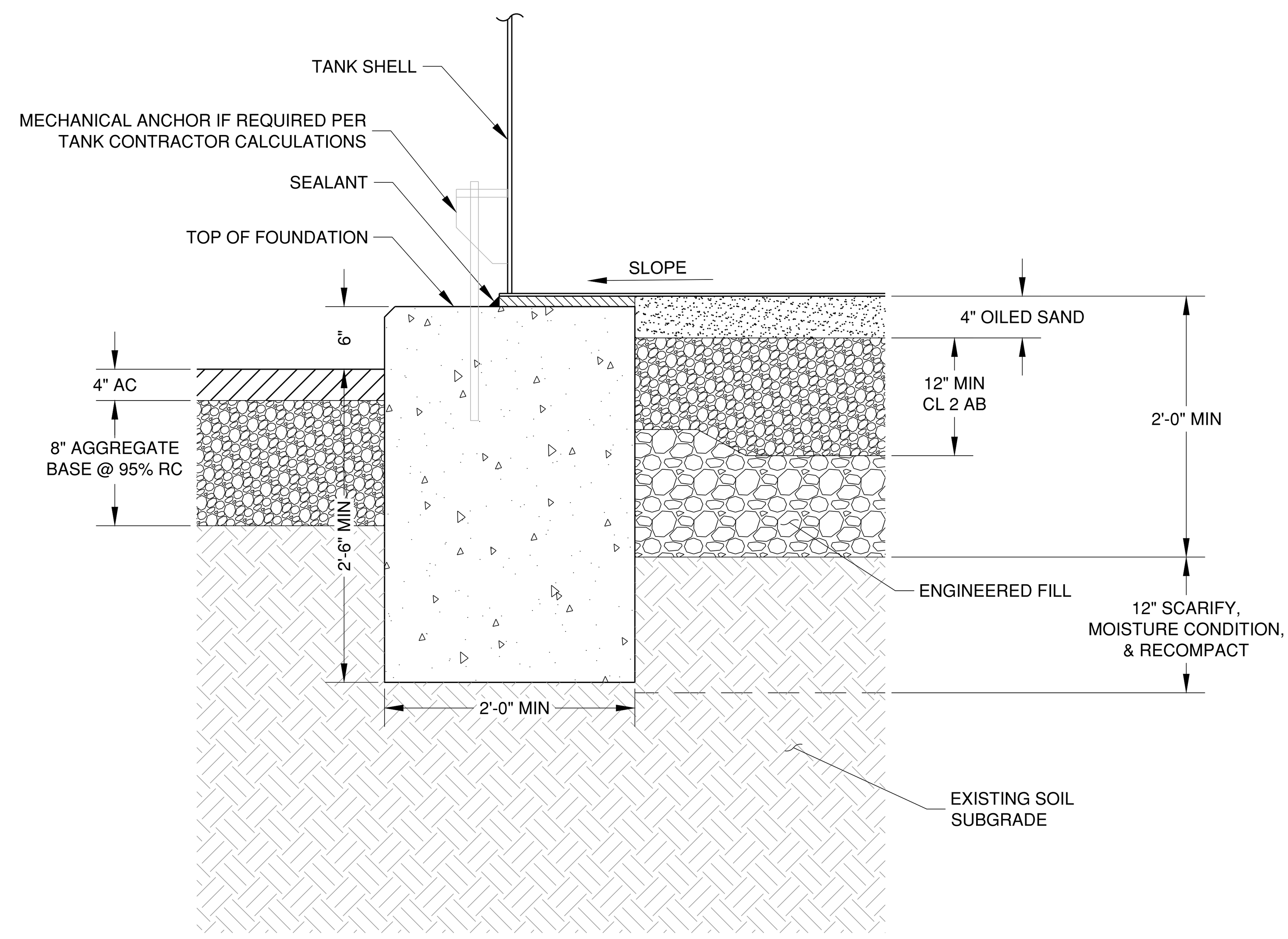
TANK INLET/OUTLET PLAN 2 -
NTS



SAMPLING PORT 3 -
NTS

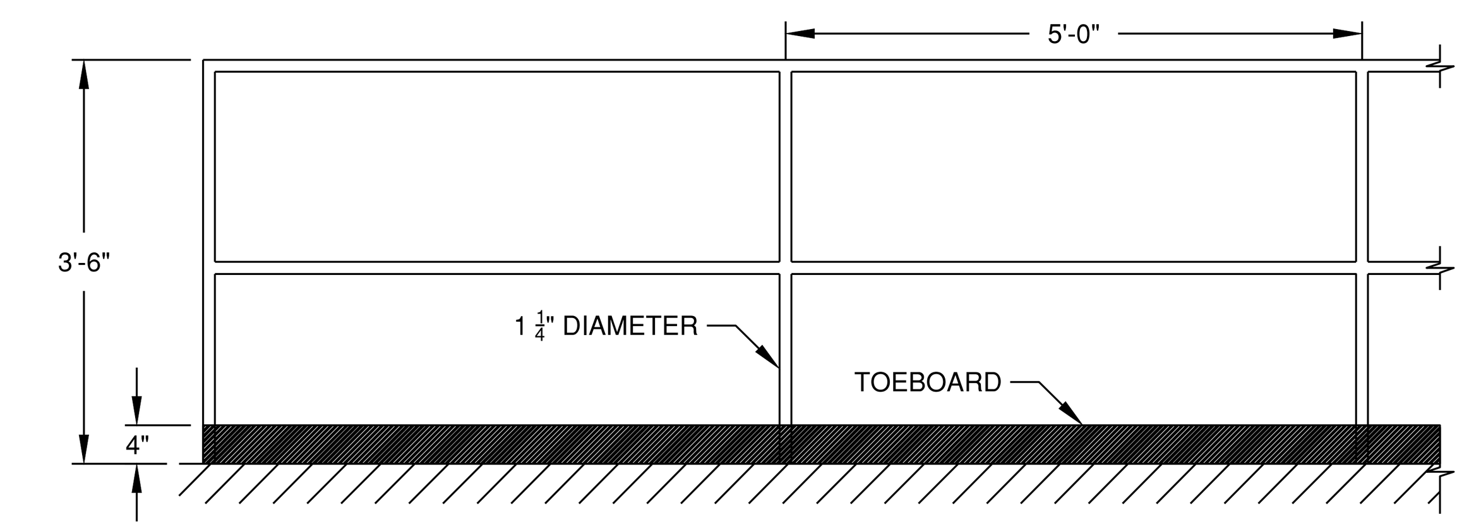


TANK PLAN W/ INLET/OUTLET (LEWIS/MADRONE) 4 -
NTS



NOTES:
1. FOUNDATION DESIGN, INCLUDING REINFORCEMENT AND ANY REQUIRED MECHANICAL ANCHORAGE, SHALL BE DESIGNED BY THE TANK CONTRACTOR.
2. FOR SELF-ANCHORED TANKS, THE MATERIAL BETWEEN THE TOP OF THE RINGWALL AND THE TANK BOTTOM PLATE SHALL BE A ½ INCH THICK CANE-FIBER JOINT FILLER MEETING THE REQUIREMENTS OF ASTM D1751. AS SUCH, GROUT MAY NOT BE USED TO MEET THE TOLERANCE REQUIREMENTS OF AWWA D100 SECTION 12.6.2. TOLERANCES MUST BE MET BEFORE PLACING THE CANE-FIBER JOINT FILLER.
3. COMPACTED OILED SAND SHALL HAVE 6 TO 8 POUNDS OF SC-800 LIQUID ASPHALT PER 100 POUNDS OF SAND.

RINGWALL FOUNDATION 5 -
NTS



GUARDRAIL 6 -
NTS

TANK DIMENSIONS			
ITEM	LEWIS	KASKI	MADRONE
DIAMETER (Ø)	32	20	26
ROOF (H)	25.00	23.00	25.00
OVERFLOW (O)	19.00	18.00	19.00
MAX WATER (MOL)	18.50	17.50	18.50

APPURTENANCE LOCATIONS

ITEM		LEWIS TANK 1	LEWIS TANK 2	KASKI TANK 1	KASKI TANK 2	MADRONE TANK 1	MADRONE TANK 2
CONTROL LINE	INLET	0°	0°	0°	0°	0°	0°
A	DRAIN	233.5°	126.5°	50.5°	294.8°	237.9°	122.1°
B	OVERFLOW	237.3°	122.7°	44.8°	299.5°	242.9°	117.1°
C	SAMPLING PORT	110°	110°	330°	40.5°	310°	50°
D	SAMPLING PORT	110°	110°	335°	45.5°	315°	45°
E	LADDER/HATCH	325.3°	34.7°	317.4°	27.9°	330°	30°
F	SIGHT GAGE	310.3°	49.7°	302.4°	12.9°	345°	15°
G	MANWAY	30°	330°	80°	265.3°	45°	315°
H	MANWAY	210°	150°	260°	85.3°	225°	135°

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(831) 883-4848

TANK DETAILS
LOMPICO TANKS REPLACEMENT
SLVWD NO. ______

San Lorenzo Valley Water District

DESIGNED BY: CJM DATE: 05/29/2019
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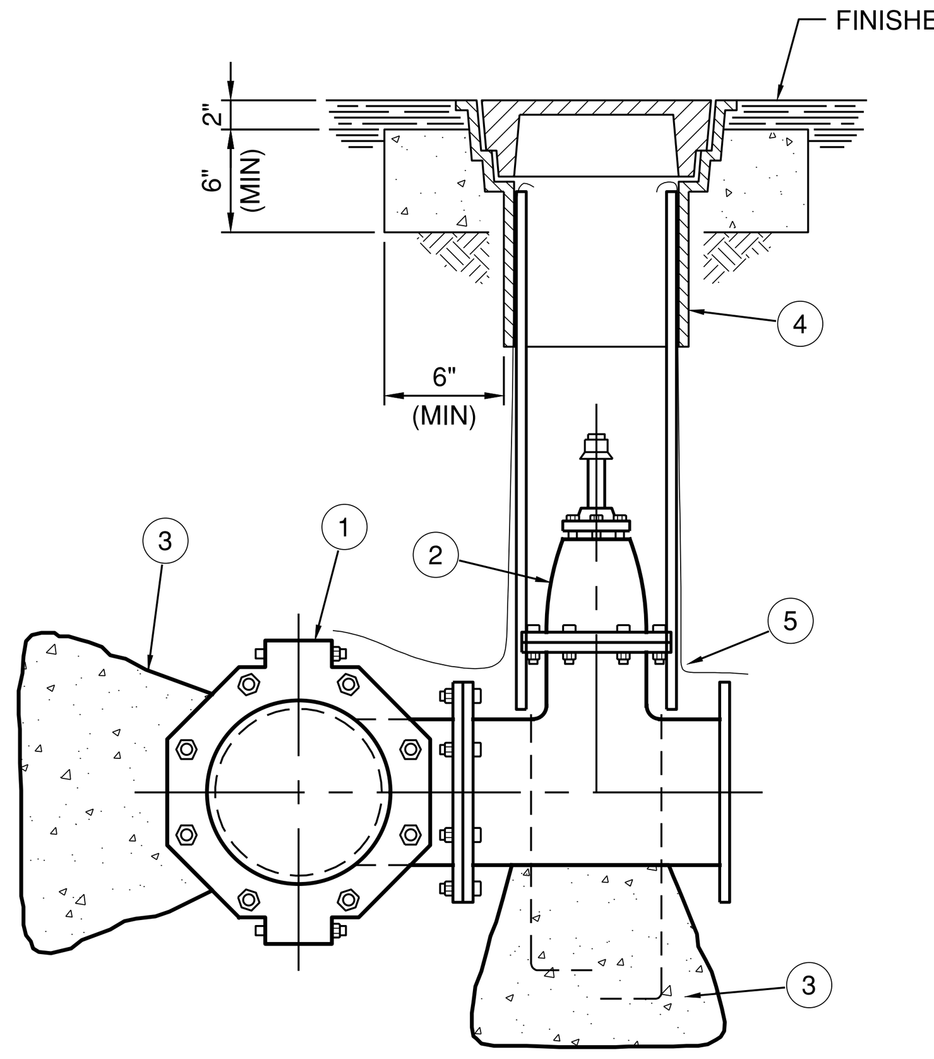
PROJECT NO.:
SCALE: NOT TO SCALE
SUBMITTAL: 60% SUBMITTAL

C4.2
SHEET 23 OF 25

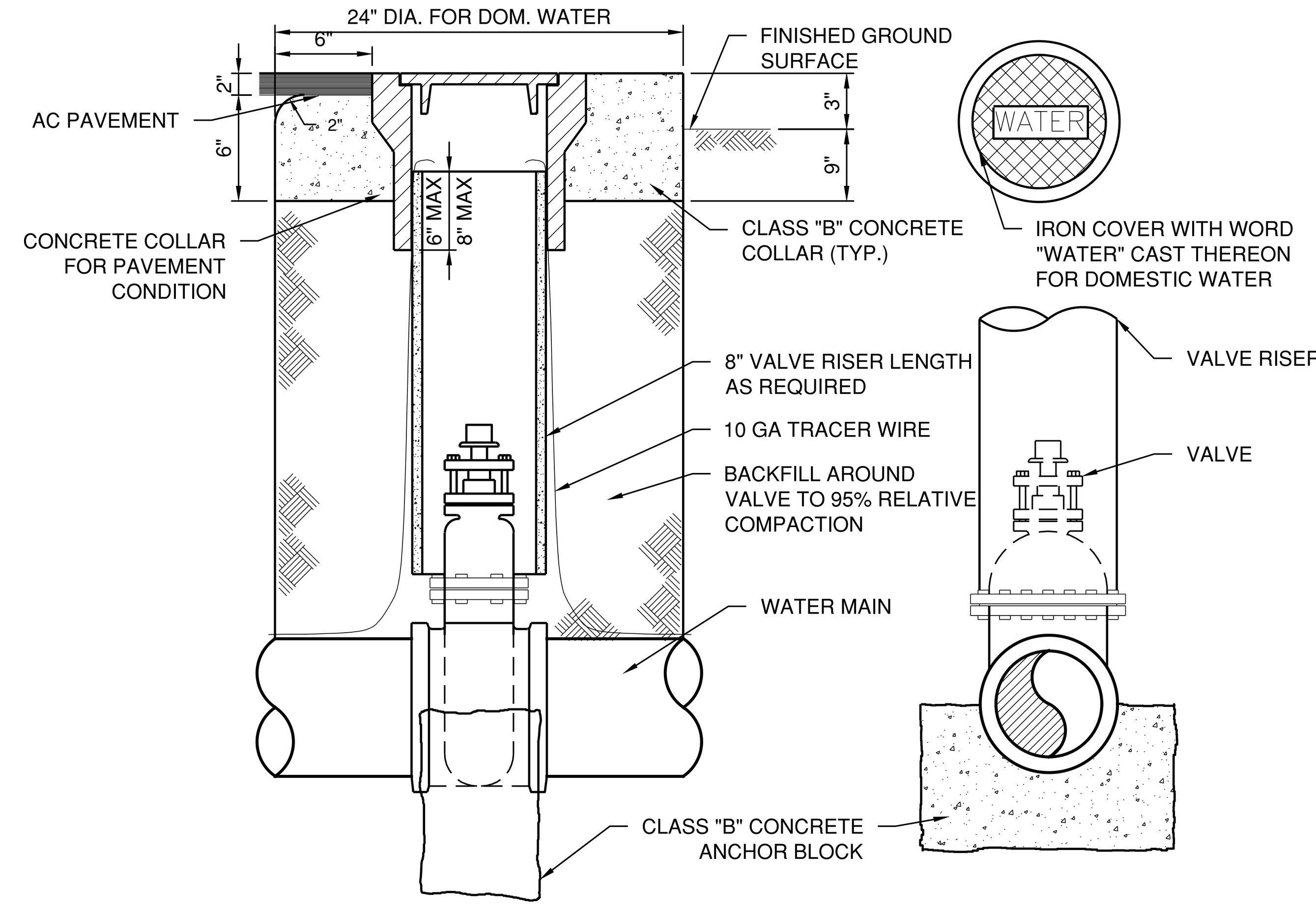


1. TAPPING SLEEVE - CAST IRON, MJ
2. GATE VALVE - RESILIENT WEDGE, FLANGED
3. CONSTRUCT CONCRETE THRUST BLOCK PER DETAIL 4/C4.3
4. VALVE RISER, BOX & LID PER DETAIL 2/C4.3
5. TRACER WIRE

NOTES
1. AIR TEST TAPPING SLEEVE PRIOR TO TAP
2. COAT ALL TAPPING SLEEVE BOLTS WITH KOPPERS BITSMASTIC
3. USE SHELL CUTTER ON ALL PVC TAPS
4. POTHOLE TO VERIFY SIZE AND MATERIAL OF EXISTING PIPE

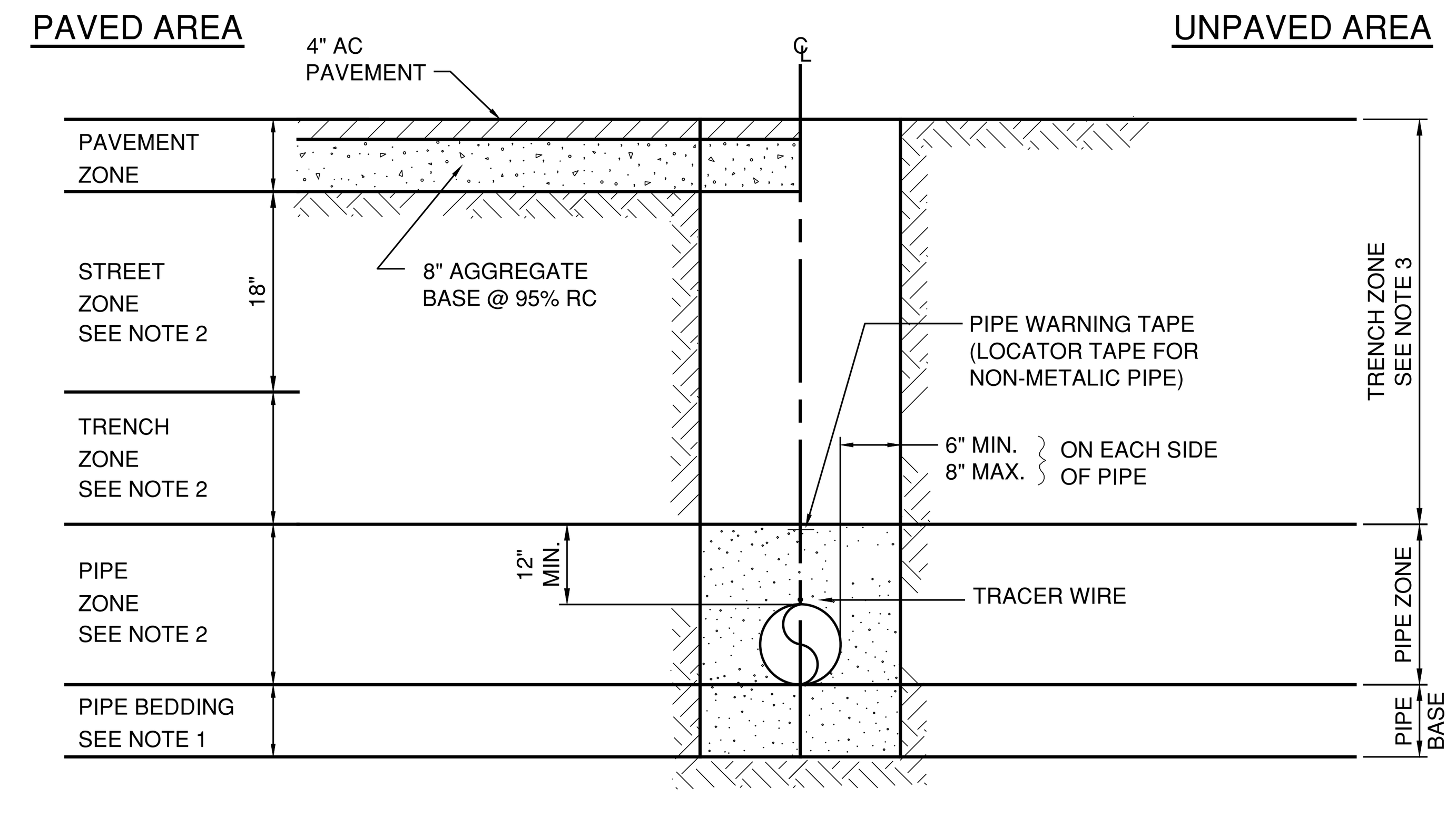
TAP OF ACP, PVC OR D.I.P. MAINS

HOT TAP
NTS
1
-



NOTES:
1- PROVIDE VALVE STEM EXTENSION IF DEPTH TO VALVE NUT EXCEEDS 4 FEET.
IN NEW TRACT DEVELOPMENTS EXTEND VALVE WELL PIPE 2' ABOVE GROUND ON "KEY VALVES" FOR EMERGENCY SHUTOFFS.
2- BUTTERFLY VALVE OPERATORS SHALL BE LOCATED ON THE LEFT-HAND SIDE OF THE VALVE (AT THE TEE OR CROSS), LOOKING THROUGH THE VALVE TOWARD THE PIPE END.
3- WHERE CONCRETE CROSS GUTTERS AT STREET INTERSECTIONS WILL INTERFERE WITH VALVE BOXES, THE PIPELINE SHALL BE MOVED TO A POSITION 7 FEET OFF THE CURB FACE TO CLEAR THE CROSS GUTTER.
4- VALVES TO BE LOCATED ADJACENT TO FITTINGS WHEREVER POSSIBLE.

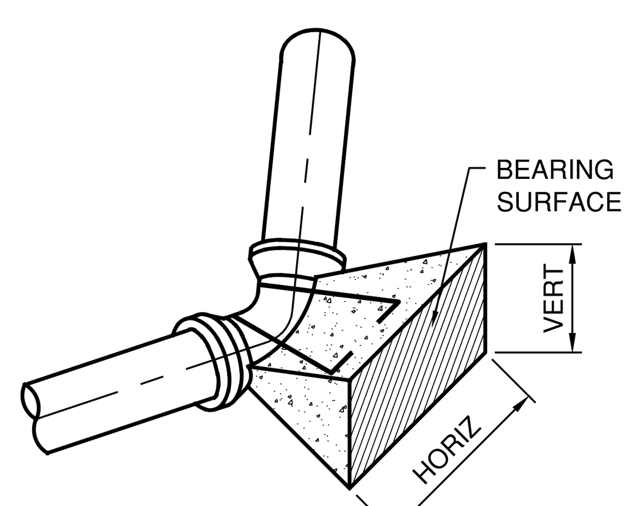
VALVE & VALVE BOX
NTS
2
-



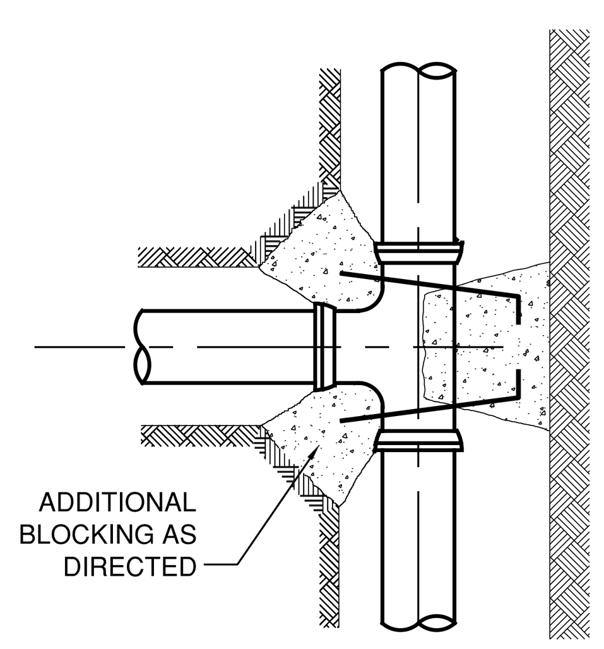
TRENCH SECTION

NOTES:
1- FOR PIPE SIZES 4-INCH THROUGH 10-INCH DIAMETER, PIPE BASE SHALL BE A MINIMUM OF 4-INCHES IN DEPTH; FOR 12-INCH DIAMETER PIPE AND LARGER, PIPE SHALL BE A MINIMUM OF 6-INCHES IN DEPTH.
2- 95% COMPACTION OF IMPORTED BACKFILL OR NATIVE BACKFILL AS APPROVED BY ENGINEER
3- 90% COMPACTION OF IMPORTED BACKFILL OR NATIVE BACKFILL AS APPROVED BY ENGINEER
4- MATCH EXISTING PAVEMENT SECTION, MINIMUM 3" AC OVER 6" AB

TYPICAL PIPE TRENCH
NTS
3
-



TYPICAL BEARING SURFACE



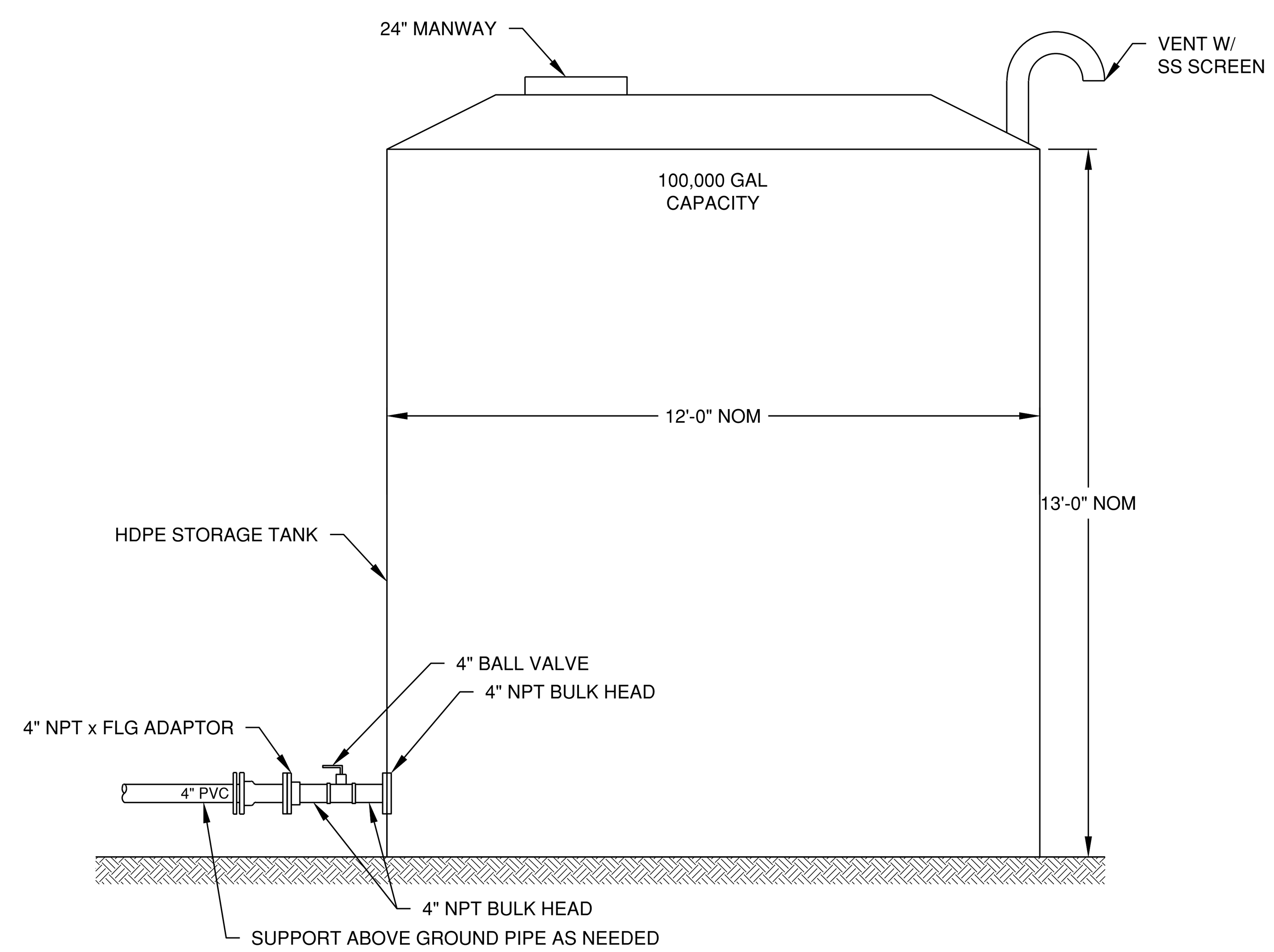
TEE OR VALVE

MINIMUM SIZE OF THRUST BLOCK BEARING SURFACE

PIPE	11 1/4° BEND	22 1/2° BEND	45° BEND	90° BEND	TEE	END CAP
SIZE	HORIZ. VERT.	HORIZ. VERT.	HORIZ. VERT.	HORIZ. VERT.	HORIZ. VERT.	HORIZ. VERT.
6"	2'-6" 1'-0"	2'-6" 1'-0"	3'-6" 1'-6"	4'-6" 2'-3"	4'-0" 2'-0"	2'-6" 1'-9"

NOTES:
1- THRUST BLOCK BEARING AREA BASED ON ALLOWABLE SOIL BEARING VALUE OF 1500 psf PRESSURE AND 225 psi LINE PRESSURE WITH 3'-0" COVER MINIMUM.
FOR BEARING = 1000 PSF, 1.5 X AREA SHOWN
FOR BEARING = 500 PSF, 3.0 X AREA SHOWN
2- ALL THRUST BLOCKS SHALL BE 2,000 PSI CONCRETE AND PLACED AGAINST UNDISTURBED SOIL. DESIGN ENGINEER SHALL DETERMINE SIZES NOT SHOWN.
3- STRAPS TO BE #4 REBARS EMBEDDED IN THRUST BLOCK TO A DEPTH EQUAL TO 3/4 OF PIPE DIAMETER. STRAP BEND EQUALS 1/2 PIPE DIAMETER
4- CONCRETE SHALL NOT EXTEND ONTO FLANGE OR ADJOINING PIPE.
5- JOINTS AND FACE OF PLUGS TO BE KEPT CLEAR OF CONCRETE
6- WRAP EXPOSED PORTION OF BARS AND 2" INTO CONCRETE WITH HALF LAPPED, 10 MIL PVC TAPE
7- WHEN CLEARANCES TO OTHER FACILITIES OR UTILITIES DO NOT ALLOW THE USE OF THRUST BLOCK, RESTRAINED PIPE SHALL BE USED.
8- THRUST BLOCKS ON CROSSES SHALL BE USED ONLY WHEN THERE IS A STUB-OUT ON ONE OR MORE SIDES, OR WHEN THERE IS ADJOINING UNRESTRAINED LENGTHS OF VALVES.
9- DISTRICT ALLOWS RESTRAINED JOINTS AS AN ALTERNATIVE TO THRUST BLOCKS.

THRUST BLOCK
NTS
4
-



TEMPORARY TANK
NTS
5
-

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
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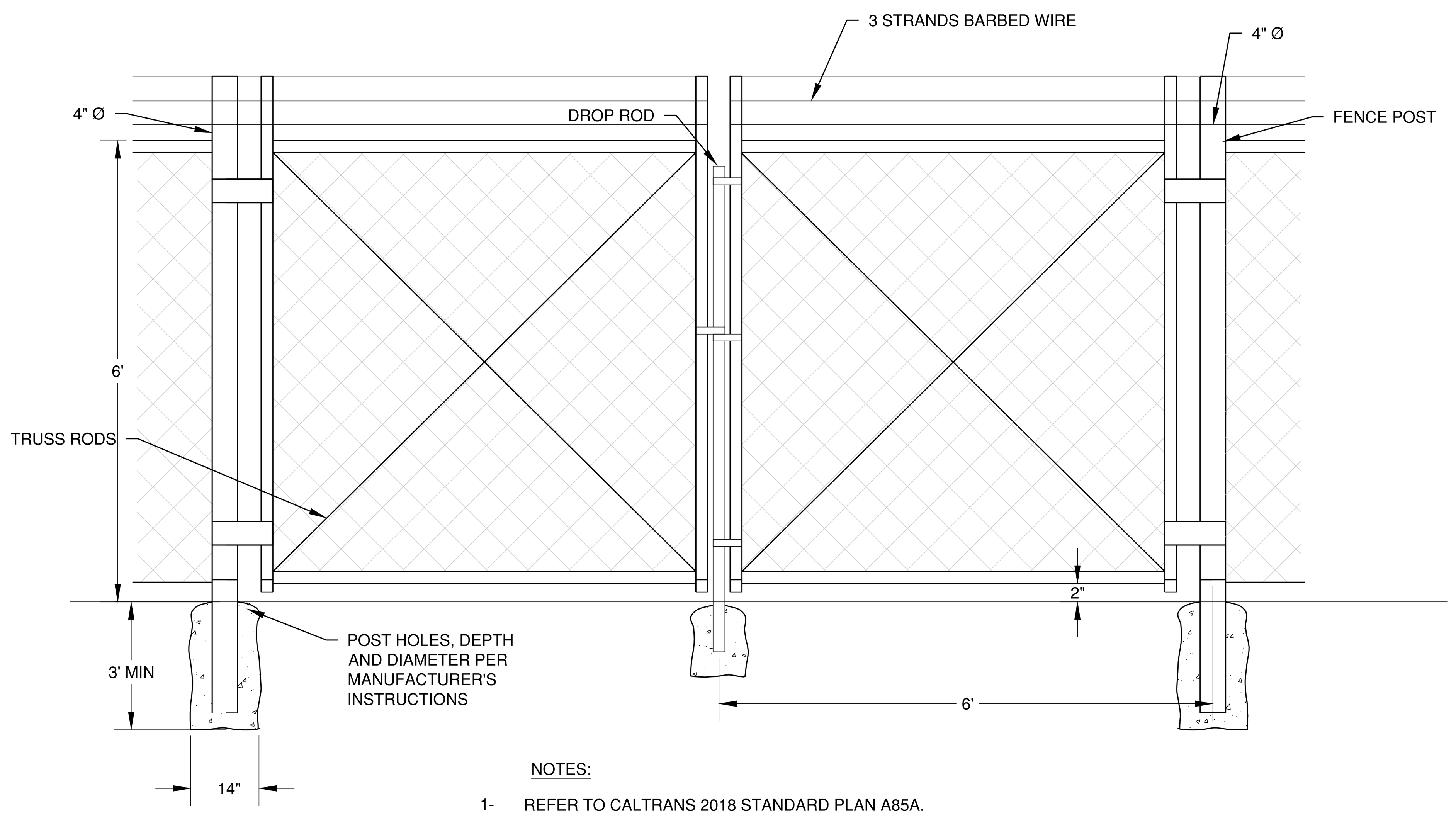
TANK DETAILS
LOMPICO TANKS REPLACEMENT
SLVWD NO. ____

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: NOT TO SCALE
SUBMITTAL: 60% SUBMITTAL

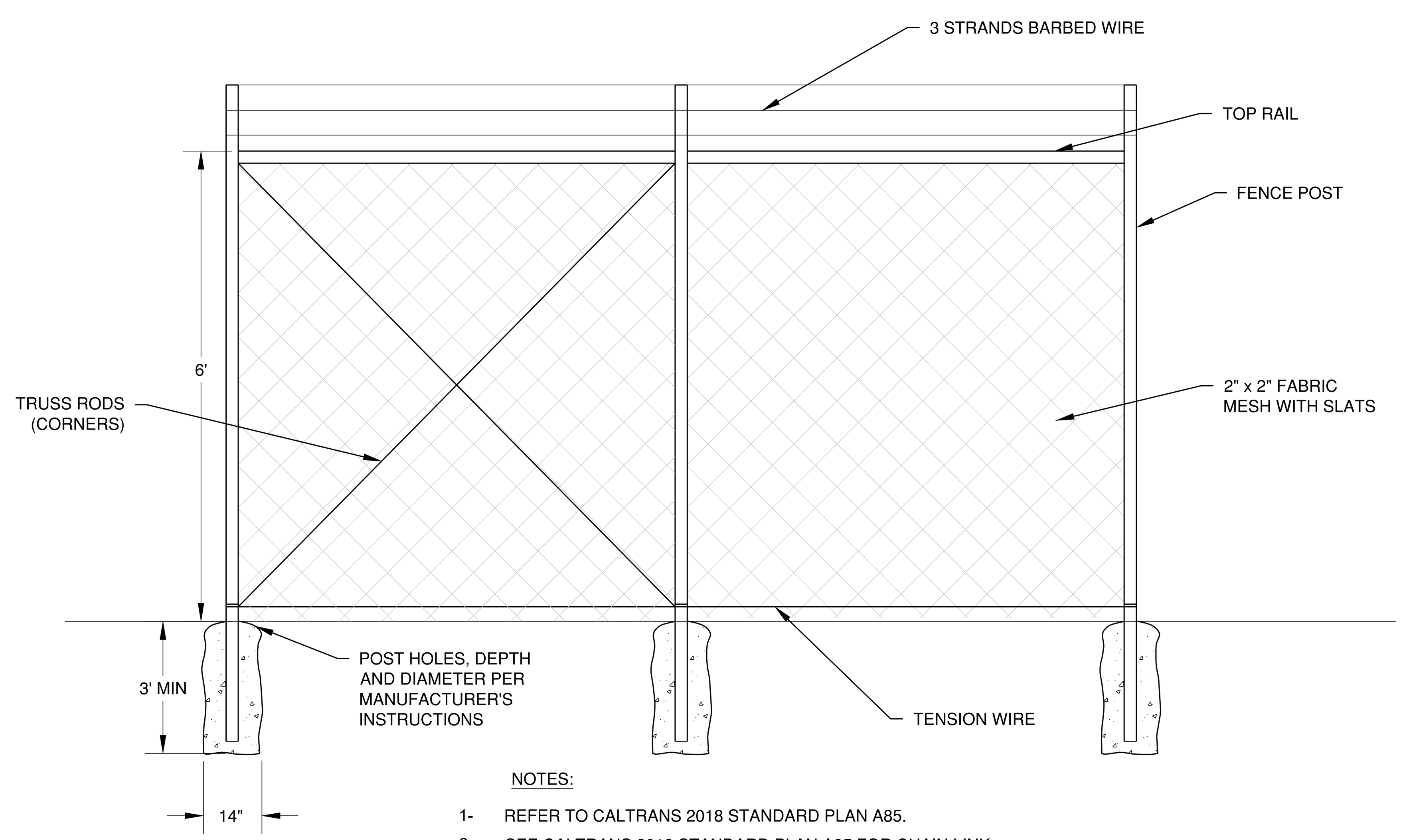
C4.3
SHEET 24 OF 25



NOTES:

1- REFER TO CALTRANS 2018 STANDARD PLAN A85A.
2- SEE CALTRANS 2018 STANDARD PLAN A85A FOR CHAIN LINK GATE INSTALLATION.
3- ALL FENCE MATERIAL SHALL BE GALVANIZED INCLUDING STRANDS OF BARBWIRE.

SWING GATE 1 / -
NTS



NOTES:

1- REFER TO CALTRANS 2018 STANDARD PLAN A85.
2- SEE CALTRANS 2018 STANDARD PLAN A85 FOR CHAIN LINK GATE INSTALLATION.
3- SEE CALTRANS 2018 STANDARD PLAN A85A FOR BARBED WIRE POST TOP DETAIL.
4- ALL FENCE MATERIAL SHALL BE GALVANIZED INCLUDING STRANDS OF BARBWIRE.

CHAIN LINK FENCE 2 / -
NTS

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
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4			
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DETAILS

LOMPICO TANKS REPLACEMENT

SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

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SCALE: NOT TO SCALE
SUBMITTAL: 60% SUBMITTAL

C4.4
SHEET 25 OF 25

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APPENDIX B

BOTANICAL PLANT LIST

Madrone Tank Site	
Common Name	Scientific Name
American century plant	*Agave americana*
Bristly ox-tongue	*Helminthotheca echioides*
California bay	*Umbellularia californica*
California blackberry	*Rubus ursinus*
California wild rose	*Rosa californica*
Coast live oak	*Quercus agrifolia*
Coast redwood	*Sequoia sempervirens*
Common rush	*Juncus effusus*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
French broom	*Genista monspessulana*
Hedge nettle	*Stachys ajugoides*
Tan oak	*Notholithocarpus densiflorus*
Madrone	*Arbutus menziesii*
Poison oak	*Toxicodendron diversilobum*
Scotch broom	*Cytisus scoparius*
Sedge species	*Carex sp.*
Slender oat	*Avena barbata*
Stinging nettle	*Urtica dioica*
Vetch species	*Vicia sp.*

Kaski Tank Site	
Common Name	Scientific Name
American century plant	*Agave americana*
American dogwood	*Cornus sericea*
Big leaf maple	*Acer macrophyllum*
Bristly ox-tongue	*Helminthotheca echioides*
California bay	*Umbellularia californica*
California blackberry	*Rubus ursinus*
California man-root	*Marah fabacea*
Coast live oak	*Quercus agrifolia*
Coast redwood	*Sequoia sempervirens*
Common nightshade	*Solanum americanum*
Common rush	*Juncus effusus*
Common sheep sorrel	*Rumex acetosella*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
French broom	*Genista monspessulana*
Hairy cats ear	Hypochaeris radicata

Hedge nettle	*Stachys ajugoides*
Tan oak	Notholithocarpus densiflorus
Madrone	*Arbutus menziesii*
Mole plant	*Euphorbia lathyris*
Poison oak	*Toxicodendron diversilobum*
Scotch broom	*Cytisus scoparius*
Sedge species	*Carex sp.*
Slender oat	*Avena barbata*
Stinging nettle	*Urtica dioica*
Vetch species	*Vicia sp.*
Western sword fern	*Polystichum munitum*

Lewis Tank Site	
Common Name	Scientific Name
American dogwood	*Cornus sericea*
Black sage	*Salvia mellifera*
Bristly ox-tongue	*Helminthotheca echioides*
California bay	*Umbellularia californica*
California blackberry	*Rubus ursinus*
California man-root	*Marah fabacea*
Chamise	*Adenostoma fasciculatum*
Coast live oak	*Quercus agrifolia*
Common groundsel	*Senecio vulgaris*
Common nightshade	*Solanum americanum*
Common rush	*Juncus effusus*
Common sheep sorrel	*Rumex acetosella*
Common snowberry	*Symphoricarpos albus*
Common sow thistle	Sonchus oleraceus
Crane's bill geranium	*Geranium molle*
Deerweed	*Acmispon glaber*
Iceplant	*Carpobrotus edulis*
Jersey cudweed	*Pseudognaphalium luteoalbum*
Lizard tail	*Eriophyllum staechadifolium*
Madrone	*Arbutus menziesii*
Marsh purslane	Ludwigia palustris
Mock heather	*Ericameria ericoides*
Pampas grass	*Cortaderia jubata*
Poison oak	*Toxicodendron diversilobum*
Red stemmed filaree	*Erodium cicutarium*
Ripgut brome	*Bromus diandrus*
Santa Cruz Mountain manzanita	*Arctostaphylos crustacea ssp. crinita*
Scarlet pimpernel	*Lysimachia arvensis*
Sedge species	Carex sp.

Silver bush lupine	*Lupinus albifrons*
Silverleaf manzanita	*Arctostaphylos silvicola*
Slender oat	*Avena barbata*
Slender sedge	*Carex tumulicola*
Smooth cats ear	*Hypochaeris glabra*
Sticky monkeyflower	*Diplacus aurantiacus*
Stinging nettle	*Urtica dioica*
Tall cyperus	*Cyperus eragrostis*
Vetch species	*Vicia sp.*
Western brackenfern	*Pteridium aquilinum*
Yerba santa	*Eriodictyon californicum*

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APPENDIX C

SPECIAL-STATUS SPECIES TABLE

CNDDB OCCURRENCE REPORT

Lompico Tanks Replacement California Natural Diversity Database Occurrence Table
(Felton, Big Basin, Castle Rock Ridge, Los Gatos, Laurel, Soquel, Santa Cruz, and Davenport Quadrangles)

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
MAMMALS			
Antrozous pallidus Pallid bat	-- / CSC / --	Occurs in a wide variety of habitats including grasslands, shrublands, arid desert areas, oak savanna, coastal forested areas, and coniferous forests of the mountain regions of California. Most common in open, dry habitats with rocky areas for roosting. Day roosts include caves, crevices, mines, and occasionally hollow trees and buildings. Seems to prefer rocky outcrops, cliffs, and crevices with access to open habitats for foraging. Similar structures are used for night roosting and will also use more open sites such as eaves, awnings, and open areas under bridges for feeding roosts.	**Unlikely** The survey area has limited open areas and lacks rocky areas for roosting.
Corynorhinus townsendii Townsend's big-eared bat	-- / CSC / --	Found primarily in rural settings from inland deserts to coastal redwoods, oak woodland of the inner Coast Ranges and Sierra foothills, and low to mid-elevation mixed coniferous-deciduous forests. Typically roost during the day in limestone caves, lava tubes, and mines, but can roost in buildings that offer suitable conditions. Night roosts are in more open settings and include bridges, rock crevices, and trees.	**Unlikely** The survey area has limited open areas and lacks rocky areas for roosting.
Dipodomys venustus venustus Santa Cruz kangaroo rat	-- /CNDDB/--	Common permanent residents of chaparral and foothill woodland habitats within the Santa Cruz Mountains from 0-1799 meters. Use well-drained loam or sandy loam soils for burrowing. Burrows are typically shallow (2-20 inches below the surface) and simple with a main chamber and few escape chambers.	**High** Suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1995 and is a nonspecific, possibly extirpated occurrence within the survey area.
Erethizon dorsatum North American porcupine	-- /CNDDB/--	Prefers coniferous and mixed forests; also inhabits riparian zones, grasslands, shrublands, and deserts in some parts of the range. Winter den may be in a rock outcrop, live hollow tree, hollow log, or outbuilding. May shelter in dense conifers in winter.	**Low** Suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1937 within 5 km of survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Lasiurus cinereus hoary bat	-- /CNDDB/--	Prefers open habitats or habitat mosaics with access to trees for cover and open areas or edge for feeding. Generally, roost in dense foliage of trees; does not use buildings for roosting. Winters in California and Mexico and often migrates towards summer quarters in the north and east during the spring. Young are born and reared in summer grounds, which is unlikely to occur in California.	**Unlikely** The survey area has limited open areas for roosting.
Neotoma fuscipes annectens San Francisco dusky-footed woodrat	-- / CSC / --	Forest habitats of moderate canopy with moderate to dense understory. Also occurs in chaparral habitats.	**Present** Numerous woodrat nests were observed throughout and adjacent to the project site.
Neotoma fuscipes annectens American badger	--/CSC/--	Dry, open grasslands, fields, pastures savannas, and mountain meadows near timberline are preferred. The principal requirements seem to be sufficient food, friable soils, and relatively open, uncultivated grounds.	**Low** Suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1983 approximately 8 km of survey area.
BIRDS			
Accipiter cooperii Cooper's hawk	--/ WL /--	Resident throughout most of the wooded portion of the state. Dense stands of live oak, riparian deciduous, or other forest habitats near water used most frequently. Seldom found in areas without dense tree stands, or patchy woodland habitats.	**Moderate** Suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1996 approximately 6 km of survey area.
Agelaius tricolor Tricolored blackbird (nesting colony)	-- / SC&CSC / --	Nest in colonies in dense riparian vegetation, along rivers, lagoons, lakes, and ponds. Forages over grassland or aquatic habitats.	**Unlikely** No suitable habitat within or adjacent to survey area.
Aquila chrysaetos Golden eagle (nesting & wintering)	-- / CFP / --	Use rolling foot-hills, mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, cliffs, and rocky outcrops. Nest in secluded cliffs with overhanging ledges as well as large trees.	**Unlikely** No suitable nesting habitat within or adjacent to survey area.
Ardea herodias Great blue heron	--/CNDDB/--	Occur in areas near water; marshes, swamps, shores, sloughs, and tide flats. (Rookeries protected)	**Unlikely** No suitable nesting habitat within or adjacent to survey area.
Athene cunicularia Burrowing owl (burrow sites & some wintering sites)	-- / CSC / --	Year-round resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Frequent open grasslands and shrublands with perches and burrows. Use rodent burrows (often California ground squirrel) for roosting and nesting cover. Pipes, culverts, and nest boxes may be substituted for burrows in areas where burrows are not available.	**Unlikely** No suitable nesting habitat within or adjacent to survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Brachyramphus marmoratus Marbled murrelet	FT / SE / --	Occur year-round in marine subtidal and pelagic habitats from the Oregon border to Point Sal. Partial to coastlines with stands of mature redwood and Douglas-fir. Requires dense mature forests of redwood and/or Douglas-fir for breeding and nesting.	**Low** Suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 2001 approximately 4 km of survey area.
Charadrius alexandrinus nivosus Western snowy plover (nesting)	FT / CSC / --	Sandy beaches on marine and estuarine shores, also salt pond levees and the shores of large alkali lakes. Requires sandy, gravelly or friable soil substrate for nesting.	**Unlikely** No suitable habitat within or adjacent to survey area.
Coturnicops noveboracensis yellow rail	-- / CSC / --	Wet meadows and coastal tidal marshes. Occurs year round in California, but in two primary seasonal roles: as a very local breeder in the northeastern interior and as a winter visitor (early Oct to mid-Apr) on the coast and in the Suisun Marsh region	**Unlikely** No suitable habitat within or adjacent to survey area.
Cypseloides niger black swift	-- /CSC/--	Coastal belt of Santa Cruz and Monterey counties; central & southern Sierra Nevada; San Bernardino & San Jacinto mountains.	**Unlikely** No suitable habitat within or adjacent to survey area.
Elanus leucurus White-tailed kite	-- / CFP / --	Open groves, river valleys, marshes, and grasslands. Prefer such area with low roosts (fences etc.). Nest in shrubs and trees adjacent to grasslands.	**Unlikely** No suitable habitat within or adjacent to survey area.
Falco peregrinus anatum American peregrine falcon (nesting)	-- / CFP / --	Forages for other birds over a variety of habitats. Breeds primarily on rocky cliffs.	**Unlikely** No suitable habitat within or adjacent to survey area.
Geothlypis trichas sinuosa saltmarsh common yellowthroat	-- / CSC / --	Resident of the San Francisco bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**Unlikely** No suitable habitat within or adjacent to survey area.
Laterallus jamaicensis coturniculus California black rail	-- / ST&CFP / --	Inhabits freshwater marshes, wet meadows & shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that does not fluctuate during the year & dense vegetation for nesting habitat.	**Unlikely** No suitable habitat within or adjacent to survey area.
Pandion haliaetus osprey	--/CNDDB/--	Ocean shore, bays, freshwater lakes, and larger streams.	**Unlikely** No suitable habitat within or adjacent to survey area.
Progne subis purple martin	--/CSC/--	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, and Monterey pine.	**Low** No suitable habitat within survey area. Closest CNDDB occurrence is from 2014 approximately 13 km of survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Riparia riparia bank swallow	--/ST/--	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	**Unlikely** No suitable habitat within or adjacent to survey area.
REPTILES AND AMPHIBIANS			
Ambystoma californiense California tiger salamander	FT / ST /--	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Need underground refuges and vernal pools or other seasonal water sources.	**Unlikely** No suitable habitat within or adjacent to survey area. No vernal pools or seasonal water sources within or adjacent to survey area.
Ambystoma macrodactylum croceum Santa Cruz long-toed salamander	FE / SE&CFP / --	Wet meadows near sea level in a few restricted locales in Santa Cruz and Monterey counties.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation for this species and lacks wet meadows near sea level.
Aneides flavipunctatus niger Santa Cruz black salamander	-- / CSC /--	Endemic to California. Occurs in the fog belt of the outer Coastal Range in mesic forests. This species occurs in moist streamside microhabitats. This species is often found in shallow standing water or seeps. Small geographical range consisting of woodland habitat within the Santa Cruz Mountains in western Santa Clara, northern Santa Cruz, and southernmost San Mateo Counties.	**Low** Suitable habitat does not exist within or adjacent to survey area, no streams or permanent water exist within the survey area. Known occurrences surround the survey area, the closest CNDDB occurrence is a historical occurrence from 1973 approximately .5 km from the survey area.
Dicamptodon ensatus California giant salamander	-- / CSC / --	Endemic to California. Occurs within the Coast Range from just north of the southern border of Mendocino County to southern Santa Cruz County. Found in wet coastal forests in or around clear, cold permanent and semi-permanent streams and seepages. Typically within elevations ranging from sea level to approximately 3000 feet.	**Low** Suitable habitat does not exist within or adjacent to survey area, no streams run within the survey area. Known occurrences surround the survey area, the closest CNDDB occurrence is a historical nonspecific occurrence from 1952 within the survey area.
Emys marmorata Western pond turtle (includes *E. m. pallida* and *E. m. marmorata* as recognized by the Department)	-- / CSC / --	Associated with permanent or nearly permanent water in a wide variety of habitats including streams, lakes, ponds, irrigation ditches, etc. Require basking sites such as partially submerged logs, rocks, mats of vegetation, or open banks.	**Unlikely** No suitable habitat within or adjacent to survey area. Site lacks permanent or nearly permanent water source.
Rana boylii foothill yellow-legged frog	-- / SC&CSC / --	Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats, including hardwood, pine, and riparian forests, scrub, chaparral, and wet meadows. Rarely encountered far from permanent water.	**Low** Suitable habitat does not exist within or adjacent to survey area, no permanent water resources within the survey area. Known occurrences surround the survey area, however the closest CNDDB occurrence is a historical nonspecific occurrence from 1930 within the survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Rana draytonii California red-legged frog	FT / CSC / --	Lowlands and foothills in or near permanent or late-season sources of deep water with dense, shrubby, or emergent riparian vegetation. During late summer or fall adults are known to utilize a variety of upland habitats with leaf litter or mammal burrows.	**Low** Suitable habitat does not exist within or adjacent to survey area, no permanent water exists within the survey area. Historical sightings approximately 3 km from survey area.
FISH			
Eucyclogobius newberryi tidewater goby	FE / CSC / --	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River.	**Unlikely** No suitable habitat within survey area.
Oncorhynchus kisutch pop. 4 coho salmon – central California ESU	FE / SE / --	Federal listing = pops between Punta Gorda & San Lorenzo River. State listing = pops south of Punta Gorda.	**Unlikely** No suitable habitat within survey area.
Oncorhynchus mykiss irideus Steelhead (Central California Coast DPS)	FT / -- / --	Coastal perennial and near perennial streams, with suitable spawning and rearing habitat and no major barriers.	**Unlikely** No suitable habitat within survey area.
Thaleichthys pacificus Eulachon	FT / -- / --	Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries.	**Unlikely** No suitable habitat within survey area.
INVERTEBRATES			
Adela oplerella Opler's longhorn moth	-- / CNDDB/ --	Occur in dry, nutrient-poor, serpentine soil grasslands of the greater San Francisco Bay area and adjacent foothills and valleys. Adults fly, mate, and lay their eggs between mid-March and late April; this timing varies depending on the weather. Eggs are deposited directly into the unopened flowers of the host plant, California cream cups (*Platystemon californicus*). The adult host plant is not known, though it appears that the adults may feed on the nectar of California cream cups and other native herbaceous species. Dispersal distance is typically 50 meters.	**Unlikely** No suitable habitat within or adjacent to survey area. Suitable soil not found within or adjacent to survey area. No known sightings of host plant within or adjacent to survey area.
Bombus caliginosus Obscure bumble bee	-- / CNDDB / --	Native to the West Coast of the United States. Occurs primarily along the coast in grassy prairies and meadows within the Coast Range. This species can nest both under and above ground. When nesting above ground the species may utilize abandoned bird nests. Found in areas that are relatively humid including areas that are frequently foggy.	**Low** Moderately suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1956 approximately 2.7 km of survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Bombus occidentalis Western bumble bee	-- / CNDDB / --	Occurs in open grassy areas, urban parks, urban gardens, chaparral, and meadows. This species generally nests underground.	**Low** Moderately suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1944 approximately .5 km of survey area.
Cicindela hirticollis gravida Sandy beach tiger beetle	-- / CNDDB / --	Found in moist sand near the ocean, for example in swales behind dunes or upper beaches beyond normal high tides.	**Unlikely** No suitable habitat within or adjacent to survey area.
Cincindela ohlone Ohlone tiger beetle	FE / -- / --	Coastal terraces with remnant stands of open native grassland with clay or sandy soils. Hunt, breed, and dig small vertical burrows along sunny single-track trails and dirt roads (maintained by cattle, hikers, etc.) in coast terrace meadows that still support native grasses. Current range from the City of Scotts Valley to the eastern edge of the City of Santa Cruz.	**Unlikely** No suitable habitat within or adjacent to survey area.
Coelus globosus globose dune beetle	-- / CNDDB / --	Coastal dunes. These beetles are primarily subterranean, tunneling through sand underneath dune vegetation.	**Unlikely** No suitable habitat within or adjacent to survey area.
Danaus plexippus pop. 1 monarch - California overwintering population	-- / CNDDB / --	Overwinters in coastal California using colonial roosts generally found in Eucalyptus, pine and acacia trees. Overwintering habitat for this species within the Coastal Zone represents ESHA. Local ordinances often protect this species as well.	**Unlikely** No suitable habitat within or adjacent to survey area.
Euhilotes enoptes smithi Smith's blue butterfly	FE / -- / --	Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz Counties. Plant hosts are *Eriogonum latifolium* and *E. parvifolium*.	**Unlikely** No suitable habitat within or adjacent to survey area.
Lytta moesta Moestan blister beetle	-- / CNDDB / --	Found on the flowers and foliage of certain plants.	**Unlikely** No suitable habitat within or adjacent to survey area.
Philanthus nasalis Antioch specid wasp	-- / CNDDB / --	Inland marine sand hills. Originally known to occur in the Antioch Dunes, Contra Costa County; however, have not been collected there since 1959. Identified in 1991 in the Zayante and Ben Lomond sandhills.	**Low** No suitable habitat is present within the survey area. The closest CNDDB occurrence is a historical occurrence from 1993 approximately 3 km of survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Polyphylla barbata Mount Hermon (barbate) June beetle	FE / -- / --	Ponderosa pine-chaparral habitat with sandy soil and open, sparsely vegetated areas. May also occur in more vegetated areas of chaparral. While not always present, silver-leaved manzanita is often an indicator of suitable habitat. Restricted to the Zayante sandhills habitat of the Ben Lomond-Mount Harmon-Scotts Valley area.	**High** Suitable habitat within and adjacent to survey area. The closest CNDDB occurrence from 2006 approximately 1.7 km of survey area..
Speyeria adiaste adiaste unsilvered fritillary	-- / CNDDB / --	Restricted to Central Coast Region of California. This species is thought to be restricted to the higher elevations of the Santa Cruz Mountains in San Mateo, Santa Cruz, and Santa Clara Counties. Inhabits openings in conifer and redwood forests, as well as oak woodlands, chaparral, and grassy slopes. Violets (*Viola* spp.) are the only known host plants. North American violets can support larval growth, but some of the European ornamental violets are toxic to most *Speyeria* species. The distribution of host plants limits the extent of available habitat.	**Low** Suitable habitat within survey area. The closest CNDDB occurrence is a historical occurrence from 1992 approximately 15 km of survey area.
Trimerotropis infantilis Zayante band-winged grasshopper	FE / -- / --	Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem)	**Unlikely** No suitable habitat within or adjacent to survey area. The closest CNDDB occurrence is from 2005 approximately 1.1 km away from survey area within the Quail Hollow Ecological Reserve.
PLANTS			
Agrostis blasdalei Blasdale's bent grass	--/--/1B	Coastal bluff scrub, coastal dunes, and coastal prairie at elevations from 0-150 meters. Perennial rhizomatous herb in the Poaceae family. Blooms May–July.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation for this species.
Amsinckia lunaris Bent-flowered fiddleneck	-- / -- / 1B	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland at elevations of 3-500 meters. Annual herb in the Boraginaceae family; blooms March-June.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Anomobryum julaceum Slender silver moss	-- / -- / 4	Damp rock and soil on outcrops; usually on roadcuts. Broadleaved upland forest, lower montane coniferous forest, and North Coast coniferous forest at elevations of 100-1000 meters. Moss in the Bryaceae family.	**Unlikely** No suitable habitat within and adjacent to survey area.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Arctostaphylos andersonii Anderson's manzanita	-- / -- / 1B	Openings and edges of broadleaved upland forest, chaparral, and north coast coniferous forest at elevations of 60-760 meters. Evergreen shrub in the Ericaceae family; blooms November-May.	**Not Present** Suitable habitat within and adjacent to survey area, however not observed during focused plant survey. Historical sightings within 2 km of survey area.
Arctostaphylos glutinosa Schreiber's manzanita	-- / -- / 1B	Broadleaved upland forest, chaparral, and north coast coniferous forest on granitic or sandstone souls at elevations between 170-685 meters. Perennial evergreen shrub in the Ericaceae family; blooms November-April.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Arctostaphylos ohloneana Ohlone manzanita	-- / -- / 1B	Closed-cone coniferous forest and coastal scrub within siliceous shale, at elevations between 450-530 meters. Evergreen shrub in the Ericaceae family; blooms February-March.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Arctostaphylos regismontana Kings Mountain manzanita	-- / -- / 1B	Broadleaved upland forest, chaparral, and north coast coniferous forest on granitic or sandstone soils at elevations between 305-730 meters. Evergreen shrub in the Ericaceae family; blooms January-April.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Arctostaphylos silvicola Silverleaf manzanita	-- / -- / 1B	Chaparral, closed-cone coniferous forest, and lower montane coniferous forest on inland marine sands at elevations of 120-600 meters. Evergreen shrub in the Ericaceae family; blooms February-March.	**Present** This species was observed during focused rare plant surveys conducted at the appropriate blooming period.
Calyptridium parryi var. hesseae Santa Cruz Mountains pussypaws	-- / -- / 1B	Sandy or gravelly openings of chaparral and cismontane woodlands at elevations of 305-1530 meters. Annual herb in the Montiaceae family; blooms May-August.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Campanula californica Swamp harebell	-- / -- / 1B	Mesic areas of bogs and fens, closed-cone coniferous forest, coastal prairie, meadows and seeps, freshwater marshes and swamps, and North Coast coniferous forest at elevations of 1-405 meters. Perennial rhizomatous herb in the Campanulaceae family; blooms June-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Carex comosa Bristly sedge	-- / -- / 1B	Coastal prairie, marshes and swamps on lake margins, and valley and foothill grassland at elevations of 0-625 meters. Perennial rhizomatous herb in the Cyperaceae family; blooms May-September.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Carex saliniformis Deceiving sedge	-- / -- / 1B	Mesic areas of coastal prairie, coastal scrub, meadows and seeps, and coastal salt marshes and swamps at elevations of 3-230 meters. Perennial rhizomatous herb in the Cyperaceae family; blooms June-July.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species. Focused rare plant surveys were conducted outside the appropriate blooming period.
Centromadia parryi ssp. *congdonii* Congdon's tarplant	-- / -- / 1B	Valley and foothill grassland on heavy clay, saline, or alkaline soils at elevations of 0-230 meters. Annual herb in the Asteraceae family; blooms May-November.	**Unlikely** No suitable habitat within or adjacent to survey area. Required soils not found within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Chorizanthe pungens var. *hartwegiana* Ben Lomond spineflower	FE / -- / 1B	Lower montane coniferous forest (maritime ponderosa pine sandhills) at elevations of 90-610 meters. Annual herb in the Polygonaceae family; blooms April-July.	**Present** This species was observed during focused rare plant surveys conducted at the appropriate blooming period.
Chorizanthe pungens var. *pungens* Monterey spineflower	FT / -- / 1B	Maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland on sandy soils at elevations of 3-450 meters. Annual herb in the Polygonaceae family; blooms April-July.	**Unlikely** Low suitability habitat within and adjacent to survey area. Historical sightings over 20 km from survey area.
Chorizanthe robusta var. *robusta* Robust spineflower	FE / -- / 1B	Openings in cismontane woodland, coastal dunes, maritime chaparral, and coastal scrub on sandy or gravelly soils at elevations of 3-300 meters. Annual herb in the Polygonaceae family; blooms April-September.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Cirsium fontinale var. campylon Mount Hamilton fountain thistle	-- / -- / 1B	Chaparral, cismontane woodland, and valley and foothill grassland on serpentinite seeps, at elevations of 100-890 meters. Perennial herb in the Asteraceae family; blooms February-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Appropriate soils not found within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Clarkia concinna ssp. automixa Santa Clara red ribbons	-- / -- / 4	Chaparral and cismontane woodlands at elevations of 90-1500 meters. Annual herb in the Onagraceae family; blooms April-July.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Collinsia multicolor San Francisco collinsia	-- / -- / 1B	Closed-cone coniferous forest and coastal scrub, sometimes on serpentinite soils, at elevations of 30-250 meters. Annual herb in the Plantaginaceae family; blooms March-May.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species. Focused rare plant surveys were conducted outside the appropriate blooming period.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Dacryophyllum falcifolium Tear drop moss	-- / -- / 1B	North coast coniferous forests on carbonate soils at elevations of 50-275 meters. Known only in Monterey and Santa Cruz counties.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species.
Dudleya abramsii ssp. setchellii Santa Clara Valley dudleya	-- / -- / 1B	Cismontane woodland and valley and foothill grasslands on rocky serpentinite soils, at elevations of 60-455 meters. Perennial herb in the Crassulaceae family; blooms April-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Required soils not found within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Eriogonum nudum var. decurrens Ben Lomond buckwheat	-- / -- / 1B	Chaparral, cismontane woodland, and lower montane coniferous forest (maritime ponderosa pine sandhills) on sandy soils, at elevations of 50-800 meters. Perennial herb in the Polygonaceae family; blooms June-October.	**Present** This species was observed during focused rare plant surveys conducted at the appropriate blooming period.
Erysimum teretifolium Santa Cruz wallflower	FE / SE / 1B	Chaparral and lower montane coniferous forest on inland marine sands, at elevations of 120-610 meters. Perennial herb in the Brassicaceae family; blooms March-July.	**Not Present** This species was not observed during focused rare plant surveys conducted at the appropriate blooming period.
Fissidens pauperculus Minute pocket moss	-- / -- / 1B	North coast coniferous forest on damp coastal soil at elevations of 10-1024 meters. Moss in the Fissidentaceae family.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Fritillaria liliacea Fragrant fritillary	-- / -- / 1B	Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland, often serpentinite, at elevations of 3-410 meters. Bulbiferous perennial herb in the Liliaceae family; blooms February-April.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Grimmia torenii Toren's grimmia	-- / CNDDB / 1B	Endemic to California. Occurrences are known from Lake, Mendocino, Contra Costa, and Santa Cruz Counties. Found in the Coast Range at elevations of 325 to 1160 meters. Occurs on pillow basalts and some sand stones. Often serpentine soil occurs in areas occupied by this species. A moss in the Gimmiaceae family.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Grimmia vaginulata Vaginulate grimmia	-- / CNDDB / 1B	Believed to be extremely rare. So far, most occurrences have been found on the vertical or underhanging surfaces of calcareous sandstone boulders created from the bedrock of the Butano Formation. The boulders with occurrences of this species were located in dense chaparral at elevations of approximately 700 meters. A moss in the Gimmiaceae family.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Hesperocyparis abramsiana var. *abramsiana* Santa Cruz cypress	FE / SE / 1B	Closed-cone coniferous forest, chaparral, and lower montane coniferous forest on sandstone or granitic soils at elevations of 280-800 meters. Evergreen tree in the Cupressaceae family.	**Not Present** Species not found during focused botanical surveys. Focused rare plant surveys were conducted outside the appropriate blooming period.
Hesperocyparis abramsiana var. *butanoensis* Butano Ridge cypress	-- / CNDDB / 1B	Only known from the Butano Ridge of the Santa Cruz Mountains. Occurs on sandstone in closed-cone coniferous forest, chaparral, and lower montane coniferous forest habitats. Elevation range of 400-490 meters. Evergreen tree in the Cupressaceae family.	**Not Present** Species not found during focused botanical surveys. Focused rare plant surveys were conducted outside the appropriate blooming period.
Hoita strobilina Loma Prieta hoita	-- / -- / 1B	Mesic areas of chaparral, cismontane woodland, and riparian woodland, usually on serpentinite soils, at elevations of 30-860 meters. Perennial herb in the Fabaceae family; blooms May-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Holocarpha macradenia Santa Cruz tarplant	FT / SE / 1B	Coastal prairies and valley foothill grasslands often clay or sandy soils, at elevations of 10-220 meters. Annual herb in the Asteraceae family; blooms June-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Horkelia cuneata ssp. sericea Kellogg's horkelia	-- / -- / 1B.1	Openings of closed-cone coniferous forests, maritime chaparral, coastal dunes, and coastal scrub on sandy or gravelly soils at elevations of 10-200 meters. Perennial herb in the Rosaceae family; blooms April-September.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Horkelia marinensis Point Reyes horkelia	-- / -- / 1B	Coastal dunes, coastal prairie, and coastal scrub on sandy soils at elevations of 5-350 meters. Perennial herb in the Rosaceae family; blooms May-September.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Lasthenia californica ssp. macrantha Perennial goldfields	-- / -- / 1B	Coastal bluff scrub, coastal dunes, and coastal scrub at an elevation of 5-520 meters. Perennial herb in the Asteraceae family. Blooms January – November.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Lessingia micradenia var. glabrata Smooth lessingia	-- / -- / 1B	Chaparral and cismontane woodlands on serpentinite soils, often on roadsides, at elevations of 120-420 meters. Annual herb in the Asteraceae family; blooms July-November.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Malacothamnus arcuatus Arcuate bush-mallow	-- / -- / 1B	Chaparral and cismontane woodland at elevations of 15-355 meters. Perennial evergreen shrub in the Malvaceae family; blooms April-September.	**Low** Suitable habitat within and adjacent to survey area is inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.
Microseris paludosa Marsh microseris	-- / -- /1B	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland at elevations of 5-300 meters. Perennial herb in the Asteraceae family; blooms April-July.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Mielichhoferia elongata Elongate copper moss	-- / -- / 4	Cismontane woodland.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Monardella sinuata ssp. nigrescens Northern curly-leaved monardella	-- / -- /1B	Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest (ponderosa pine sandhills) on sandy soils at elevations of 0-300 meters. Annual herb in the Lamiaceae family; blooms April-September.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Monolopia gracilens Woodland monolopia	-- / -- / 1B	Openings of broadleaved upland forest, chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland on serpentinite soils at elevations of 100-1200 meters. Annual herb in the Asteraceae family; blooms February-July.	**Moderate** Suitable habitat within and adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Orthotrichum kellmanii Kellman's Bristle Moss	--/--/1B	Sandstone, carbonate in Chaparral or Cismontane woodland. Blooms January-February. 343-685 meters.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Pedicularis dudleyi Dudley's lousewort	-- / SR / 1B	Maritime chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland at elevations of 60-900 meters. Perennial herb in the Orbanchaceae family; blooms April-June.	**Low** Suitable habitat within and adjacent to survey area is inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.
Penstemon rattanii var. kleei Santa Cruz Mountains beardtongue	-- / -- / 1B	Chaparral and lower montane and North Coast coniferous forests at elevations of 400-1100 meters. Perennial herb in the Plantaginaceae family; blooms May-June.	**Unlikely** Suitable habitat within and adjacent to survey area. Site is located out of suitable elevation range for this species. Focused rare plant surveys were conducted outside the appropriate blooming period.
Pentachaeta bellidiflora White-rayed pentachaeta	FE / SE / 1B	Cismontane woodland and valley and foothill grasslands, often on serpentinite soils, at elevations of 35-620 meters. Annual herb in the Asteraceae family; blooms March-May.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Pinus radiata Monterey pine	-- / -- / 1B	Closed-cone coniferous forest and cismontane woodland at elevations of 25-185 meters. Evergreen tree in the Pinaceae family. Only three native stands in CA at Ano Nuevo, Cambria, and the Monterey Peninsula; introduced in many areas.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species. Focused rare plant surveys were conducted outside the appropriate blooming period.
Piperia candida White-flowered rein orchid	-- / -- / 1B	Broadleaved upland forest, lower montane coniferous forest, and North Coast coniferous forest, sometimes on serpentinite soils, at elevations of 30-1310 meters. Perennial herb in the Orchidaceae family; blooms May-September.	**Unlikely** No suitable habitat within and adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Plagiobothrys chorisianus var. chorisianus Choris' popcorn-flower	-- / -- / 1B	Mesic areas of chaparral, coastal prairie, and coastal scrub at elevations of 15-160 meters. Annual herb in the Boraginaceae family; blooms March-June.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species. Focused rare plant surveys were conducted outside the appropriate blooming period.
Plagiobothrys diffusus San Francisco popcorn-flower	-- / SE / 1B	Coastal prairie and valley and foothill grassland at elevations of 60-360 meters. Annual herb in the Boraginaceae family; blooms March-June.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Plagiobothrys glaber Hairless popcorn-flower	-- / -- / 1A	Alkaline meadows and seeps, and coastal salt marshes and swamps at elevations of 15-180 meters. Annual herb in the Boraginaceae family; blooms March-May.	**Unlikely** No suitable habitat within or adjacent to survey area. Site is located out of suitable elevation range for this species.

Species	Status (Service/ Department/CNPS)	General Habitat	Potential Occurrence within Project Vicinity
Polygonum hickmanii Scotts Valley polygonum	FE / SE / 1B	Valley and foothill grassland on mudstone and sandstone at elevations of 210-250 meters. Annual herb in the Polygonaceae family; blooms: May-August.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Senecio aphanactis Chaparral ragwort	-- / -- / 2B	Chaparral, cismontane woodland, and coastal scrub, sometimes on alkaline soils, at elevations of 15-800 acres. Annual herb in the Asteraceae family; blooms January-April.	**Low** Suitable habitat within and adjacent to survey area is inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.
Sidalcea malachroides Maple-leaved checkerbloom	-- / -- / 4	Broadleaved upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, and riparian woodlands, often in disturbed areas, at elevations of 2-730 meters. Perennial herb in the Malvaceae family; blooms March-August.	**Low** Suitable habitat found within and adjacent to survey area inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.
Stebbinsoseris decipiens Santa Cruz microseris	-- / -- / 1B	Broadleaved upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, and openings in valley and foothill grassland, sometimes on serpentinite, at elevations of 10-500 meters. Annual herb in the Asteraceae family; blooms April-May.	**Low** Suitable habitat within and adjacent to survey area inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.
Streptanthus albidus ssp. peramoenus Most beautiful jewel-flower	-- / -- / 1B	Chaparral, cismontane woodlands, and valley and foothill grasslands on serpentinite soils at elevations of 94-1000 meters. Annual herb in the Brassicaceae family; blooms March-October.	**Unlikely** No suitable habitat within or adjacent to survey area. Focused rare plant surveys were conducted outside the appropriate blooming period.
Trifolium buckwestiorum Santa Cruz clover	-- / -- / 1B	Gravelly margins of broadleaved upland forest, cismontane woodland, and coastal prairie at elevations of 105-610 meters. Annual herb in the Fabaceae family; blooms April-October.	**Low** Suitable habitat within or adjacent to survey area inadequate. Focused rare plant surveys were conducted outside the appropriate blooming period.

STATUS DEFINITIONS

Federal

FE = listed as Endangered under the federal Endangered Species Act
FT = listed as Threatened under the federal Endangered Species Act
FC = Candidate for listing under the federal Endangered Species Act
-- = no listing

State

SE = listed as Endangered under the California Endangered Species Act
ST = listed as Threatened under the California Endangered Species Act
SR = listed as Rare under the California Endangered Species Act
SC = Candidate for listing under the California Endangered Species Act
CSC = California Department of Fish and Wildlife Species of Concern
CFP = California Fully Protected Animal
WL = CDFW Watch List
CNDDB = This designation is being assigned to animal species with no other status designation defined in this table. These animal species are included in the Department's CNDDB "Special Animals" list (2010), which includes all taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special-status species." The Department considers the taxa on this list to be those of the greatest conservation need.
-- = no listing

California Native Plant Society

1B = List 1B species; rare, threatened or endangered in California and elsewhere
List 4 = Limited distribution (CNPS Watch List)
-- = no listing

POTENTIAL TO OCCUR

Present = known occurrence of species within the site; presence of suitable habitat conditions; or observed during field surveys
High = known occurrence of species in the vicinity from the CNDDB or other documentation; presence of suitable habitat conditions
Moderate = known occurrence of species in the vicinity from the CNDDB or other documentation; presence of marginal habitat conditions within the site
Low = species known to occur in the vicinity from the CNDDB or other documentation; lack of suitable habitat or poor quality
Unlikely = species not known to occur in the vicinity from the CNDDB or other documentation, no suitable habitat is present within the site
Not Present = species was not observed during surveys

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APPENDIX D

IPaC RESOURCES LIST FOR THE SURVEY AREAS

IPaC **U.S. Fish & Wildlife Service**

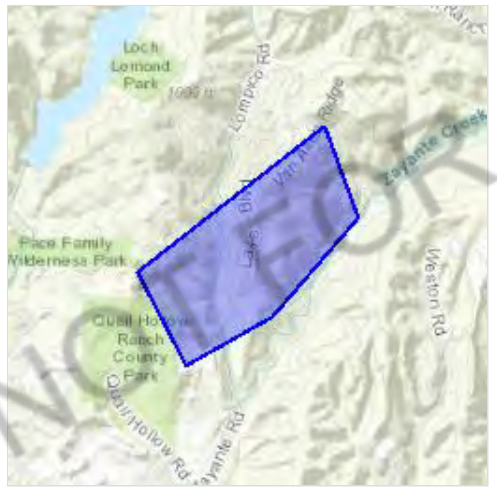
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Santa Cruz County, California



Local office

Ventura Fish And Wildlife Office

(805) 644-1766
(805) 644-3958

2493 Portola Road, Suite B
Ventura, CA 93003-7726

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS

California Least Tern Sterna antillarum browni — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/8104

Least Bell's Vireo Vireo bellii pusillus — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/5945

Marbled Murrelet Brachyramphus marmoratus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/4467

Southwestern Willow Flycatcher Empidonax traillii extimus — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/6749

Reptiles

NAME	STATUS
San Francisco Garter Snake Thamnophis sirtalis tetrataenia No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5956	Endangered

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Tidewater Goby Eucyclogobius newberryi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/57	Endangered

Insects

NAME	STATUS
Mount Hermon June Beetle Polyphylla barbata No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3982	Endangered
Ohlone Tiger Beetle Cicindela ohlone No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8271	Endangered
Smith's Blue Butterfly Euphilotes enoptes smithi There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4418	Endangered
Zayante Band-winged Grasshopper Trimerotropis infantilis There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/1036	Endangered

Flowering Plants

NAME	STATUS
Ben Lomond Spineflower Chorizanthe pungens var. hartwegiana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7498	Endangered
Ben Lomond Wallflower Erysimum teretifolium No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7429	Endangered
Marsh Sandwort Arenaria paludicola No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2229	Endangered
Menzies' Wallflower Erysimum menziesii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2935	Endangered
Santa Cruz Tarplant Holocarpha macradenia There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6832	Threatened

Scotts Valley Polygonum Polygonum hickmanii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3222	Endangered
Scotts Valley Spineflower Chorizanthe robusta var. hartwegii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7108	Endangered

Conifers and Cycads

NAME	STATUS
Santa Cruz Cypress Cupressus abramsiana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1678	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Zayante Band-winged Grasshopper Trimerotropis infantilis https://ecos.fws.gov/ecp/species/1036#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Allen's Hummingbird Selasphorus sasin This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

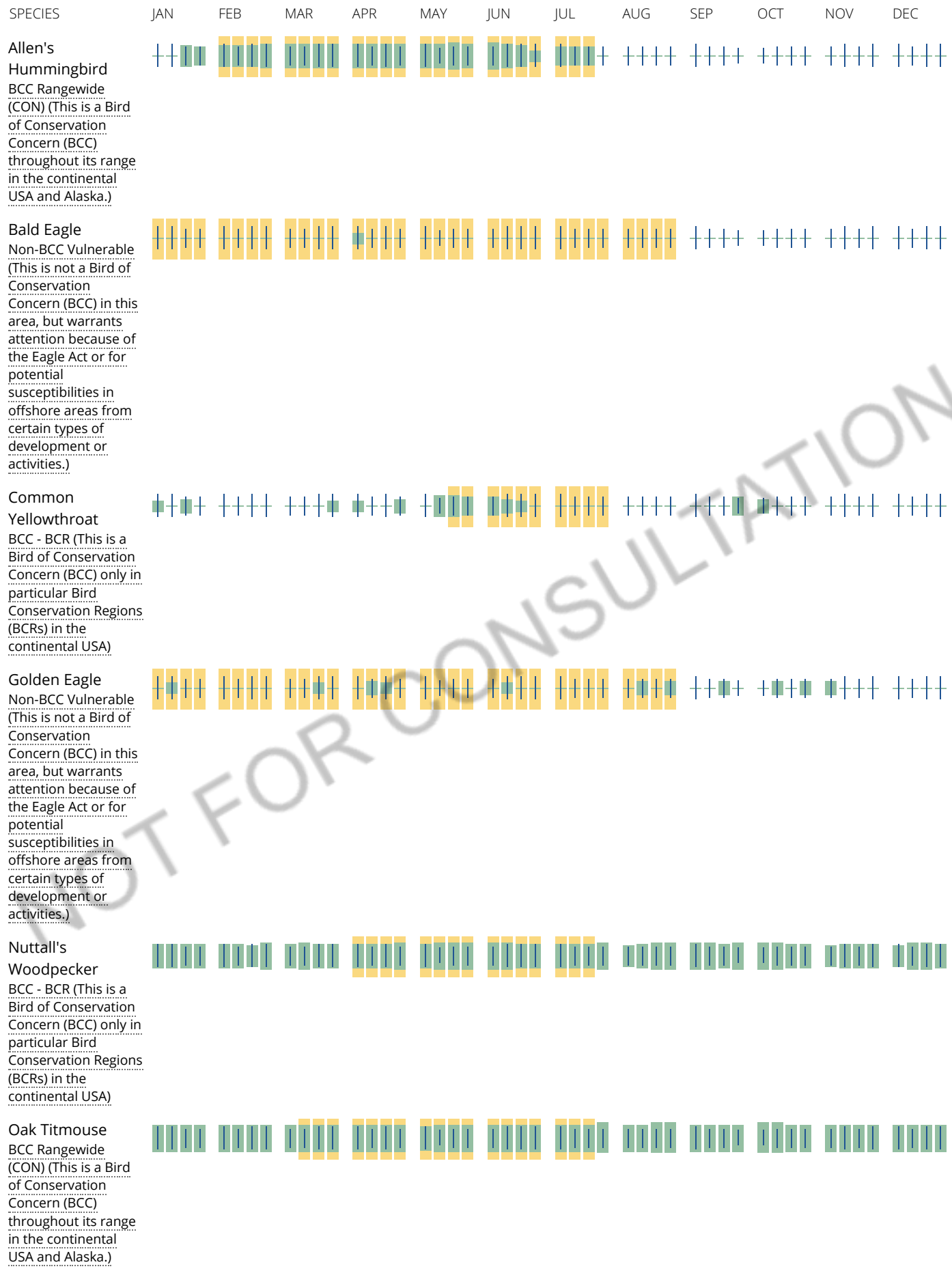
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

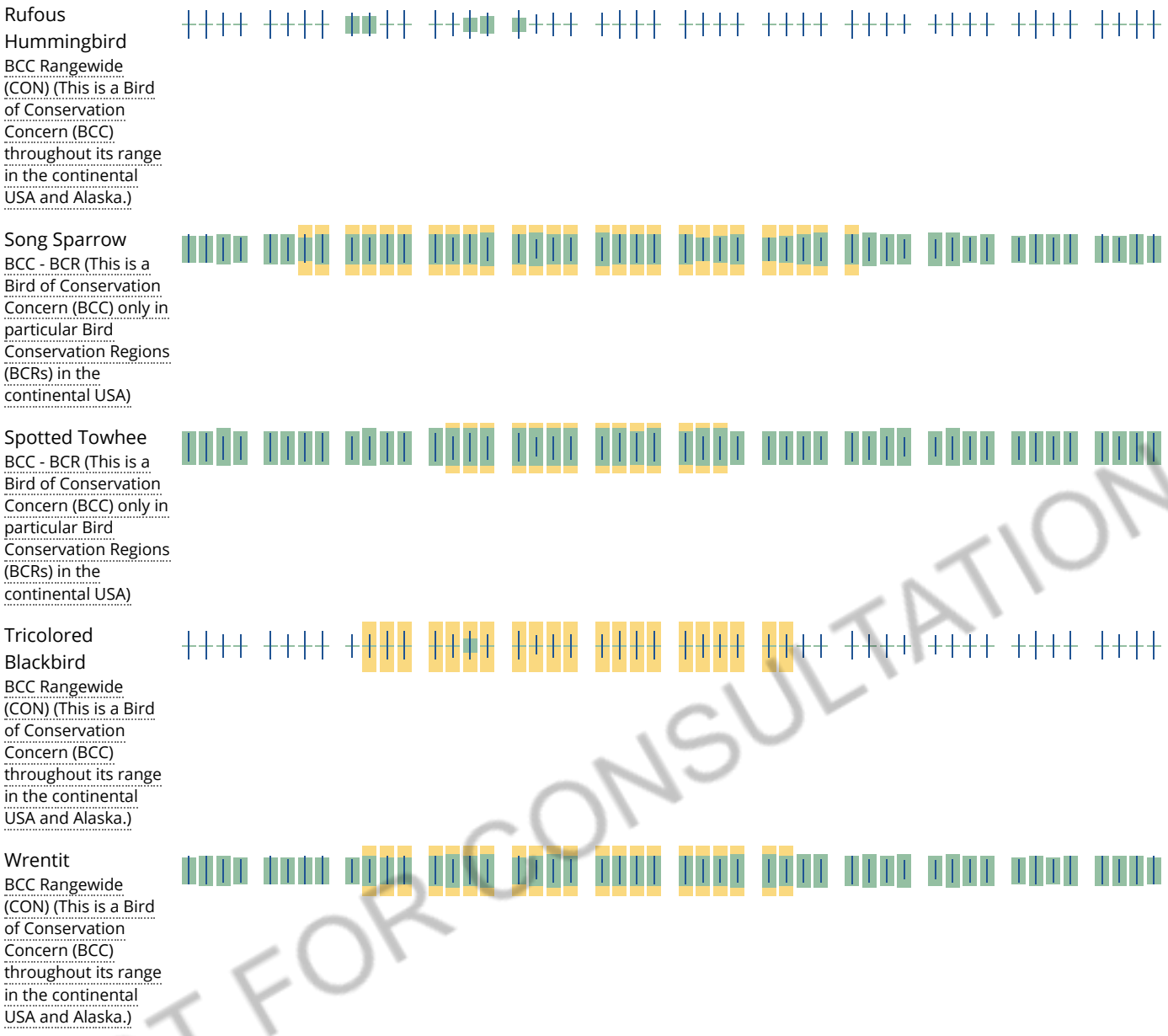
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort – no data





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project

intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

R3UBH
R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX E

EMERGENCY ENDANGERED SPECIES ACT CONSULTATION FOR THE SAN LORENZO VALLEY WATER DISTRICT LEWIS TANK SITE

Denise Duffy & Associates, Inc.
PLANNING AND ENVIRONMENTAL CONSULTING

MEMORANDUM

Date: July 9, 2019

To: Chad Mitcham, United States Fish and Wildlife Service (Service)

cc: Rick Rodgers, San Lorenzo Valley Water District (District)
Jen Michelsen, (District)
Jodi McGraw, Jodi McGraw Consulting (JMc)

From: Matt Johnson, Denise Duffy & Associates, Inc. (DD&A)

Subject: Emergency Endangered Species Act Consultation for the San Lorenzo Valley Water District Lewis Tank Site

INTRODUCTION

Denise Duffy & Associates, Inc. (DD&A) was contracted by San Lorenzo Valley Water District (District) to prepare CEQA documentation for the Lompico Tanks Replacement Project. The District proposes to replace aging water storage tanks at three distinct locations (Kaski, Madrone, and Lewis) with modern water storage tanks. Site improvements include the installation of two (2) 40,000-gallon steel bolted water storage tanks at the Kaski tank site and two (2) 75,000-gallon tanks at the Madrone tank site, to replace the existing redwood water storage tanks. At the Lewis tank site, improvements include installation of two (2) 110,000-gallon steel bolted water storage tanks to replace an existing 100,000-gallon redwood water storage tank (Attachment A, Schaaf and Wheeler 2019).

DD&A was informed through email by the District on June 12, 2019 that the Lewis tank had begun to leak excessively. The District employed divers to repair the tank, however they determined that the tank will soon fail. To ensure water storage and availability for the residents that rely on the Lompico Tanks infrastructure (which includes Lewis tank), the District proposes to install temporary storage tanks, as soon as possible. The temporary storage tanks were proposed for use during the demolition and construction of the new storage system as part of the Lompico Tanks Replacement Project; however, due to the current state of the Lewis tank, the District desires to install them prior to the completion of the CEQA review process and other related regulatory permit requirements. The temporary tanks and associated infrastructure, shown in the attached site plans, will be placed north of the existing Lewis tank site fence line. the District and their design team considered the following alternatives for temporary tank placement before deciding on the current location:

1. Inside the Lewis tank site existing fence line,
2. outside the Lewis tank site existing fence line between West Ave and the north fence, and
3. a nearby District lot (APN 075-321-02), which was the old Lewis tank #1 site.

The proposed temporary tank location (Option 2) was determined to be the least impactful and most efficient option. The off-site location (Option 3) would require grading and pipe installation that would impact a larger footprint of suitable habitat for Mount Hermon June beetle (MHJB, *Polyphylla barbata*), a federally Endangered species. There is an existing Pressure Release Valve (PRV) vault adjacent to the onsite location so ground disturbance for temporary piping would be reduced when compared to the off-site option. Additionally, the proposed off-site location has not been utilized by the District in approximately 20 years and vegetation removal would be extensive. Option 1, placing the temporary tanks within the existing fence line, was dismissed because the replacement of the

Lewis redwood tank will involve removing and regrading everything inside the existing fence line, so temporary tanks installed inside the existing fence would eventually be relocated outside the fence. Additionally, the site north of the fence is approximately 5-feet higher in elevation than the area inside the fence; the elevation reduces the change in system water pressure.

The District requested that DD&A evaluate the Lewis tank site for potential impacts that may occur to federally listed species during the installation of temporary tanks. Presented below is an evaluation of the Lewis tank site and potential impacts to federally listed species and/or suitable habitat that may occur during temporary tank installation, as well as the completion of the proposed tank replacement project. This memorandum is specific to the Lewis tank project site (survey area**,** Figure 1). Habitat for federally listed species was not documented at the Madrone or Kaski tank sites. According to the 60% design plans for the Lewis tank, the project consists of demolition of all existing facilities within the fence line at the Lewis tank project site, over-excavation and grading within the existing fence line, temporary tank storage outside the existing fence line north of the project site, replacement of the existing tank with two (2) new tanks, and use of the existing access road.

RESULTS

DD&A performed a biological investigation of the Lewis tank site as a component of the CEQA review process. Prior to the field investigation, DD&A reviewed existing technical documents including: *Biological Assessment for Lewis Tank #1, near 10011 West Drive Felton, CA (APNs: 075-311-06)* (Attachment B, McGraw Consulting 2016). The McGraw Biological Assessment determined that:

> "*Other than in the areas covered by impervious surfaces, including the tank, shed, and other infrastructure, the project parcel and access road have the potential to support the Mount Hermon June beetle…*" (Page 2, Paragraph 6)

DD&A's field investigation, conducted on December 14, 2018, concurred with the findings of the McGraw Biological Assessment, that suitable habitat for MHJB, is present at the project site. Two[1] vegetation types were observed within the Lewis tank survey area: silverleaf manzanita (*Arctostaphylos silvicola*) chaparral and ruderal/disturbed (Figure 2). The ruderal/disturbed habitat, which covers the area within and immediately surrounding the existing fence line, is dominated by herbaceous plants including primarily exotic annual grasses and forbs including; redstem filaree (*Erodium cicutarium*), rattail fescue (*Festuca myuros*), smooth cat's ears (*Hypochaeris glabra*), and ripgut brome (*Bromus diandrus*). The area surrounding the Lewis tank site is occupied by silverleaf manzanita chaparral, a plant community found within the sandhills ecosystem on Zayante soils in central Santa Cruz County (McGraw Consulting 2016). Shrubs within the Lewis tank site include silverleaf manzanita (Arctostaphylos silvicola) deer weed (*Acmispon glaber*), silver bush lupine (*Lupinus albifrons var. albifrons*), and yerba santa (*Eriodictyon californicum*). Zayante soils, present within both habitat types, represents suitable habitat for MHJB. However, the areas within and immediately surrounding the fence line are relatively degraded due to the dominance of non-native invasive plant species and disturbance attributed to the operations of the tank site.

DD&A mapped all habitats and features, including impervious surfaces, using a Trimble Geo 7 Series GPS unit. The data was then post-processed, transferred to shapefile format, and analyzed using ArcGIS 10.6. Figure 3 displays the survey area and identifies the total suitable habitat for MHJB within the survey area. DD&A overlaid the 60% design plans to identify potential impacts, both permanent and temporary, resulting from the proposed tank replacement. It was determined that approximately 0.76-acre (33,465.08 square feet [ft^2]) of suitable MHJB habitat

[1] A third classification for ground cover was also observed; developed. This ground cover type consists of the existing water supply infrastructure and other impervious areas (cement/pavement).

exists within the survey area. Approximately 0.17-acre (7,262.98 ft^2) of this habitat will be permanently impacted[2] by the tank replacement and approximately 0.16-acre (7,061.70 ft^2) of this habitat will be temporarily[3] impacted by the temporary tanks/staging/other construction activities. Installation of the temporary storage tanks will temporarily impact approximately 0.05-acre (2,259.70 ft^2) of suitable MHJB habitat[4].

DD&A conducted an additional site visit on May 2, 2019 to determine presence/absence of several special-status plant species with the potential to occur at the project site. DD&A documented a population of Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), a federally Endangered species, within the survey area (Figure 4). DD&A recorded the population with the following methodology; when an occurrence was five (5) plants or less it was recorded as a point, occurrences totaling greater than five (5) individuals were mapped as polygons. The results of this survey effort are shown in Figure 4. DD&A recorded nine (9) polygons totaling approximately 645 ft^2 and 5 points, totaling 7 individuals, within the survey area. Installation of the temporary storage tanks will temporarily impact Ben Lomond spineflower populations with an area totaling approximately 415 ft^2. Implementation of the tank replacement project will impact an additional 35 ft^2 (total impact of 450 ft^2) of Ben Lomond spineflower and one individual Ben Lomond spineflower.

RECOMMENDATIONS

The installation of the temporary tanks and the completion of the tank replacement project will result in temporary and permanent impacts to MHJB suitable habitat and Ben Lomond spineflower populations. DD&A and the District discussed the potential impacts to listed species during a conference call with United States Fish and Wildlife Service (Service) on June 3, 2019. The Service requested that DD&A identify avoidance and minimization measures to reduce the potential for the project to impact MHJB individuals and habitat. Measures are included below to avoid or minimize these potential impacts to the greatest extent possible. At the request of the Service, the following measures were adapted from the *Low-Effect Habitat Conservation Plan for the San Lorenzo Valley Water District's Probation Tank Replacement Project* (McGraw Consulting 2017) and the *Final Mitigated Negative Declaration and Response to Comments Received Probation Tank Replacement Project* (District 2017).

To avoid and minimize impacts to special status plant species, the District will implement the following avoidance and minimization measures (A&MMs):

A&MM 1. Prior to construction, implement a construction fencing plan that demarcates construction access routes and staging areas such that inadvertent impacts to special-status plant species are avoided. Install construction fencing prior to work and maintain fencing throughout the construction period.

A&MM 2. During the summer prior to construction, if possible, a qualified biologist will collect seed of all the Ben Lomond spineflower plants from within the project impact area, for use in restoration (see RM 3).

A&MM 3. For all mapped Ben Lomond spineflower populations that cannot be avoided during installation of the temporary storage tanks or implementation of the larger tank replacement project, and have already desiccated beyond the ability to collect seed, topsoil shall be salvaged for use in restoration efforts, post-project.

a) Topsoil (top 6-8 inches) will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and will be stockpiled in uncompacted piles less than 4 feet tall.

[2] Due to soil disturbance and compactions all areas within the existing fence line will be permanently impacted.

[3] Areas outside of the existing fence line will be restored, therefore impacts are considered temporary.

[4] This temporary impact is included in the total temporary impacts in the preceding statement, not in addition to.

Stockpiled soils will be placed on top of an impervious surface, such as a tarp, within temporary disturbance areas. Topsoil stockpiles will be stabilized by spraying with a tackifier (soil stabilizer) or covered with a permeable natural material, such as jute or coconut fiber blankets, as consistent with SWPPP requirements. To minimize compaction, no equipment will be allowed to travel over or park on the salvaged soil stockpiles (see RM 3).

b) Areas within the existing fence line of the Lewis tank site are dominated by non-native invasive plant species. To reduce the potential for these species to cultivate new areas, this measure does not apply to Ben Lomond spineflower populations within the existing fence line of the Lewis tanks site.

To avoid or minimize impacts to MHJB, the District will implement the following A&MMs:

A&MM 4. Prior to construction, implement a construction fencing plan that demarcates construction access routes and staging areas such that inadvertent impacts to suitable habitat for MHJB are avoided. Install construction fencing prior to work and maintain fencing throughout the construction period.

A&MM 5. The District will salvage the soil within the approximately 0.11-acre area proposed for use by the temporary tanks that has not already been salvaged for Ben Lomond spineflower restoration (A&MM 3). Topsoil (top 6-8 inches) will be carefully removed by an experienced operator using a dragline, excavator, scraper, or dozer and will be stockpiled in uncompacted piles less than 4 feet tall. Stockpiled soils will be placed on top of an impervious surface, such as a tarp, within temporary disturbance areas. Topsoil stockpiles will be stabilized by spraying with a tackifier (soil stabilizer) or covered with a permeable natural material, such as jute or coconut fiber blankets, as consistent with SWPPP requirements. To minimize compaction, no equipment will be allowed to travel over or park on the salvaged soil stockpiles (see RM 3).

A&MM 6. Implement Worker Environmental Awareness Training: A qualified biologist will conduct training sessions to familiarize all construction personnel with the following: identification of MHJB, other protected wildlife and plants, as well as their habitat, general provisions and protections afforded by the Endangered Species Act (ESA), measures implemented to protect the species, penalties for violation of the ESA, reporting requirements, and a review of project footprint boundaries. the District and/or their contractor(s) will require all construction employees to participate in the training prior to working on-site.

A&MM 7. If ground disturbing activities are conducted during the flight season of the MHJB, cover exposed soil nightly to avoid impacts to dispersing males. Adult male Mount Hermon June beetles actively search for mates and breed during the evenings for approximately 12-14 weeks between May 1 and August 30. During this period, males and females may burrow into duff and soils at relatively shallow depths for protection during the daytime hours. Every attempt will be made to conduct soil disturbing aspects of the project outside of the adult flight season (May to August). If construction occurs during any part of the flight season, tarps or other impervious material will be used to cover open soil each night by 7:00 p.m. This will prevent adult males from burrowing into the exposed area and then being impacted by subsequent soil disturbance (digging, grading, or covering).

A&MM 8. A qualified biologist will be on site during all ground-disturbing activities to capture any MHJB observed in the construction areas and relocate them outside to intact sandhills habitat that supports appropriate soils and vegetation.

To provide compensation for impacts to Ben Lomond spineflower plants/seedbank and MHJB suitable habitat the District will implement the following restoration measures (RM):

RM 1. To quantify the incidental take at the end of the project, a qualified biologist will calculate the area of soil disturbance (and thus incidental take) and count the number of MHJB that were observed during tank installation.

RM 2. To compensate for impacts to MHJB habitat impacts at the Lewis tank site the District will set aside 28,850.64 ft^2 (0.67-acre) of habitat within the 6.7-acre conservation area at the Olympia Wellfield. Setting aside 21,788.94 ft^2 (0.51-acre) of habitat within the conservation area will offset the permanent habitat loss at a 3:1 ratio, which is appropriate given the moderate quality of habitat at the site. The temporary impacts of this project will be compensated for at a 1:1 ratio, which reflects the fact that the habitat to be impacted on site will be restored following the project. Prior to initiation of ground-disturbing activities associated with the project, the District will contribute $94,918.61 to the endowment that it will use to manage and monitor the 6.7-acre conservation area (Table 1).

Table 1. Endowment Contribution for the Lewis Tank Replacement Project

Project Component	**Habitat Impacts**	**Area of Impact**		**Mitigation Ratio**	**Area of Mitigation**		**Endowment Contribution**	
		Area (ac)	Area (ft^2)		Area (ac)	Area (ft^2)	Per Square Foot	Total
Lewis Tank Replacement	Permanent	0.17	7,262.98	3:1	0.51	21,788.94	$3.29	$71,685.61
Temporary Tank	Temporary	0.11	4,802.00	1:1	0.11	4,802.00	$3.29	$15,798.58
Staging/Construction Easement	Temporary	0.05	2,259.70	1:1	0.05	2,259.70	$3.29	$7,434.41
TOTAL		**0.33**	**14,324.68**		**0.67**	**28,850.64**		**$94,918.61**

RM 3. Following completion of the project, the District will restore the estimated 0.08-acre area of temporary disturbance that is outside of the existing fence line and access road, at the Lewis tank site. Restoration activities will occur for three years, to enable native plant regeneration to occur. The restoration is anticipated to include dispersal of any site-collected Ben Lomond spineflower seed and salvaged topsoil (A&MM 3 and 5) into the non-road portions of the temporary disturbance area.

The District will work with a qualified biologist to develop a more detailed proposal for review by the Service that outlines the specific habitat restoration and monitoring activities. The proposal will also include updating the Sandhills Projects database that the District created to help the Service and others track Sandhills conservation and mitigation projects, to include this and other sandhills conservation and mitigation projects that have been conducted since the database was created and submitted to the Service in 2014.

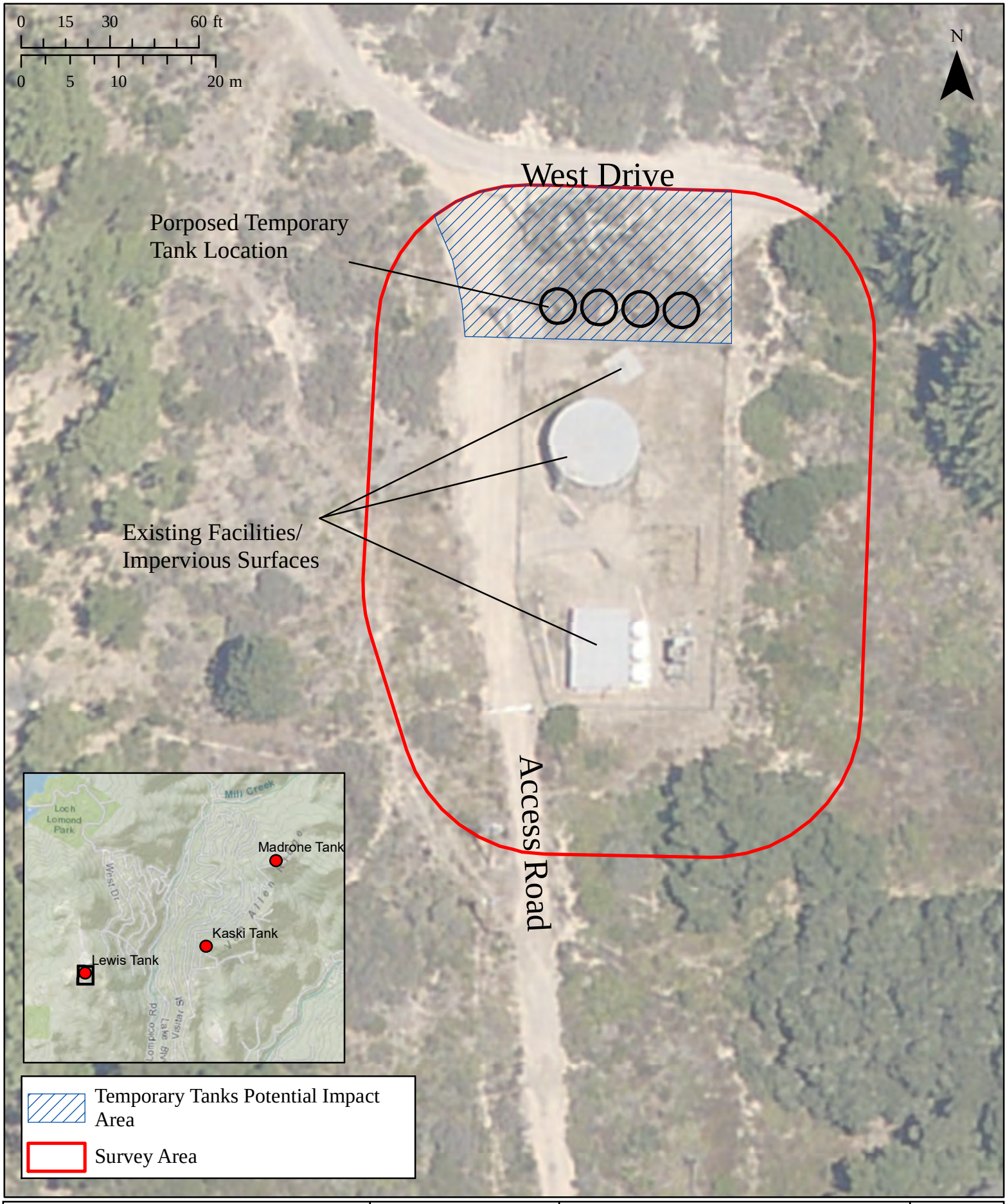
It is our professional opinion that implementation of these measures would minimize potential impacts to MHJB and Ben Lomond spineflower.

REFERENCES

McGraw Consulting. 2016. Biological Assessment for Lewis Tank #1, near 10011 West Drive Felton, CA (APNs: 075-311-06)

McGraw Consulting. 2017. Low-Effect Habitat Conservation Plan for the San Lorenzo Valley Water District's Probation Tank Replacement Project.

San Lorenzo Valley Water District. 2017. Final Mitigated Negative Declaration and Response to Comments Received Probation Tank Replacement Project.



Lewis Tank Survey Area

Date: 6/27/2019
Scale: 1 in = 40 ft
Project: 2018.62

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341

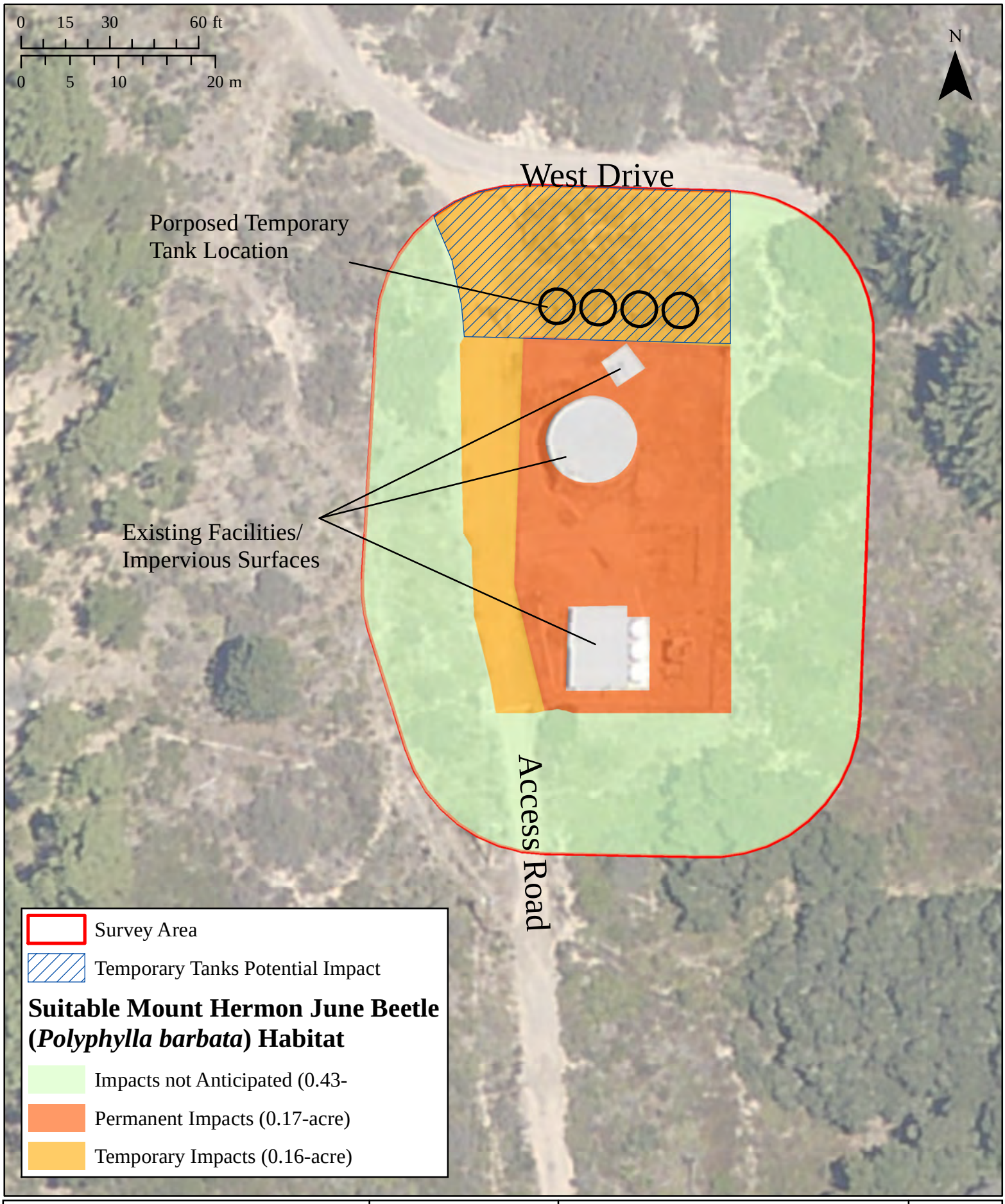
Figure 1

Lewis Tank Site Vegetation Map

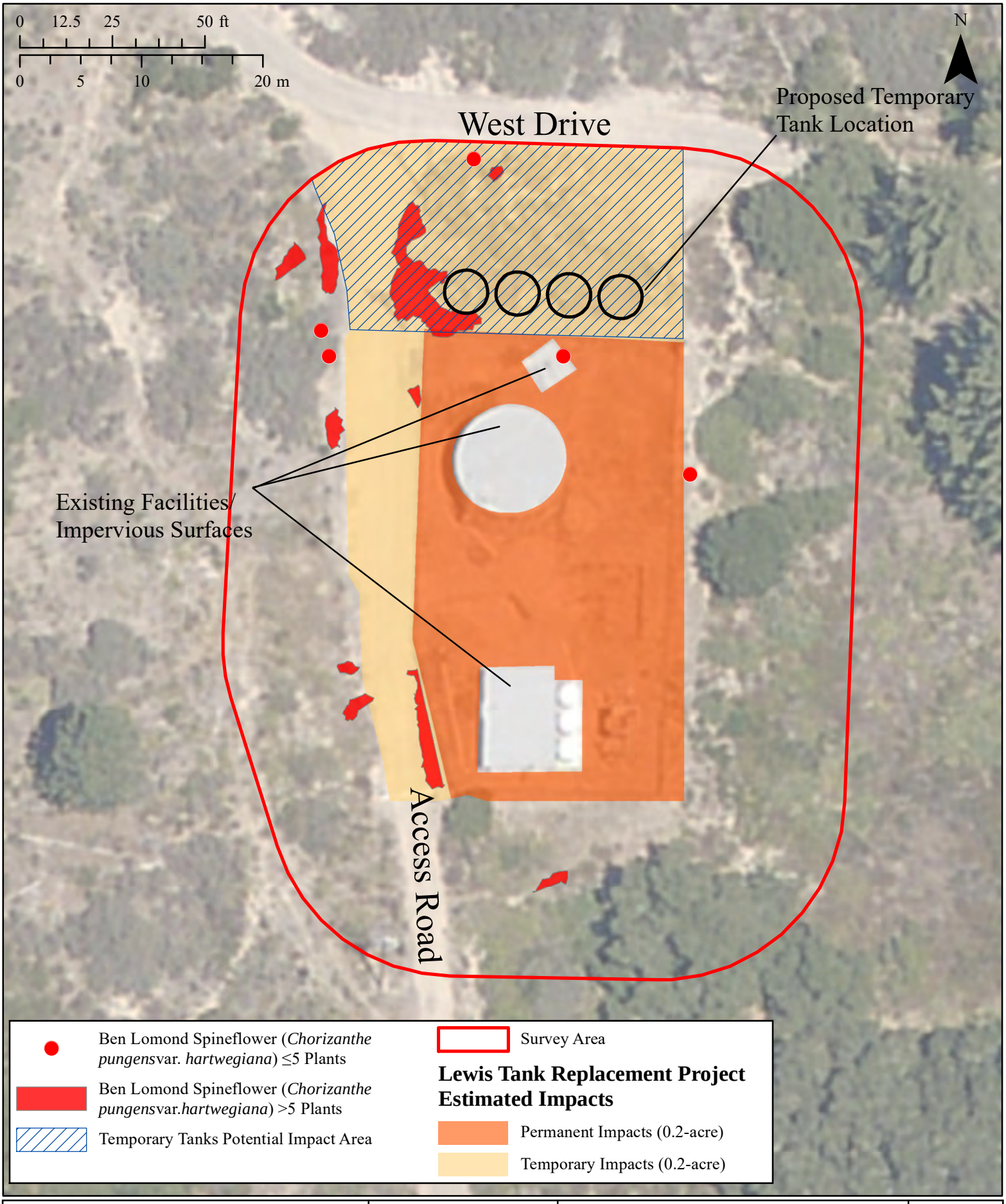
Date: 6/28/2019
Scale: 1 in = 40 ft
Project: 2018.62

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341

Figure 2



Potential Impacts to Suitable Mount Hermon June Beetle Habitat	Date: 7/9/2019 Scale: 1 in = 40 ft Project: 2018.62	Monterey | San Jose **Denise Duffy and Associates, Inc.** Environmental Consultants Resource Planners 947 Cass Street, Suite 5 Monterey, CA 93940 (831) 373-4341	Figure 3



Ben Lomond Spineflower Lewis Tank Site

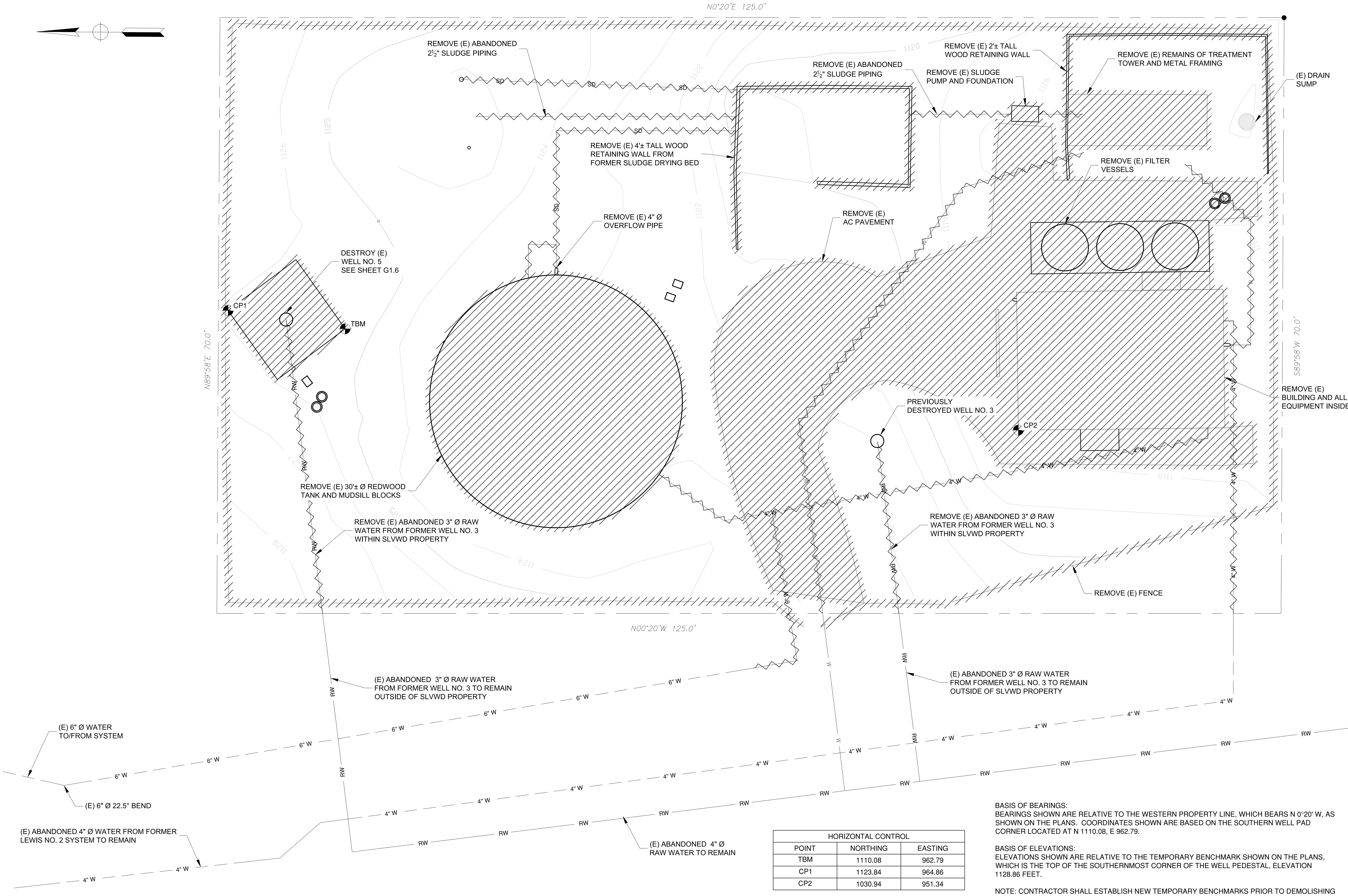
Date: 6/28/2019
Scale: 1 in = 30 ft
Project: 2018.62

Monterey | San Jose
Denise Duffy and Associates, Inc.
Environmental Consultants Resource Planners
947 Cass Street, Suite 5
Monterey, CA 93940
(831) 373-4341

Figure 4

Attachment A.

Lewis Tank Site Plans



HORIZONTAL CONTROL		
POINT	NORTHING	EASTING
TBM	1110.08	962.79
CP1	1123.84	964.86
CP2	1030.94	951.34

BASIS OF BEARINGS:
BEARINGS SHOWN ARE RELATIVE TO THE WESTERN PROPERTY LINE, WHICH BEARS N 0°20' W, AS SHOWN ON THE PLANS. COORDINATES SHOWN ARE BASED ON THE SOUTHERN WELL PAD CORNER LOCATED AT N 1110.08, E 962.79.

BASIS OF ELEVATIONS:
ELEVATIONS SHOWN ARE RELATIVE TO THE TEMPORARY BENCHMARK SHOWN ON THE PLANS, WHICH IS THE TOP OF THE SOUTHERNMOST CORNER OF THE WELL PEDESTAL, ELEVATION 1128.86 FEET.

NOTE: CONTRACTOR SHALL ESTABLISH NEW TEMPORARY BENCHMARKS PRIOR TO DEMOLISHING EXISTING TEMPORARY BENCHMARKS.

PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

LEWIS
SITE DEMOLITION PLAN
LOMPICO TANKS REPLACEMENT

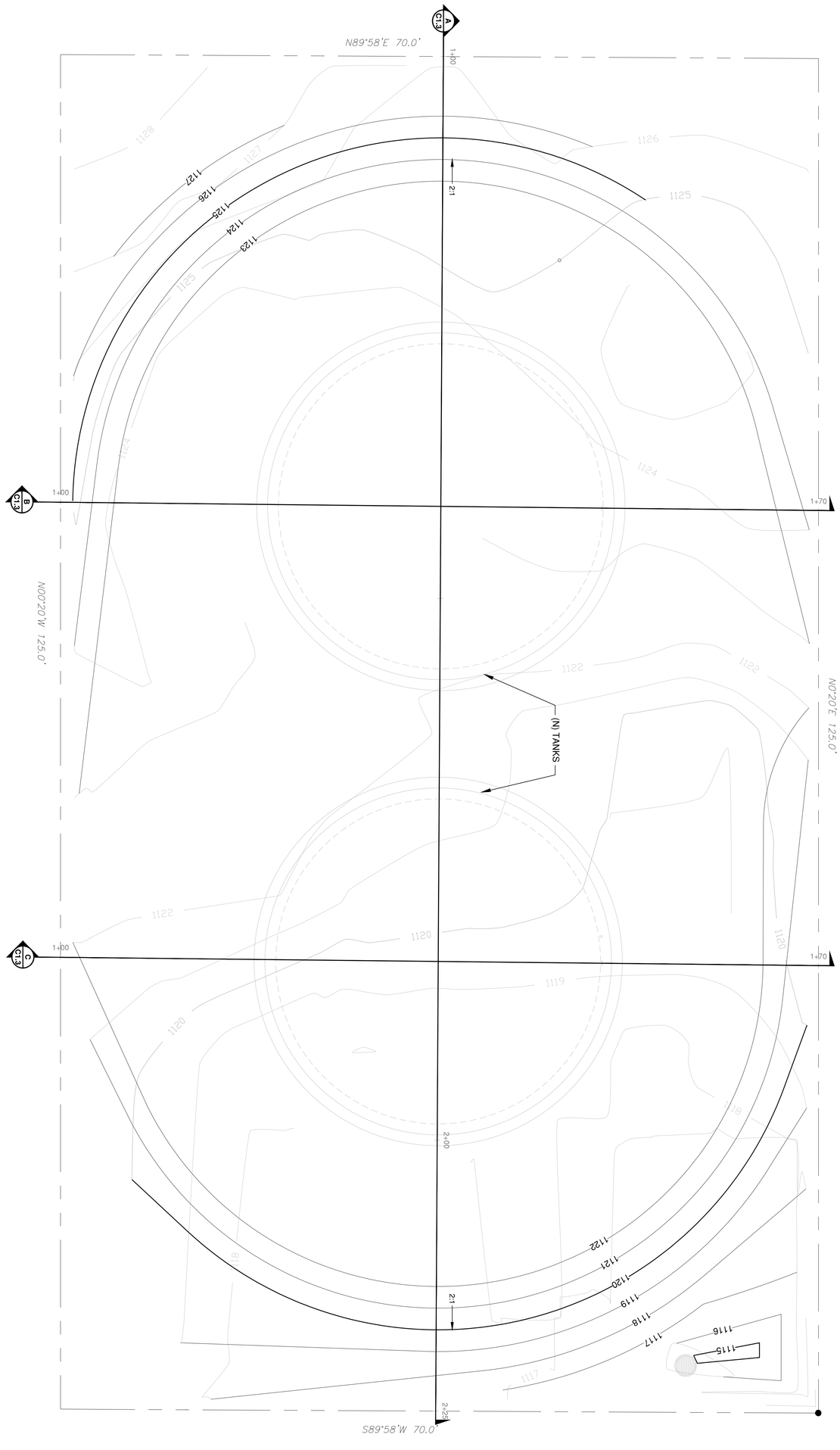
SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=5'
SUBMITTAL: 60% SUBMITTAL

C1.1
SHEET 10 OF 25

PRELIMINARY - NOT FOR CONSTRUCTION



0 5 10
SCALE IN FEET

DESIGNED BY:	CJM	DATE:	05/29/2019
DRAWN BY:	CJM	DATE:	05/29/2019
QC CHECKED BY:	AAS	DATE:	05/29/2019
PROJECT NO.:			
SCALE:	1"=5'		
SUBMITTAL:	60% SUBMITTAL		

SHEET 11 OF 25
C1.2

San Lorenzo Valley WATER DISTRICT

LEWIS
SITE GRADING PLAN

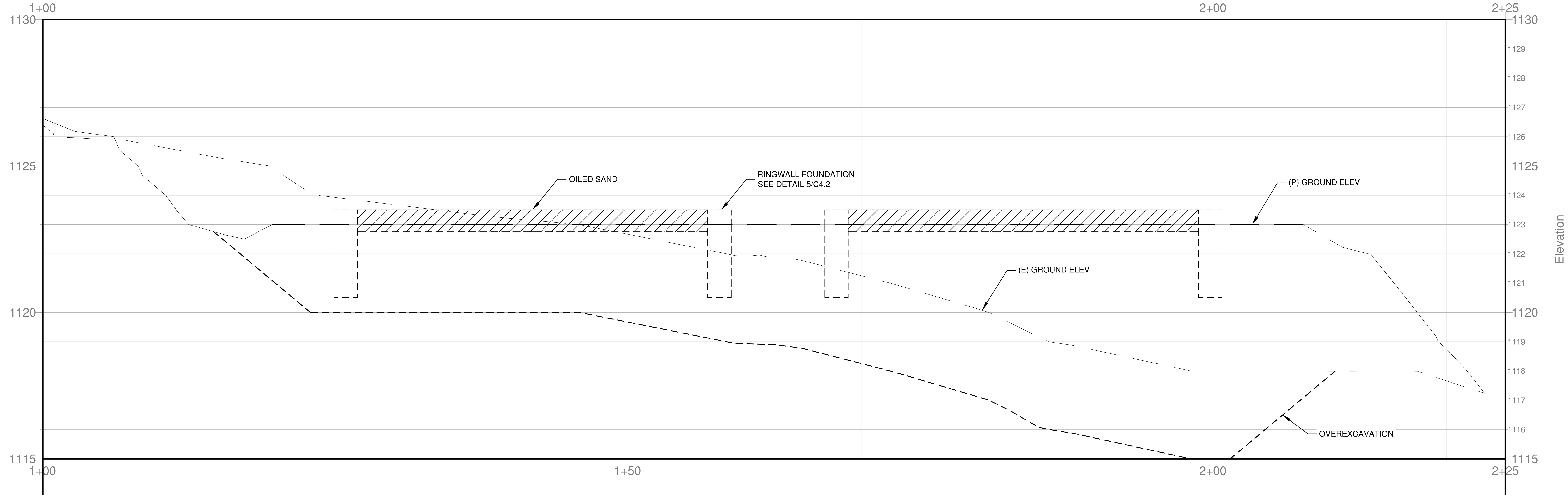
LOMPICO TANKS REPLACEMENT

SLVWD NO. _____

REGISTERED PROFESSIONAL ENGINEER
ANDREW A. STERGULZ
No. 68703
CIVIL
STATE OF CALIFORNIA
PRELIMINARY NOT FOR CONSTRUCTION

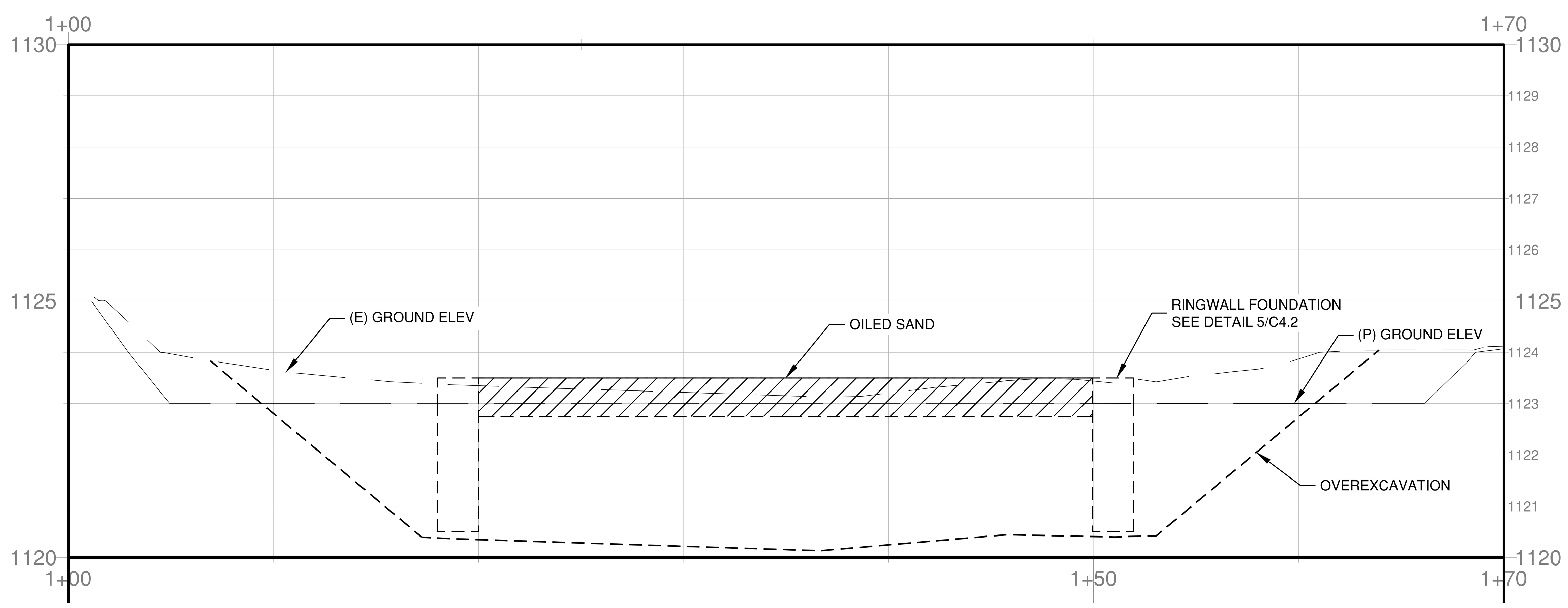
Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			



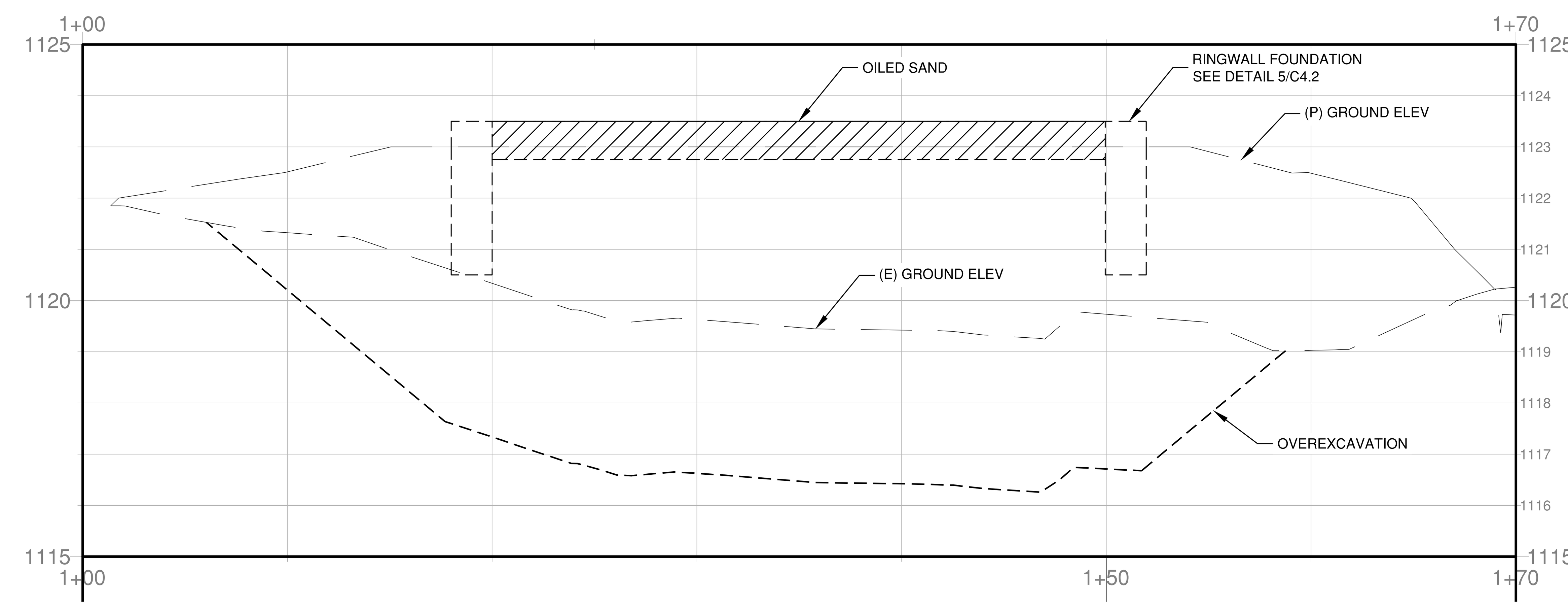
SECTION A

HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION B

HORIZONTAL 1"=5'
VERTICAL 1"=2'



SECTION C

HORIZONTAL 1"=5'
VERTICAL 1"=2'

NOTES:
OVEREXCAVATE AND RECOMPACT EXISTING SUBGRADE PER GEOTECH REPORT. LIMIT OF OVER-EXCAVATION IS NOMINALLY 3-FEET, SUBJECT TO FIELD APPROVAL BY THE GEOTECHNICAL ENGINEER, OR WHERE SANDSTONE/SILTSTONE IS ENCOUNTERED.

0 5 10
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

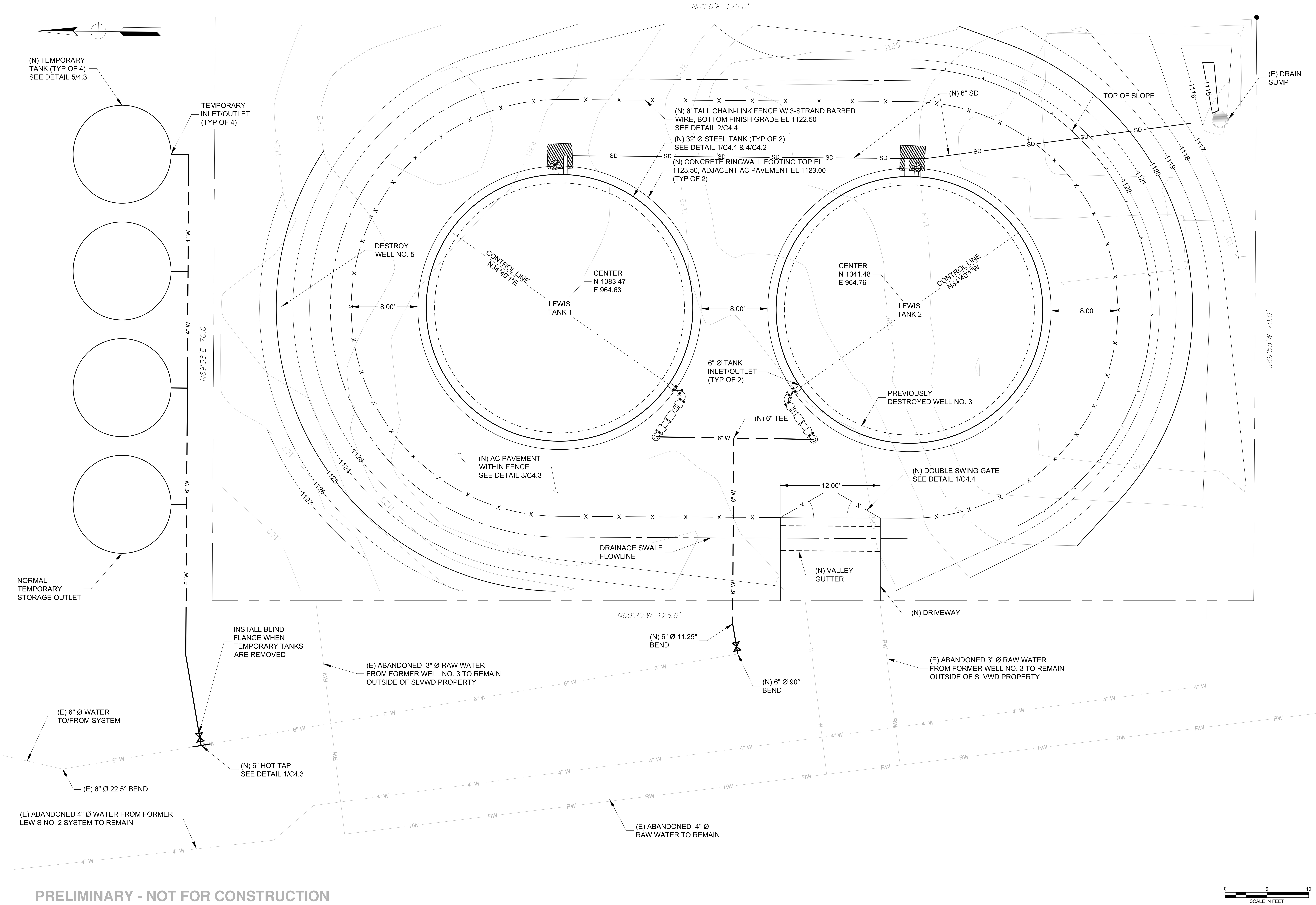
REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

LEWIS
SITE GRADING SECTIONS
LOMPICO TANKS REPLACEMENT
SLVWD NO. ____

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: AS SHOWN
SUBMITTAL: 60% SUBMITTAL

C1.3


N0°20'E 125.0'
N00°20'W 125.0'
N89°58'E 70.0'
S89°58'W 70.0'
(N) TEMPORARY TANK (TYP OF 4) SEE DETAIL 5/4.3
TEMPORARY INLET/OUTLET (TYP OF 4)
NORMAL TEMPORARY STORAGE OUTLET
(N) 6' TALL CHAIN-LINK FENCE W/ 3-STRAND BARBED WIRE, BOTTOM FINISH GRADE EL 1122.50 SEE DETAIL 2/C4.4
(N) 32' Ø STEEL TANK (TYP OF 2) SEE DETAIL 1/C4.1 & 4/C4.2
(N) CONCRETE RINGWALL FOOTING TOP EL 1123.50, ADJACENT AC PAVEMENT EL 1123.00 (TYP OF 2)
(N) 6" SD
TOP OF SLOPE
(E) DRAIN SUMP
DESTROY WELL NO. 5
CONTROL LINE N34°40'1"E
CENTER N 1083.47 E 964.63
LEWIS TANK 1
CENTER N 1041.48 E 964.76
CONTROL LINE N34°40'1"W
LEWIS TANK 2
8.00'
8.00'
8.00'
6" Ø TANK INLET/OUTLET (TYP OF 2)
PREVIOUSLY DESTROYED WELL NO. 3
(N) 6" TEE
(N) AC PAVEMENT WITHIN FENCE SEE DETAIL 3/C4.3
12.00'
(N) DOUBLE SWING GATE SEE DETAIL 1/C4.4
DRAINAGE SWALE FLOWLINE
(N) VALLEY GUTTER
(N) DRIVEWAY
INSTALL BLIND FLANGE WHEN TEMPORARY TANKS ARE REMOVED
(N) 6" Ø 11.25° BEND
(N) 6" Ø 90° BEND
(E) ABANDONED 3" Ø RAW WATER FROM FORMER WELL NO. 3 TO REMAIN OUTSIDE OF SLVWD PROPERTY
(E) ABANDONED 3" Ø RAW WATER FROM FORMER WELL NO. 3 TO REMAIN OUTSIDE OF SLVWD PROPERTY
(E) 6" Ø WATER TO/FROM SYSTEM
(N) 6" HOT TAP SEE DETAIL 1/C4.3
(E) 6" Ø 22.5° BEND
(E) ABANDONED 4" Ø WATER FROM FORMER LEWIS NO. 2 SYSTEM TO REMAIN
(E) ABANDONED 4" Ø RAW WATER TO REMAIN
SCALE IN FEET
PRELIMINARY - NOT FOR CONSTRUCTION

REV. NO. | DESCRIPTION | BY | DATE

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

LEWIS
SITE IMPROVEMENT PLAN
LOMPICO TANKS REPLACEMENT
SLVWD NO. ______

San Lorenzo Valley WATER DISTRICT

DESIGNED BY: CJM DATE: 05/29/2019
DRAWN BY: CJM DATE: 05/29/2019
QC CHECKED BY: AAS DATE: 05/29/2019
PROJECT NO.:
SCALE: 1"=5'
SUBMITTAL: 60% SUBMITTAL

C1.4
SHEET 13 OF 25

Attachment B.

Biological Assessment for Lewis Tank #1, near 10011 West Drive Felton, CA (APNs: 075-311-06)

Jodi McGraw Consulting
www.jodimcgrawconsulting.com
PO Box 221 • Freedom, CA • 95019
phone/fax: (831) 768-6988
jodi@jodimcgrawconsulting.com

December 9, 2016

Jen Michelsen
Environmental Programs Manager
San Lorenzo Valley Water District
13060 CA-9
Boulder Creek, CA 95006

RE: Biological Assessment for Lewis Tank #1, near 10011 West Drive Felton, CA (APNs: 075-311-06)

Dear Ms. Michelsen:

I am writing to provide you with a report of my assessment of the habitat within and adjacent to the San Lorenzo Valley Water District's Lewis Tank #1 site, located in County of Santa Cruz Assessor's parcel 075-311-06 (0.20 acres). The parcel lacks a *situs* address but is just east of 10011 West Drive in Felton, CA.

Purpose

I understand that the District is evaluating replacing the existing 100,000-gallon water tank, which is leaking, with either 2 new 100,000 gallon tanks, or 1 new 200,000-gallon tank. As part of this infrastructure project, the District is also evaluating abandoning the on-site wells, and removing a sediment basin, aerator tower, and adjacent water tanks, though the shed will remain.

The purpose of my assessment was to evaluate whether the proposed parcel features habitat for, or occurrences of, special status plants and animals including: Ben Lomond spineflower (*Chorizanthe pungens* var. *pungens*), Santa Cruz wallflower (*Erysimum teretifolium*), silverleaf manzanita (*Arctostaphylos silvicola*), Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*), Mount Hermon June Beetle (*Polyphylla barbata*) or the Zayante Band-Winged Grasshopper (*Trimerotropis infantilis*). These species occur within Sandhills communities found on Zayante coarse sand soil in central Santa Cruz County (McGraw 2004).

Existing Development and Land Use

The 0.2-acre parcel features water supply infrastructure including a 100,000-gallon tank, two wells, a shed, and water treatment infrastructure including a sediment basin, aerator tower, and adjacent water tanks. The driveway to the parcel is located 130 feet south of West Road along a graveled, unnamed access road, which would be used to access the parcel during the proposed project.

Soils

The parcel is mapped by the Soil Conservation Service as featuring Zayante soils on 5 to 30% slopes. These soils are poorly developed, deep, coarse, sand soils derived from the weathering of uplifted marine sediments and sandstones (USDA 1980). The soil I observed in the parcel was a relatively loose medium gray brown sand or loamy sand soil characteristic of Zayante soil in transitional areas, where they occur in close proximity to non-

Zayante soil. Relative to intact habitat, the soil is very compacted, perhaps as a result of efforts to level the site and install the infrastructure. Throughout the parcel, there are patches of non-native rock (e.g. drain rock), wood chips, asphalt, and concrete, brought into the site during prior infrastructure improvements and site maintenance projects.

Vegetation

The parcel features habitat that could be characterized a cleared northern maritime chaparral. Naturally occurring plant species were removed as part of work to install the infrastructure, and based on the structure and plant species composition in the area, the vegetation appears to be mowed or otherwise cleared on a regular basis.

As a result, the site is dominated by herbaceous plants including primarily exotic annual grasses and forbs including redstem filaree (*Erodium cicutarium*), rattail fescue (*Festuca myuros*), smooth cat's ears (*Hypochaeris glabra*), and ripgut brome (*Bromus diandrus*). However, native plant species occur patchily and at low abundance, and including several shrubs found in the silverleaf manzanita chaparral—a plant community found within the Sandhills ecosystem on Zayante soils in central Santa Cruz County (McGraw 2004), which occurs on the adjacent parcels to the west and north. Shrubs within the site include deer weed (*Acmispon glaber*), silver bush lupine (*Lupinus albifrons* var. *albifrons*), and yerba santa (*Eriodictyon californicum*).

The area west of the gravel road that would be used to access the site during construction features silverleaf manzanita chaparral also includes silverleaf manzanita (*Arctostaphylos silvicola*), Santa Cruz Mountains manzanita (*Arctostaphylos crinita* ssp. *crinita*), and chamise (*Adenostoma fasciculatum*).

Special-Status Plants

During my assessment, I did not observe any of the special-status plant species within the parcel, though as noted, silverleaf manzanita occurs on the adjacent parcel to the west. Endemic to the Santa Cruz Sandhills, this shrub is listed as State Rank 1B.1, which is for plants that are the most rare and endangered in California and elsewhere" (CNPS 2015). Zayante soils provide suitable habitat for Ben Lomond spineflower, which has the potential to occur in areas of less dense herbaceous plant cover which occur patchily within the parcel, as well as along the western margin of the gravel access road. A more comprehensive survey of the site and proposed access and staging areas should be conducted during the flowering season (April-June) to evaluate whether presence this or other special-status plants including Ben Lomond wallflower and Ben Lomond buckwheat could be impacted by the project. The latter two perennial plants were not observed during the late fall assessment, and are therefore unlikely to occur on the property or access road.

Special-Status Animals

Mount Hermon June Beetle

Other than in the areas covered by impervious surfaces, including the tank, shed, and other infrastructure, the project parcel and access road have the potential to support the Mount Hermon June beetle—an insect that feeds as a fossorial larva on plant roots and associated mycorrhizae, and then emerges as an adult in late spring and summer to mate. Mount Hermon June beetle occurs in areas with Zayante soils that feature a variety of vegetation, including silverleaf manzanita chaparral, sand parkland, and ponderosa pine forest, as well as areas that have been landscaped and feature ornamental vegetation. Perhaps because it lives 99% of its life belowground, the Mount Hermon June beetle has been found within developed areas and other areas

impacted by human uses, including mowed areas subject to recreation and denuded areas, such as vehicle turnouts along roads. Though the drain rock/decomposed gravel, and wood chips degrade habitat for the fossorial insect, these areas may still be occupied as they soil coverings are not completely impervious. The Mount Hermon June beetle has been observed just west of the subject parcel (USFWS 2009).

Zayante Band-Winged Grasshopper

The property does not provide suitable habitat for the Zayante band-winged grasshopper—an insect that requires open sunlit, sparsely vegetated areas within largely intact sand parkland habitat. The dense chaparral and forest surrounding the parcel is not suitable. Although the tank parcel has been cleared, the small grasshopper, which flies only short distances, would be highly unlikely to colonize the area. The nearest population of the Zayante band-winged grasshopper is located approximately 1.1 miles south within the Quail Hollow Ecological Reserve (USFWS 2009).

Implications

Although degraded by prior use for as a water treatment and storage facility, the subject parcel supports sensitive communities and species of the Santa Cruz Sandhills. Development of Sandhills habitat is regulated by local, state, and federal statutes. The County of Santa Cruz Sensitive Habitat Ordinance protects Sandhills communities, including silverleaf manzanita chaparral, and habitats for rare species including the Mount Hermon June beetle. The ordinance requires that disturbance of sensitive habitat and rare species be avoided; where it cannot be avoided, it must be minimized and mitigated. As a special district, the San Lorenzo Valley Water District is exempt from County zoning and planning regulations related to facilities for the storage or transmission of water (M. Johnston, pers. comm. 2015).

The federal Endangered Species Act protects federally-endangered species, including the Mount Hermon June beetle, Zayante band-winged grasshopper, Ben Lomond spineflower, and Ben Lomond wallflower. The federal Endangered Species Act makes it illegal to 'take' (kill, harm, harass, etc.) endangered animals including the Mount Hermon June beetle and Zayante band-winged grasshopper. However, the U.S. Fish and Wildlife Service (USFWS), which administers the Act, can permit take of the endangered insect that might occur incidentally during otherwise lawful projects, such as public infrastructure projects, by issuing what is known as an 'incidental take permit' (ITP).

To receive a federal ITP, project proponents must complete a Habitat Conservation Plan (HCP), which outlines how they will mitigate the project's negative effects on the endangered species. Mitigation must include steps to avoid, minimize, and repair impacts at the project site, as well as efforts to compensate for them by benefiting similar habitat elsewhere. The mitigation provided in the HCP can often also satisfy requirements of the County's Sensitive Habitat Ordinance, when necessary.

As you are aware, the District has recently submitted an HCP to replace another leaking water tank in Sandhills habitat. As one of two alternate forms of mitigation, the HCP proposes that the District set aside 5.5 acres of habitat at the Olympia Wellfield to mitigate the impacts of that project. Assuming that the current HCP is approved and the District opts to establish the habitat set aside, an HCP for the Lewis Tank Replacement Project could utilize a portion of the remaining 4.5 acres of habitat protected and managed within the site to offset the impacts of the Lewis Tank replacement.

This information is provided to aid evaluation of your proposed project. I recommend that you discuss project permitting requirements with the USFWS, which administers the Endangered Species Act, and the County of

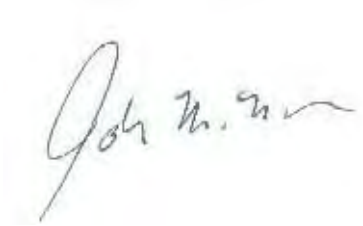
Santa Cruz Planning Department, which administers the Sensitive Habitat Ordinance and is otherwise responsible for local land use permitting. The following contact information for agency personnel knowledgeable about the local and federal regulations is provided to assist you.

Contact information for agency representatives knowledgeable about regulations influencing development of Sandhills habitat

U.S. Fish and Wildlife Service	**County of Santa Cruz**
Chad Mitcham	Matt Johnston
Deputy Assistant Field Supervisor	Environmental Coordinator
US Fish and Wildlife Service	County of Santa Cruz
2493 Portola Road, Suite B	701 Ocean Street
Ventura, CA 93003	Santa Cruz, CA 95060
(831) 768-7794	(831) 454-3114
Chad_Mitcham@fws.gov	PLN458@co.santa-cruz.ca.us

I hope you will not hesitate to contact me if you have any questions or if I can assist you further.

Sincerely,



Jodi M. McGraw

e-cc: Rick Rogers, Director of Operations

References

California Native Plant Society. 2015. Inventory of rare and endangered plants of California. Sacramento, CA. Accessed on-line at: http://www.rareplants.cnps.org/

McGraw, J. M. 2004. Sandhills conservation and management plan: a strategy for preserving native biodiversity in the Santa Cruz Sandhills. Report submitted to the Land Trust of Santa Cruz County, Santa Cruz, CA.

Johnston, M. 2015. E-mail from County of Santa Cruz Environmental Coordinator regarding the San Lorenzo Valley Water District's Probation Tank Replacement Project. Sent to Rodney Cahill, Mesiti-Miller Engineering. February 11, 2015.

U.S. Department of Agriculture. 1980. Soil Survey of Santa Cruz County. Soil Conservation Service, United States Department of Agriculture and University of California.

U.S. Fish and Wildlife Service. 2009. Zayante band-winged grasshopper and Mount Hermon June beetle five-year review. US Fish and Wildlife Service. August 2009.

APPENDIX F

EMAIL RESPONSE FROM THE UNITED STATES FISH AND WILDLIFE SERVICE REGARDING ESA COMPLIANCE AT LEWIS TANK

From:	Mitcham, Chad
To:	Jen Michelsen
Cc:	Jodi McGraw; Matt Johnson; Leilani Takano; Rick Rogers; James Furtado; Darren Langfield
Subject:	Re: [EXTERNAL] SLVWD Lompico Tanks Replacement Project
Date:	Monday, July 15, 2019 4:22:51 PM

Jen,

We have received your request for authorization to conduct emergency replacement of the San Lorenzo Valley Water District's (Water District) Lewis Tank in Santa Cruz County, California. We understand that the Water District has determined this project is necessary to ensure continued water supply for residents that are served by the Lewis Tank. Tank replacement would occur within suitable habitat for the Mount Hermon June beetle (*Polyphylla barbata*) and Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*).

The Water District would conduct the tank replacement project at the earliest opportunity and has proposed measures (see letter dated July 9, 2019) to minimize effects to sensitive species in the project area, which include but are not limited to: having a qualified biologist onsite during all ground disturbing activities, collection and reseeding of Ben Lomond spineflower seed within a 0.08-acre area, covering open soil with impervious materials if ground disturbing activities are conducted within the flight season of the Mount Hermon June beetle, and setting aside and funding management of 0.67-acre of habitat for the Mount Hermon June beetle and Ben Lomond spineflower within the 6.7-acre conservation area at the Olympia Wellfield. We acknowledge that the Water District has determined the tank replacement project to be an emergency and is proposing measures to offset impacts to sensitive species. Within 60 days of project completion, we request that you provide the Service with a summary report of activities conducted as well as any observed take resulting from project activities.

We endeavor to work with partners such as the Water District to ensure priority projects are able to move forward with little delay. As such, we highly anticipate, by December 2019, receipt of an application and draft Habitat Conservation Plan (HCP) for all activities that the Water District may need to implement for the foreseeable future. An HCP would provide the Water District incidental take coverage under the federal Endangered Species Act as well as provide a well-planned conservation plan for the species on Water District land. Thank you for your coordination on this project, and please contact me if you have any questions.

Sincerely,

Chad Mitcham
Fish & Wildlife Biologist

U.S. Fish & Wildlife Service
VFWO, Santa Cruz sub-office
1100 Fiesta Way
Watsonville, CA 95076
(805) 677-3328

On Tue, Jul 9, 2019 at 11:51 AM Jen Michelsen <jmichelsen@slvwd.com> wrote:

> Dear Chad,
>
> The San Lorenzo Valley Water District is working to replace old, leaking redwood tanks that serve the Lompico Community. One of those tanks, called the Lewis Tank, is located within suitable habitat for the Mount Hermon June Beetle. We met by teleconference on June 3, 2019 to discuss the Lewis Tank Replacement Project as an emergency project. On June 12th the Lewis tank began to leak excessively. SLVWD employed divers to repair the tank, however SLVWD has determined that the tank will soon fail. To ensure water storage and availability for the residents that rely on the Lompico Tanks infrastructure (which includes Lewis tank), SLVWD proposes to install temporary storage tanks at the Lewis Tank site and proceed with the replacement project as soon as possible.
>
> The attached memo describes the Lompico Tanks Replacement Project including: the temporary tank placement alternatives, temporary and permanent impacts resulting from the temporary tanks and the construction to replace the Lewis Tank as well as minimization & mitigation measures and restoration measures to be implemented for the temporary tanks, during construction and following construction.
>
> Emergency Permit: Due to the risk of failure of the Lewis Tank, we would like to request an emergency permit to install the temporary tanks and proceed with the replacement of the Lewis tank as soon as possible.
>
> Sandhills HCP: The District is also working toward proposing a programmatic permit for other upcoming infrastructure replacement & maintenance projects that exist in sandhills habitat. The District is currently in contract with McGraw Consulting who is working to prepare a draft Habitat Conservation Plan for the projects and will be coordinating with USFWS on that effort. We anticipate the the HCP will be available for review by the USFWS in December 2019.
>
> Sandhills Database: Additionally, the District will work with McGraw Consulting to update the Sandhills Projects Database that McGraw Consulting created on behalf of the District to help the Service track Sandhills conservation and mitigation projects. The Service has requested that the District update the database for each project such as this, so that the Service has a spatial record of where projects and the associated mitigation have occurred.
>
> We appreciate your assistance with this process and we look forward to future collaborative efforts with you to protect natural resources in the San Lorenzo Valley. If you have any questions or concerns please

feel free to contact me or the other staff at the District, Darren Langfield - District Engineer, Rick Rogers - District Manager or our consultants Matt Johnson or Jodi McGraw copied here to discuss the project(s).

Sincerely,

Jen Michelsen

Jen Michelsen
Environmental Programs Manager
San Lorenzo Valley Water District
(831) 430-4627
Jmichelsen@slvwd.com

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Appendix B

Geotechnical Investigation

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GEOTECHNICAL INVESTIGATION

KASKI, MADRONE & LEWIS TANK SITES
SANTA CRUZ COUNTY, CALIFORNIA

FOR
SCHAAF AND WHEELER CONSULTING CIVIL ENGINEERS
SALINAS, CALIFORNIA

Pacific Crest
ENGINEERING INC

CONSULTING GEOTECHNICAL ENGINEERS

Project No. 1886-SZ25-D61
DECEMBER 2018
www.4pacific-crest.com

December 10, 2018 Project No. 1886-SZ25-D61

Andrew A. Sterbenz, PE
Senior Project Manager
Schaaf and Wheeler Consulting Civil Engineers
3 Quail Run Circle, Ste. 101
Salinas, CA 93907

Subject: **Geotechnical Investigation – Design Phase**
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

Dear Mr. Sterbenz,

In accordance with your authorization, we have performed a geotechnical investigation for the Kaski, Madrone and Lewis tank sites in Santa Cruz County, California.

The accompanying report presents our findings, conclusions and recommendations for the subject sites. If you have any questions concerning the information presented in this report, please contact our office.

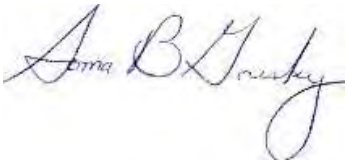
Very truly yours,

PACIFIC CREST ENGINEERING INC.

Prepared by:

Michael Luciano
Staff Geologist

Reviewed by:



Soma Goresky
Associate Engineer
GE 2252
Expires 6/30/19

Copies: 3 to Client

TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION REPORT
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

I. INTRODUCTION

PURPOSE AND SCOPE

This report describes the geotechnical investigation and presents our conclusions and recommendations for the Kaski, Madrone and Lewis tank sites located in Santa Cruz County, California.

Our scope of services for this project has consisted of:

1. Site reconnaissance to observe the existing conditions.

2. Review of the following published maps:
   - Geologic Map of Santa Cruz County, California, Brabb, 1997.
   - Preliminary Map of Landslide Deposits in Santa Cruz County, California, Cooper-Clark and Associates, 1975.
   - Map Showing Geology and Liquefaction Potential of Quaternary Deposits in Santa Cruz County, California, Dupré, 1975.
   - Map Showing Faults and Their Potential Hazards in Santa Cruz County, California, Hall, Sarna-Wojcicki, Dupré, 1974.
   - U.S. Geological Survey (and the California Geologic Survey), 2018, Quaternary fault and fold database for the United States, accessed July 2018, from USGS web site: http//earthquake.usgs.gov/hazards/qfaults/.

3. The drilling and logging of 4 test borings.

4. Laboratory analysis of retrieved soil samples.

5. Engineering analysis of the field and laboratory test results.

6. Preparation of this report documenting our investigation and presenting geotechnical recommendations for the design and construction of the project.

PROJECT LOCATION

The Kaski tank site is located approximately 750 feet northwest of the terminus of Tromba Road in Santa Cruz County, California. Please refer to the Regional Site Map, Figure No. 1, in Appendix A for the general vicinity of the project site, which is located by the following coordinates:

Latitude = 37.100815 degrees
Longitude = -122.048085 degrees

The Madrone tank site is located approximately 650 feet northeast of the intersection of Madrone Avenue and Whilaway Avenue in Santa Cruz County, California. Please refer to the Regional Site Map, Figure No. 1, in Appendix A for the general vicinity of the project site, which is located by the following coordinates:

Latitude = 37.107335 degrees
Longitude = -122.041717 degrees

The Lewis tank site is located approximately 1200 feet southwest of the intersection of Vera Ave and West Drive in Santa Cruz County, California. Please refer to the Regional Site Map, Figure No. 1, in Appendix A for the general vicinity of the project site, which is located by the following coordinates:

Latitude = 37.098421 degrees
Longitude = -122.059068 degrees

PROPOSED IMPROVEMENTS

The Kaski and Madrone sites are currently occupied by two 60,000-gallon redwood water storage tanks. The Lewis site is currently occupied by one 100,000-gallon water storage tank. It is our understanding that all of these tanks are to be replaced by steel bolted tanks of similar volume, over essentially the same footprints. The Lewis site will likely install two tanks as part of the upgrade.

The purpose of our investigation was to characterize the subsurface conditions around the tank sites, in order to assess geotechnical impacts and develop geotechnical recommendations for the design and construction of the new tanks.

A previous geotechnical investigation was performed for the three sites by Haro Kasunich & Associates (Project SC10325, dated 9/27/12). Our present work is intended to supplement the data obtained in that report and provide revised geotechnical recommendations for the proposed project.

II. INVESTIGATION METHODS

FIELD INVESTIGATION

Four, 6-inch diameter test borings were drilled at the tank sites on October 10, 2018. The approximate locations of the test borings are shown, for each tank site, on Figures No. 2, 3 and 4, in Appendix A. The drilling method used was a limited access "minuteman" drilling rig. A geologist from Pacific Crest Engineering Inc. was present during the drilling operations to log the soil encountered and to choose sampler type and locations.

Relatively undisturbed soil samples were obtained at various depths by driving a split spoon sampler 24 inches into the ground. This was achieved by dropping a 140 pound hammer a vertical height of 30 inches. The number of blows required to drive the sampler each 6-inch increment and the total number of blows required to drive the last 12 inches was recorded by the geologist. The outside diameter of the samplers was 3, 2½ or 2 inches and is designated on the Boring Logs as "L", "M" or "T", respectively.

The field blow counts in 6-inch increments are reported on the Boring Logs adjacent to each sample. The field blow count data has been normalized to a 2-inch O.D. sampler. The normalization method used was derived from the second edition of the Foundation Engineering Handbook (H.Y. Fang, 1991). The method utilizes a Sampler Hammer Ratio which is dependent on the weight of the hammer, height of hammer drop, outside diameter of sampler, and inside diameter of sampler.

The limited access drill is equipped with a 140-pound safety hammer on a cathead and a rope and pully system which has an energy efficiency roughly equivalent to the 60% standard (the N_{60} standard is based on a cathead and rope system). Therefore, we did not apply an energy correction to the field measured blow counts performed. We note that no drilling was performed between samples, so the second drive of the same sampler does not represent standard penetration blow count.

The soils encountered in the borings were continuously logged in the field and visually described in accordance with the Unified Soil Classification System (ASTM D2488) as described in the Boring Log Explanation, Figures No. 6 and 7, in Appendix A. The soil classification was verified upon completion of laboratory testing in accordance with ASTM D2487.

Appendix A contains our boring logs and an explanation of the soil classification system used. Stratification lines on the boring logs are approximate as the actual transition between soil types may be gradual.

HKA (2012) drilled eight borings spread over the three tanks sites, using both a limited access and a truck mounted rig. Consequently, their borings penetrated deeper into bedrock materials and extended a maximum 36½ feet below ground surface. Appendix B presents the borings HKA drilled for this project.

LABORATORY TESTING

The laboratory testing program was developed to aid in evaluating the engineering properties of the materials encountered at the site. Laboratory tests performed include:

- Moisture Density relationships in accordance with ASTM D2937.
- Gradation testing in accordance with ASTM D1140
- Field penetrometer testing to approximate unconfined compressive strength.

The results of the laboratory testing are presented on the boring logs opposite the sample tested and/or presented graphically in Appendix A.

III. FINDINGS AND ANALYSIS

GEOLOGIC SETTING

The surficial geology in the area of the Kaski site is mapped as Monterey Formation (Brabb 1997). The deposits locally are described as "medium- to thick-bedded and laminated olive gray to light gray semisiliceous organic mudstone and sandy siltstone and includes a few thick dolomite interbeds."

The surficial geology in the area of the Madrone site is mapped as Butano Formation- upper sandstone member (Brabb 1997). The deposits locally are described as "thin bedded to very thick bedded medium-gray, fine to medium grained arkosic sandstone containing thin interbeds of medium gray siltstone."

The surficial geology in the area of the Lewis site is mapped as Santa Margarita Sandstone (Brabb 1997). The deposits locally are described as "very thick bedded to massive thickly cross-bedded yellowish-gray to white friable granular medium- to fine-grained arkosic sandstone; locally calcareous and locally bituminous."

The native soil and bedrock encountered at each location during our field investigations are consistent with these bedrock descriptions.

Although much of the Santa Cruz County area is mapped as landslide deposits, our site observations and review of the Santa Cruz County Geologic Hazard map indicate that there is a low hazard of landsliding at the tank sites. We did not observe any features indicative of large or moderate scale landsliding in the immediate vicinity of each site.

SURFACE CONDITIONS

The Kaski tank site currently supports two approximately 24-foot diameter tanks founded on roughly 26-foot diameter concrete foundations. The site is located on a level to gently sloping pad that has been graded by cutting on the east side and filling on the west side. Natural slopes above and below the pad range in inclination between 15 and 25 degrees. The 10 to 12-foot cut east and northeast of the tank site stands at an approximately 1:1 slope. Fills have been placed on the west side of the tank pad (See Figure 2). The pad slopes gently to the west. Fill slopes on the west side of the pad, descend to the west at approximately a 2:1 inclination (horizontal:vertical). Significant pooling of water was observed leaking from the existing tanks and the water has begun to scour the ground surface (see Figure 2).

The Madrone tank site is located near a ridgetop and currently supports two approximately 26-foot diameter tanks founded on roughly 29-foot diameter concrete foundations. The site is located on a level graded pad. Previous grading appears to consist of minor cutting on the east side of the ridgetop and filling on the west and north sides of the tanks (see Figure 3). The ridge slopes away from the site to the north, west and south at approximately a 3:1 slope (horizontal:vertical).

The Lewis tank site currently supports one approximaltey 30-foot diameter tank, a well, and a water treatment building, pond and tower. The tank site was cut into a gently south and east slope with level pads graded for the tank site and water treatment improvements (See Figure 4). Past grading appears to consist of maximum 1 to 2-foot cuts and fills in order to accommodate site improvements.

SUBSURFACE CONDITIONS

Our borings were focused on characterizing fill and soil at the sites and confirming depth to bearing material. Bedrock characteristics were previously explored by HKA (2012). Our subsurface exploration consisted of four test borings drilled on the tank pads. The borings extended 10 to 12 feet below existing grade. The soil profiles and classifications, laboratory test results and groundwater conditions encountered for each test boring are presented in the Log of Test Borings, in Appendix A. The general subsurface conditions are described below.

Previous borings were performed by Haro Kasunich & Associates in 2012. These borings are presented in Appendix B. We note that boring B-7 was missing from the report copy we received.

The subsurface profile at the Kaski site, encountered within B-1K, consisted of about 3½ feet of fill overlying native soil and Monterey Formation bedrock. The fill consisted of sandy lean clay with scattered weathered siltstone clasts up to ½" in diameter. Native Monterey Formation consisted of severely to completely weathered siltstone bedrock. The upper two feet of bedrock has weathered to a sandy silt. The fill within B-1K was very stiff in density. The weathered Monterey Formation was generally soft to moderately hard in rock hardness. B-1, B-2, and B-3 were drilled by HKA (2012) at the Kaski site. Siltstone bedrock was explored to a maximum depth of 21½ feet and found to be similar in strength to the bedrock encountered in our B-1K boring.

The subsurface profile at the Madrone site, encountered within B-1M, consisted of native, moderately weathered, very soft to moderately hard Butano Sandstone. No fill was encountered at our boring location. Up to 5 feet of fill and native soils were encountered in HKA's borings and these materials were found to be loose and compressible.

The subsurface profile at the Lewis site, encountered within B-1L and B-2L, consisted of 4 to 6 feet of colluvium overlying native Santa Margarita Formation bedrock. In boring B-1L the soil is overlain by 4 feet of fill material. Both fill and native material consisted of loose to medium dense silty sand and sand with silt. Native Santa Margarita Formation consisted of very soft sandstone bedrock, with the upper few feet weathered to a sandy silt or silty sand. We interpret the material below about 7 feet in the HKA borings (B-7 and B-8) to be completely weathered sandstone bedrock.

Groundwater was not encountered in any of our borings or the HKA (2012) borings and no evidence of shallow ground water was observed at the site. Water observed at the Kaski and Lewis sites is associated with long term leakage from the tanks. The groundwater conditions described in this report reflect the conditions encountered during our drilling investigation in October 2018 at the specific locations drilled. It must be anticipated that the perched and regional groundwater tables may vary

with location and could fluctuate with variations in rainfall, runoff, irrigation and other changes to the conditions existing at the time our measurements were made.

Please refer to the Logs of Test Borings in Appendix A and Appendix B for a more detailed description of the subsurface conditions encountered in each of our test borings at the subject site.

FAULTING AND SEISMICITY

Faulting

Mapped faults which have the potential to generate earthquakes that could significantly affect the subject site are listed in Table No. 1. The fault distances are approximate distances based the U.S. Geological Survey and California Geological Survey, Quaternary fault and fold database, accessed on October 2018 from the USGS website (http//earthquake.usgs.gov/hazards/qfaults/) and overlaid onto Google Earth.

Kaski Site- Table No. 1 - Distance to Significant Faults

Fault Name	Distance (miles)	Direction
Zayante	½	Northeast
Butano	4	Northeast
San Andreas	5½	Northeast
Sargeant	6	Northeast
Lexington	6	Northeast

Madrone Site- Table No. 2 - Distance to Significant Faults

Fault Name	Distance (miles)	Direction
Zayante	500 feet	Northeast
Butano	3½	Northeast
San Andreas	5	Northeast
Sargeant	5½	Northeast
Lexington	5½	Northeast

Lewis Site- Table No. 3 - Distance to Significant Faults

Fault Name	Distance (miles)	Direction
Zayante	¾	Northeast
Butano	4½	Northeast
San Andreas	6	Northeast
Sargeant	6½	Northeast
Lexington	6½	Northeast

Seismic Shaking and CBC Design Parameters

Due to the proximity of the site to active and potentially active faults, it is reasonable to assume the site will experience high intensity ground shaking during the lifetime of the project. Structures founded on thick soft soil deposits are more likely to experience more destructive shaking, with higher amplitude and lower frequency, than structures founded on bedrock. Generally, shaking will be more intense closer to earthquake epicenters. Thick soft soil deposits large distances from earthquake epicenters, however, may result in seismic accelerations significantly greater than expected in bedrock.

Selection of seismic design parameters should be determined by the project structural designer. The site coefficients and seismic ground motion values shown in the table below were developed based on CBC 2016 incorporating the ASCE 7-10 standard, and the project site location.

Kaski Site- Table No. 4 - 2016 CBC Seismic Design Parameters [1]

Seismic Design Parameter	ASCE 7-10 Value
Site Class	D
Spectral Acceleration for Short Periods	Ss = 1.55g
Spectral Acceleration for 1-second Period	S_1 = 0.71g
Short Period Site Coefficient	Fa = 1.0
1-Second Period Site Coefficient	Fv = 1.3
Design Spectral Response Acceleration for Short Period	S_{DS} = 1.03g
Design Spectral Response Acceleration for 1-Second Period	S_{D1} = 0.62g

Madrone Site- Table No. 5 - 2016 CBC Seismic Design Parameters [1]

Seismic Design Parameter	ASCE 7-10 Value
Site Class	D
Spectral Acceleration for Short Periods	Ss = 1.62g
Spectral Acceleration for 1-second Period	S_1 = 0.74g
Short Period Site Coefficient	Fa = 1.0
1-Second Period Site Coefficient	Fv = 1.5
Design Spectral Response Acceleration for Short Period	S_{DS} = 1.08g
Design Spectral Response Acceleration for 1-Second Period	S_{D1} = 0.74g

Lewis Site- Table No. 6 - 2016 CBC Seismic Design Parameters [1]

Seismic Design Parameter	ASCE 7-10 Value
Site Class	D
Spectral Acceleration for Short Periods	Ss = 1.5g
Spectral Acceleration for 1-second Period	S_1 = 0.67g
Short Period Site Coefficient	Fa = 1.0
1-Second Period Site Coefficient	Fv = 1.5
Design Spectral Response Acceleration for Short Period	S_{DS} = 1.00g
Design Spectral Response Acceleration for 1-Second Period	S_{D1} = 0.67g

Note 1: Design values have been obtained by using the SEAOC/OSHPD Seismic Design Maps Tool.
Note 2: The Seismic Design Category assumes a structure with Risk Category IV. Pacific Crest Engineering Inc. should be contacted for revised seismic design parameters if the proposed structure has a different occupancy rating than that assumed.

The recommendations of this report are intended to reduce the potential for structural damage to an acceptable risk level, however strong seismic shaking could result in minor damage and the need for post-earthquake repairs. It should be assumed that exterior improvements such as pavements or sidewalks may need to be repaired or replaced following strong seismic shaking.

GEOTECHNICAL HAZARDS

A quantitative analysis of geotechnical hazards was beyond our scope of services for this project. In general, however, the geotechnical hazards associated with the project site include seismic shaking (discussed above), ground surface fault rupture, liquefaction, lateral spreading, and landsliding. A qualitative discussion of these hazards is presented below.

Ground Surface Fault Rupture

Pacific Crest Engineering Inc. has not performed a specific investigation for the presence of active faults at the project site. Based upon our review of the Santa Cruz County GIS Hazard Maps, the project site is not mapped within a fault hazard zone.

Ground surface fault rupture typically occurs along the surficial traces of active faults during significant seismic events. Since the nearest known active, or potentially active fault trace is mapped approximately 0.1 miles from the site, it is our opinion that the potential for ground surface fault rupture to occur at the site should be considered low.

Liquefaction and Lateral Spreading

A quantitative liquefaction analysis was not within our scope for this project. Based upon our review of the Santa Cruz County GIS Hazard Maps, the project site is not mapped within a liquefaction hazard zone.

Liquefaction tends to occur in loose, saturated fine-grained sands and coarse silt, or clays with low plasticity. At the Kaski and Madrone sites, we did not encounter potentially liquefiable soils, nor did we encounter groundwater during our field investigation. Consequently, it is our opinion that the potential for liquefaction to occur at these sites should be considered low.

At the Lewis site, the loose upper 6 to 8 feet of soils have some potential for seismically induced soil densification. However, due to the lack of groundwater, the potential for liquefaction is considered to be low.

Liquefaction induced lateral spreading occurs when a liquefied soil mass fails toward an open slope face or fails on an inclined topographic slope. Our analysis indicates that the site has a low potential for liquefaction, consequently the potential for lateral spreading is also considered low.

Landsliding

No landslide deposits are mapped within the subject sites. (Cooper-Clark 1975) An investigation to determine whether the proposed project is located on an existing landslide or the potential for a deep-seated landslide to occur and adversely affect the project was beyond our scope of services and was not performed.

Although a large portion of the Santa Cruz County area consists of landslide deposits, the subject sites are located some distance from these mapped areas. It is our opinion that the potential for landsliding to occur and adversely affect the proposed development should be considered low.

IV. DISCUSSION AND CONCLUSIONS

GENERAL

1. The results of our investigation indicate that proposed improvements to the tank pads are feasible from a geotechnical engineering standpoint, provided our recommendations are included in the design and construction of the project.

2. Grading and foundation plans should be reviewed by Pacific Crest Engineering Inc. during their preparation and prior to contract bidding.

3. Pacific Crest Engineering Inc. should be notified at least four (4) working days prior to any site clearing and grading operations on the property in order to observe the stripping and disposal of unsuitable materials, and to coordinate this work with the grading contractor. During this period, a pre-construction conference should be held on the site, with at least the client or their representative, the grading contractor and one of our engineers present. At this meeting, the project specifications and the testing and inspection responsibilities will be outlined and discussed.

4. Field observation and testing must be provided by a representative of Pacific Crest Engineering Inc., to enable them to form an opinion as to the degree of conformance of the exposed site conditions to those foreseen in this report, the adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the specification requirements. Any work related to grading or foundation excavation that is performed without the full knowledge and direct observation of Pacific Crest Engineering Inc., the Geotechnical Engineer of Record, will render the recommendations of this report invalid, unless the Client hires a new Geotechnical Engineer who agrees to take over complete responsibility for this report's findings, conclusions and recommendations. The new Geotechnical Engineer must agree to prepare a Transfer of Responsibility letter. This may require additional test borings and laboratory analysis if the new Geotechnical Engineer does not completely agree with our prior findings, conclusions and recommendations.

PRIMARY GEOTECHNICAL CONSIDERATIONS

5. Based upon the results of our investigation, it is our opinion that the primary geotechnical issues associated with the design and construction of the proposed project are the following:

a. *Non-Engineered Fills:* At each of the tank sites, areas of non-engineered fill were encountered in borings and observations. It should be anticipated that other areas of non-engineered fills may be encountered during construction. To mitigate the potential for adverse settlement to occur beneath the proposed improvements, we recommend subexcavation and recompaction of existing fill be performed where such fills underlie proposed tank foundations, slabs-on-grade and pavements. Refer to the Earthwork section of this report for recommendations.

b. *Divergent Bearing Conditions And Differential Settlement:* The western portions of the tanks at the Kaski site appear to be underlain by fill while the rest of the tanks are bearing on the cut native material. It also appears that some fill material underlies the northern edge of the Madrone tanks. Generally, spanning a cut/fill transition can lead to differential settlement. Additionally, loose surficial soils may compress under the proposed loads resulting in adverse settlement. To reduce the potential for adverse settlement to occur beneath the proposed improvements, we recommend subexcavation of the tank subgrades to a depth 2 feet below the base of the footing or until competent bedrock is exposed. Refer to the Earthwork section of this report for recommendations.

c. *Excavations and Existing Improvements:* We understand that the existing tanks will be relocated during grading. If this construction plan changes and some tanks are to remain in place during earthwork, it will be difficult to excavate the tank pads. Temporary shoring and other measures will be required. We request the opportunity to review construction plans if the existing tanks cannot be relocated during construction.

d. *Strong Seismic Shaking:* The project site is located within a seismically active area and strong seismic shaking is expected to occur within the design lifetime of the project. Improvements should be designed and constructed in accordance with the most current CBC and the recommendations of this report to minimize reaction to seismic shaking. Structures built in accordance with the latest edition of the California Building Code have an increased potential for experiencing relatively minor damage which should be repairable, however strong seismic shaking could result in architectural damage and the need for post-earthquake repairs.

V. RECOMMENDATIONS

EARTHWORK

Clearing and Stripping

1. The initial preparation of the site may consist of demolition of existing structures and their foundations and removal of designated trees and debris. For all the tank replacements we understand that the existing tanks can be removed so that the earth work can be completed across the entire tank pad as recommended in this section. All foundation elements from existing structures must be completely removed from the building areas. Tree removal should include the entire stump and root ball. The extent of this soil removal will be designated by a representative of Pacific Crest Engineering Inc. in the field. This material must be removed from the site.

2. Any voids created by the removal of old structures and their foundations, tree and root balls, septic tanks, and leach lines must be backfilled with properly compacted engineered fill which meets the requirements of this report.

3. Any wells encountered shall be capped in accordance with the requirements and approval of the County Health Department. The strength of the cap shall be equal to the adjacent soil and shall not be located within 5 feet of a structural footing.

4. Surface vegetation, tree roots and organically contaminated topsoil should then be removed ("stripped") from the area to be graded. In addition, any remaining debris or large rocks must also be removed (this includes asphalt or rocks greater than 2 inches in greatest dimension). This material may be stockpiled for future landscaping.

5. It is anticipated that the depth of stripping may be 2 to 4 inches. Final required depth of stripping must be based upon visual observations by a representative of Pacific Crest Engineering Inc., in the field. The required depth of stripping will vary based upon the type and density of vegetation across the project site and with the time of year.

Subgrade Preparation

6. All existing fill within the tank pad areas should be subexcavated and removed. Fill depth is anticipated to be as much as 4 feet at the Kaski tank site, 4 feet at the Lewis site and 1 to 2 feet at the Madrone site. The approximate lateral extents of existing fills are shown on Figure 2, 3 and 4. Additionally, loose surficial soils should be subexcavated to a depth 2 feet below base of footing or until competent bedrock is exposed, whichever depth is less. The excavation process should be observed and the extent designated by a representative of Pacific Crest Engineering Inc., in the field. Any voids created by fill removal must be backfilled with properly compacted engineered fill.

7. Subexcavations should extend at least 5 feet horizontally beyond foundations and at least 2 feet horizontally beyond pavements and flatwork.

8. Final depth of subexcavation should be determined by a representative of Pacific Crest Engineering Inc., in the field.

9. We understand that the existing tanks will be removed, and the pads rebuilt. In general, care must be taken not to undermine the foundation system beneath any existing structures. Excavations made adjacent to existing footings must not extend below a line drawn outward at a gradient of 2:1 (H:V) from the bottom outside edge of the footing.

10. Wet and soft soils will likely be encountered at the bottom of the excavations. If wet or unstable subgrades are encountered they may need to further subexcavated and replaced with stabilization fabric, crushed rock or other materials to create a stable working surface. The depth of over-excavations and method used should be determined in the field at the time of construction.

11. Following clearing, stripping and any necessary subexcavations, the exposed subgrade soil that is to support concrete slabs-on-grade, foundations, pavements or engineered fill should then be scarified 8 inches, and the soil moisture conditioned and compacted as outlined below. The moisture

conditioning procedure will depend upon the time of year that the work is done, but it should result in the soils being 1 to 3 percent over optimum moisture content at the time of compaction.

Material for Engineered Fill

12. Native or imported soil proposed for use as engineered fill should meet the following requirements:

a. free of organics, debris, and other deleterious materials,
b. free of "recycled" materials such as asphaltic concrete, concrete, brick, etc.,
c. granular in nature, well graded, and contain sufficient binder to allow utility trenches to stand open,
d. free of rocks in excess of 2 inches in size.

13. In addition to the above requirements, import fill should have a Plasticity Index between 4 and 12, have a minimum Resistance "R" Value of 30, and be non-expansive.

14. Samples of any proposed imported fill planned for use on this project should be submitted to Pacific Crest Engineering Inc. for appropriate testing and approval not less than ten (10) working days before the anticipated jobsite delivery. This includes proposed import trench sand, drain rock and aggregate base materials. Imported fill material delivered to the project site without prior submittal of samples for appropriate testing and approval must be removed from the project site.

Engineered Fill Placement and Compaction

15. Following the subexcavation and subgrade preparation, the tank pad should be brought up to design grades with engineered fill that is moisture conditioned and compacted according to the recommendations of this report. Recompacted sections should extend at least 5 feet horizontally beyond all footings, slabs and pavement areas.

16. Engineered fill should be placed in maximum 8-inch lifts, before compaction, at a water content which is within 1 to 3 percent of the laboratory optimum value.

17. All soil on the project should be compacted to a minimum of 90% of its maximum dry density. The upper 8 inches of the soil subgrade within the tank pad areas, pavement areas, and all aggregate subbase and aggregate base should be compacted to a minimum of 95% of its maximum dry density.

18. The maximum dry density will be obtained from a laboratory compaction curve run in accordance with ASTM Procedure #D1557. This test will also establish the optimum moisture content of the material. Field density testing will be performed in accordance with ASTM Test #D6938 (nuclear method).

19. We recommend field density testing be performed in maximum 2-foot elevation differences. In general terms, we recommend at least one compaction test per 200 linear feet of utility trench or

retaining wall backfill, and at least one compaction test per 2,000 square feet of building or structure area. This is a subjective value and may be changed by the geotechnical engineer based on a review of the final project layout and exposed field conditions.

20. We anticipate that the fill slope at the Kaski site will need to be rebuilt. In general, engineered fill placed on existing slopes that are steeper than 5:1 (horizontal:vertical) should be keyed and benched into competent native material. Toe keys should be constructed at the base of the fill slope with a minimum 10-foot-wide width and sloped negatively at least 2% into the bank. The depth of the keyways will vary, depending on the materials encountered. It is anticipated that the depth of the keyways may be 2 to 4 feet, but at all locations shall be at least 2 feet into firm material.

21. Subsequent benches may be required as the fill section progresses upslope. Benches and keys will be designated in the field by a representative of Pacific Crest Engineering Inc.

Cut and Fill Slopes

22. Fill slopes should be constructed with engineered fill meeting the minimum density requirements of this report and have a gradient no steeper than 2:1 (horizontal:vertical). Fill slopes should not exceed 15 feet in vertical height unless specifically reviewed by Pacific Crest Engineering Inc. Where the vertical height exceeds 15 feet, intermediate benches must be provided. These benches should be at least 6 feet wide and sloped to control surface drainage. A lined ditch should be used on the bench.

23. Permanent cut slopes in soil shall not exceed a 2:1 (horizontal:vertical) gradient. Permanent cut slopes in bedrock shall not exceed a 1½:1 gradient. If sloughing of soil and increased maintenance is to be avoided, then we recommend the existing cut slope behind the tank be flattened to a maximum inclination of 1½:1. A lined ditch should be installed at the top of all cut slopes.

24. The above slope gradients are based on the strength characteristics of the materials under conditions of normal moisture content that would result from rainfall falling directly on the slope, and do not take into account the additional activating forces applied by seepage from spring areas or subsurface groundwater. Therefore, in order to maintain stable slopes at the recommended gradients, it is important that any seepage forces and accompanying hydrostatic pressure (if encountered) be relieved by adequate drainage. Drainage facilities may include subdrains, gravel blankets, rock fill surface trenches or horizontally drilled drains. Configurations and type of drainage will be determined by a representative of Pacific Crest Engineering Inc. during the grading operations.

25. The surfaces of all cut and fill slopes should be prepared and maintained to reduce erosion. This work, at a minimum, should include track rolling of the slope and effective planting. The protection of the slopes should be installed as soon as practicable so that a sufficient growth will be established prior to inclement weather conditions. It is vital that no slope be left standing through a winter season without the erosion control measures having been provided.

26. The above recommended gradients do not preclude periodic maintenance of the slopes, as minor sloughing and erosion may take place.

27. If a fill slope is to be placed above a cut slope, the toe of the fill slope should be set back at least 8 feet horizontally from the top of the cut slope. A lateral surface drain should be placed in the area between the cut and fill slopes.

28. All pavements and flatwork should be set back at least 5 feet horizontally from the top of cut and fill slopes. All foundations should be set back at least 8 feet horizontally from the top of cut and fill slopes.

Soil Moisture and Weather Conditions

29. Surface water associated with long term leakage from the tanks was observed at the Kaski and Lewis sites. Additionally, if earthwork activities are done during or soon after the rainy season, the on-site soils and other materials may be too wet in their existing condition to be used as engineered fill. These materials may require a diligent and active drying and/or mixing operation to reduce the moisture content to the levels required to obtain adequate compaction as an engineered fill. If the on-site soils or other materials are too dry, water may need to be added. In some cases, the time and effort to dry the on-site soil may be considered excessive, and the import of aggregate base may be required.

Utility Trench Backfill

30. Utility trenches that are parallel to the sides of the building should be placed so that they do not extend below a line sloping down and away at a 2:1 (horizontal:vertical) slope from the bottom outside edge of all footings.

31. Utility pipes should be designed and constructed so that the top of pipe is a minimum of 24 inches below the finish subgrade elevation of any road or pavement areas. Any pipes within the top 24 inches of finish subgrade should be concrete encased, per design by the project civil engineer.

32. For the purpose of this section of the report, backfill is defined as material placed in a trench starting one foot above the pipe, and bedding is all material placed in a trench below the backfill.

33. Unless concrete bedding is required around utility pipes, free-draining clean sand should be used as bedding. Sand bedding should be compacted to at least 95 percent relative compaction. Clean sand is defined as 100 percent passing the #4 sieve, and less than 5 percent passing the #200 sieve.

34. Approved imported clean sand or native soil should be used as utility trench backfill. Backfill in trenches located under and adjacent to structural fill, foundations, concrete slabs and pavements should be placed in horizontal layers no more than 8 inches thick. This includes areas such as sidewalks, patios, and other hardscape areas. Each layer of trench backfill should be water conditioned and compacted to at least 95 percent relative compaction

35. All utility trenches beneath perimeter footing or grade beams should be backfilled with controlled density fill (such as 2-sack sand\cement slurry) to help minimize potential moisture intrusion below interior floors. The length of the plug should be at least three times the width of the footing or grade beam at the building perimeter, but not less than 36 inches. A representative from Pacific Crest Engineering Inc. should be contacted to observe the placement of slurry plugs. In addition, all utility pipes which penetrate through the footings, stemwalls or grade beams (below the exterior soil grade) should also be sealed water-tight, as determined by the project civil engineer or architect.

36. Utility trenches which carry "nested" conduits (stacked vertically) should be backfilled with a control density fill (such as 2-sack sand\cement slurry) to an elevation one foot above the nested conduit stack. The use of pea gravel or clean sand as backfill within a zone of nested conduits is not recommended.

37. A representative from our firm should be present to observe the bottom of all trench excavations, prior to placement of utility pipes and conduits. In addition, we should observe the condition of the trench prior to placement of sand bedding, and to observe compaction of the sand bedding, in addition to any backfill planned above the bedding zone.

38. Jetting of the trench backfill is not recommended as it may result in an unsatisfactory degree of compaction.

39. Trenches must be shored as required by the local agency and the State of California Division of Industrial Safety construction safety orders.

Excavations and Shoring

40. It should be understood that on-site safety is the *sole responsibility* of the Contractor, and that the Contractor shall designate a *competent person* (as defined by CAL-OSHA) to monitor the slope excavation prior to the start of each work day, and throughout the work day as conditions change. The competent person designated by the Contractor shall determine if flatter slope gradients are more appropriate, or if shoring should be installed to protect workers in the vicinity of the slope excavation. Refer to Title 8, California Code of Regulations, Sections 1539-1543.

41. All excavations must meet the requirements of 29 CFR 1926.651 and 1926.652 or comparable OSHA approved state plan requirements.

42. The "top" of any temporary cut slope and excavations should be set-back at least ten feet (measured horizontally) from any nearby structure or property line. Any excavations which cannot meet this requirement will need to have a shoring system designed to support steeper sidewall gradients.

43. Temporary shoring is not currently anticipated for this project. Should these requirements change, please contact our office for additional recommendations.

FOUNDATIONS

44. The following foundation recommendations are based on the assumption that the current tanks will be replaced, and the entire tank pad will be rebuilt as recommended in the Earthwork section of this report.

45. At the time we prepared this report, plans had not been completed and the location and details of proposed tank(s) and grading had not been finalized. We request an opportunity to review these items during the design stages to verify that the following recommendations apply.

46. We recommend that proposed tank(s) be founded on reinforced concrete spread footings or ringwalls. Geotechnical design parameters for this system is provided below.

47. All footings must be trenched at least 24 inches below final pad grade.

48. Footings should be designed for the following allowable bearing capacities:
    a. 2,500 psf for Dead plus Live Load
    b. a 1/3rd increase for Seismic or Wind Load

49. In computing the pressures transmitted to the soil by the footings, the embedded weight of the footing may be neglected.

50. No footing should be placed closer than 8 feet from the top of adjacent cut or fill slopes.

51. No footings shall be constructed with the intent of placing engineered fill against the footing after the footing is poured, and counting that engineered fill as part of the embedment depth of the footing.

52. Footings may be assumed to have a resistance to lateral sliding coefficient of 0.30.

53. Footings may be assumed to have a lateral bearing pressure resistance value of 350 psf/foot. The upper one foot of soil should be ignored when calculating lateral resistance.

54. The footing excavations must be free of loose material prior to placing concrete. The footing excavations should be thoroughly saturated prior to placing concrete.

55. Provided our recommendations are followed, under static loading conditions, we estimate that total post-construction foundation settlement will be less than 1 inch, and post-construction differential foundation settlement will be less than 1/2 inch.

56. Footing excavations must be observed by a representative of Pacific Crest Engineering Inc. before placement of formwork, steel and concrete to ensure bedding into proper material.

57. The footings should contain steel reinforcement as determined by the project civil or structural engineer in accordance with applicable CBC or ACI Standards.

RETAINING WALLS

58. We anticipate that a retaining wall may be proposed at one or more tank sites. The following parameters may be used for preliminary planning purposes. We request the opportunity to review any proposed retaining wall locations to verify that these parameters apply.

59. Retaining walls with full drainage should be designed using the following criteria:

a. The following lateral earth pressure values should be used for design:

Table No. 7, Active Earth Pressure Values

Maximum Backfill Slope (H:V)	Active Earth Pressure (psf/ft of depth)
Level	40
2:1	55
1½:1	65

b. Should the slope behind the retaining walls be other than shown in Table 7, supplemental design criteria will be provided for the active earth or at rest pressures for the particular slope angle.

c. Active earth pressure values may be used when walls are free to yield an amount sufficient to develop the active earth pressure condition (about ½% of height). The effect of wall rotation should be considered for areas behind the planned retaining wall (pavements, foundations, slabs, etc.).

d. Retaining walls should be supported on shallow foundation designed using an allowable bearing capacity of 2000 psf for dead plus live load, with a 1/3rd increase for short term loads.

e. Retaining wall footings should be embedded a minimum of 18 inches below the lowest adjacent compacted pad grade. There should be a minimum of 5 feet of horizontal cover as measured from the outside edge of the footing.

f. For resisting lateral forces a passive earth pressure of 350 psf/ft of depth should be used. The upper 12 inches should be ignored.

g. The mechanics of soil pressure on the footing keyway intended to enhance sliding stability has been considered. The active pressure on the keyway, acting opposite the passive pressure, may be taken as zero.

h. A "coefficient of friction" between base of foundation and soil of 0.30

i. If the structural designer wishes to include seismic forces in their design, the wall may be designed using the above active soil pressures plus a horizontal seismic force of $13H^2$ pounds per lineal foot (where H is the height of retained material). The resultant seismic force should be applied at a point $1/3^{rd}$ above the base of the wall. This force has been estimated using the Mononobe-Okabe method of analysis as modified by Whitman (1990) and Lew and Sitar (2010). A reduced factor of safety for overturning and sliding may be used in seismic design as determined by the structural designer.

Retaining Wall Drainage

60. The above design criteria are based on fully drained conditions. Therefore, we recommend that permeable material meeting the State of California Standard Specification Section 68-2.02F, Class 1, Type A, be placed behind the wall, with a minimum width of 12 inches and extending for the full height of the wall to within 1 foot of the ground surface. The top of the permeable material should be covered with Mirafi 140N filter fabric or equivalent and then compacted native soil placed to the ground surface. A 4-inch diameter perforated rigid plastic drain pipe should be installed within 3 inches of the bottom of the permeable material and be discharged to a suitable, approved location. The perforations should be placed downward; oriented along the lower half of the pipe. Neither the pipe nor the permeable material should be wrapped in filter fabric. Please refer to the Typical Retaining Wall Drain Detail, Figure 13, in Appendix A for details.

61. The area behind the wall and beyond the permeable material should be compacted with approved material to a minimum relative compaction of 90%.

PAVEMENT DESIGN

62. The design of the pavement section was beyond our scope of services for this project. To have the selected pavement sections perform to their greatest efficiency, it is very important that the following items be considered:

a. Properly scarify and moisture condition the upper 8 inches of the subgrade soil and compact it to a minimum of 95% of its maximum dry density, at a moisture content of 1 to 3% over the optimum moisture content for the soil.

b. Provide sufficient gradient to prevent ponding of water.

c. Use only quality materials of the type and thickness (minimum) specified. All aggregate base and subbase must meet Caltrans Standard Specifications for Class 2 materials and be angular in shape. All Class 2 aggregate base should be ¾ inch maximum in aggregate size.

d. Compact the base and subbase uniformly to a minimum of 95% of its maximum dry density.

e. Use ½ inch maximum, Type "A" medium graded asphaltic concrete. Place the asphaltic concrete only during periods of fair weather when the free air temperature is within prescribed limits by Cal Trans Specifications.

f. **Porous pavement systems which consist of porous paving blocks, asphaltic concrete or concrete are generally not recommended due to the potential for saturation of the subgrade soils and resulting increased potential for a shorter pavement life. At a minimum, porous pavement systems should include a layer of Mirafi HP370 geotextile fabric placed on the subgrade soil beneath the porous paving section. These pavement systems should only be used with the understanding by the Owner of the increased potential for pavement cracking, rutting, potholes, etc.**

g. Maintenance should be undertaken on a routine basis.

SURFACE DRAINAGE

63. Surface water drainage is the responsibility of the project civil engineer. The following should be considered by the civil engineer in design of the project.

64. Slope failures can occur where surface drainage is allowed to concentrate onto unprotected slopes. Improvements to the surface drainage around the project area is important to reduce potential for shallow slumping of slopes. Erosion control measures should be implemented and maintained. Under no circumstances should surface runoff be directed toward, or discharged upon, any topographic slopes.

65. Surface water must not be allowed to pond or be trapped adjacent to foundations, or on tank pads and surrounding areas.

66. Final grades should be provided with positive gradient away from all foundation elements. Soil grades should slope away from foundations at least 5 percent for the first 10 feet. Impervious surfaces should slope away from foundations at least 2 percent for the first 10 feet. Concentrations of surface runoff should be handled by providing structures, such as paved or lined ditches, catch basins, etc.

67. Following completion of the project we recommend that storm drainage provisions and performance of permanent erosion control measures be closely observed through the first season of significant rainfall, to determine if these systems are performing adequately and, if necessary, resolve any unforeseen issues.

68. Surface drainage facilities must not be altered, nor any filling or excavation work performed in the area without first consulting Pacific Crest Engineering Inc. Surface drainage improvements developed

by the project civil engineer must be maintained by the property owner at all times, as improper drainage provisions can produce undesirable affects.

EROSION CONTROL

69. The surface soils are classified as having a moderate to high potential for erosion. Therefore, the finished ground surface should be planted with ground cover and continually maintained to minimize surface erosion. For specific and detailed recommendations regarding erosion control on and surrounding the project site, the project civil engineer or an erosion control specialist should be consulted.

PLAN REVIEW

70. We respectfully request an opportunity to review the project plans and specifications during preparation and before bidding to verify that the recommendations of this report have been included and to provide additional recommendations, if needed. These plan review services are also typically required by the reviewing agency. Misinterpretation of our recommendations or omission of our requirements from the project plans and specifications may result in changes to the project design during the construction phase, with the potential for additional costs and delays in order to bring the project into conformance with the requirements outlined within this report. Services performed for review of the project plans and specifications are considered "post-report" services and billed on a "time and materials" fee basis in accordance with our latest Standard Fee Schedule.

VI. LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. This Geotechnical Investigation was prepared specifically for the Schaaf and Wheeler Consulting Civil Engineers and for the specific project and location described in the body of this report. This report and the recommendations included herein should be utilized for this specific project and location exclusively. This Geotechnical Investigation should not be applied to nor utilized on any other project or project site. Please refer to the ASFE "Important Information about Your Geotechnical Engineering Report" attached with this report.

2. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that planned at the time, our firm should be notified so that supplemental recommendations can be provided.

3. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are called to the attention of the Architects and Engineers for the project and incorporated into the plans, and that the necessary steps are taken to ensure that the Contractors and Subcontractors carry out such recommendations in the field.

4. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural process or the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside of our control. This report should therefore be reviewed in light of future planned construction and then current applicable codes. This report should not be considered valid after a period of two (2) years without our review.

5. This report was prepared upon your request for our services in accordance with currently accepted standards of professional geotechnical engineering practice. No warranty as to the contents of this report is intended, and none shall be inferred from the statements or opinions expressed.

6. The scope of our services mutually agreed upon for this project did not include any environmental assessment or study for the presence of hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site.

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

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

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

Read the Full Report

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

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

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

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

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

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

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

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are *Not* Final

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

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

A Geotechnical Engineering Report Is Subject to Misinterpretation

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

Do Not Redraw the Engineer's Logs

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

Give Contractors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Geoenvironmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

Rely on Your ASFE-Member Geotechncial Engineer for Additional Assistance

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

ASFE
The Best People on Earth

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e-mail: info@asfe.org www.asfe.org

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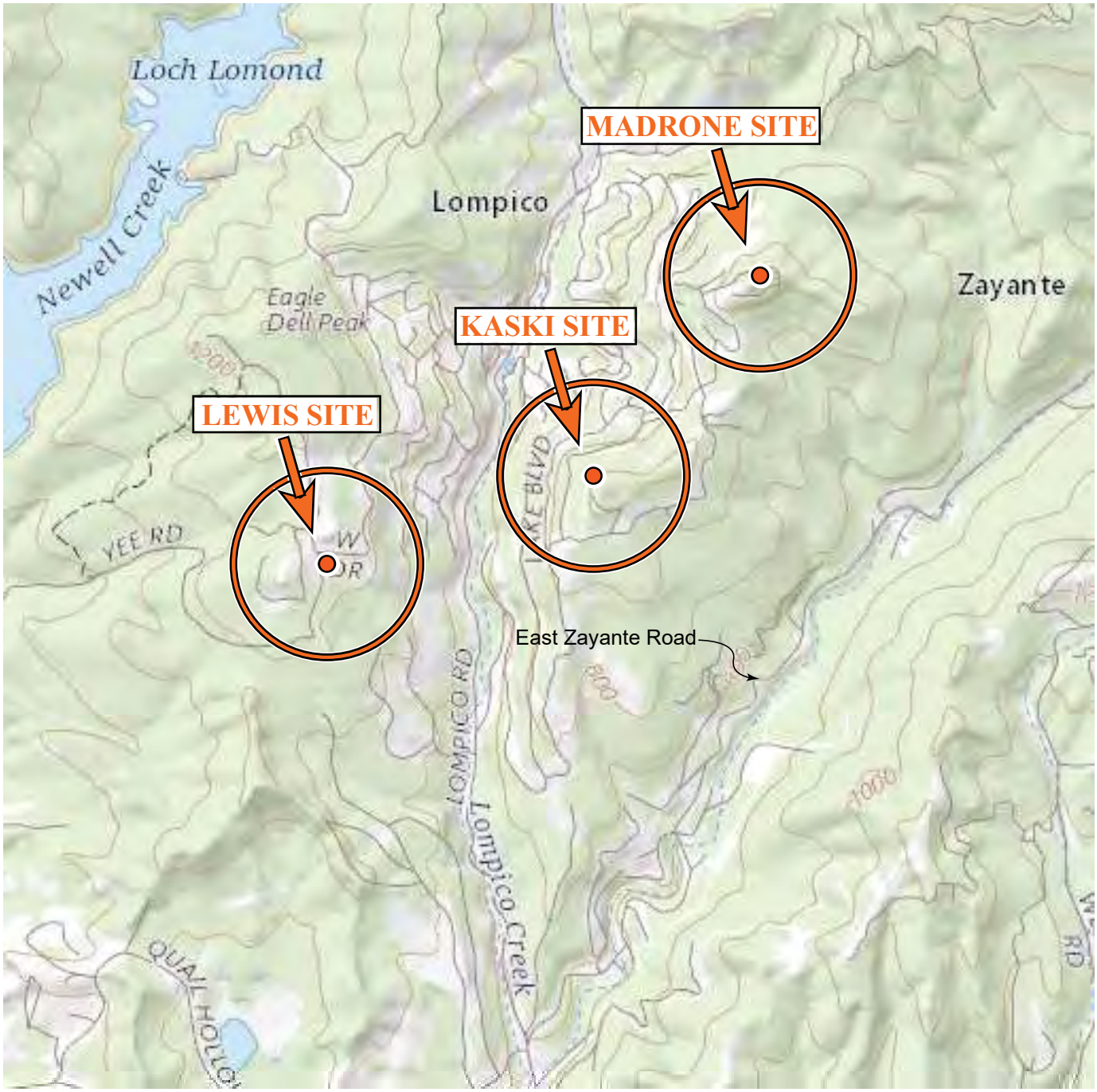
APPENDIX A

Regional Site Map
Site Map Showing Test Borings (3)
Cross Section A-A'
Key to Soil Classification
Log of Test Borings



Base Map: United States Geological Survey
Felton Quadrangle, California
Santa Cruz County, 7.5 Minute Series, 2018

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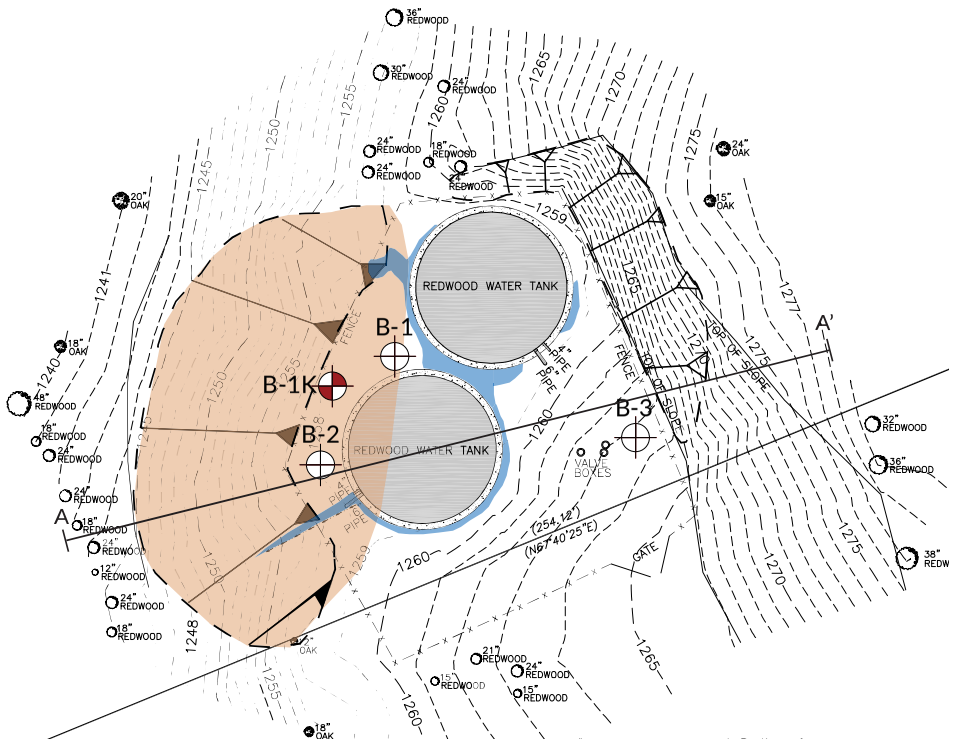
Regional Site Map
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

Figure No. 1
Project No. 1886
Date: 12/10/18



EXPLANATION

B-1k	Boring performed by PCE (10/10/18)
B-4	Boring by HKA (9/2012)
	Cut Slope
	Fill Slope
	Approximate area underlain by fill
A — A'	Cross-section
	Running water observed (10/10/18)

0 20 40

Scale: 1 inch = 20 feet

Base Map: Paul Jensen (2010)

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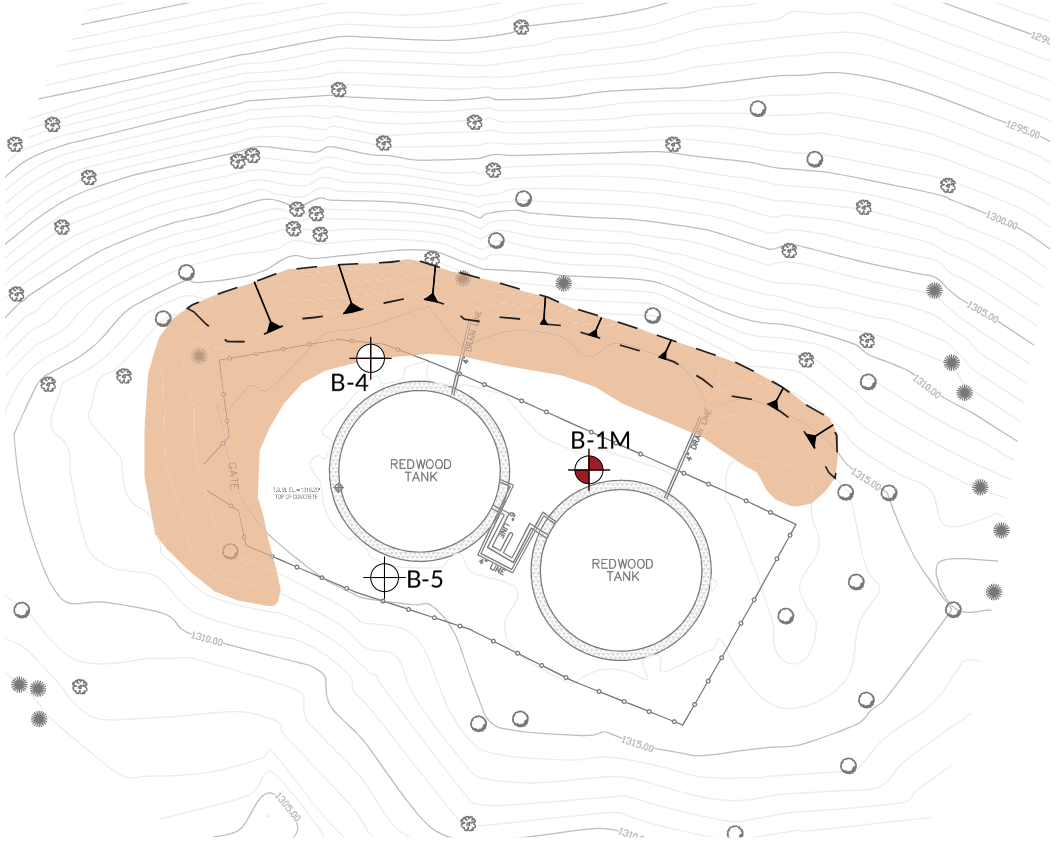
Site Map Showing Test Boring Locations- Kaski Site
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

Figure No. 2
Project No. 1886
Date: 12/10/18



EXPLANATION

- B-1M — Boring performed by PCE (10/10/18)
- B-5 — Boring by HKA (9/2012)
- Cut Slope
- Fill Slope
- Approximate area underlain by fill

0 20 40

Scale: 1 inch = 20 feet

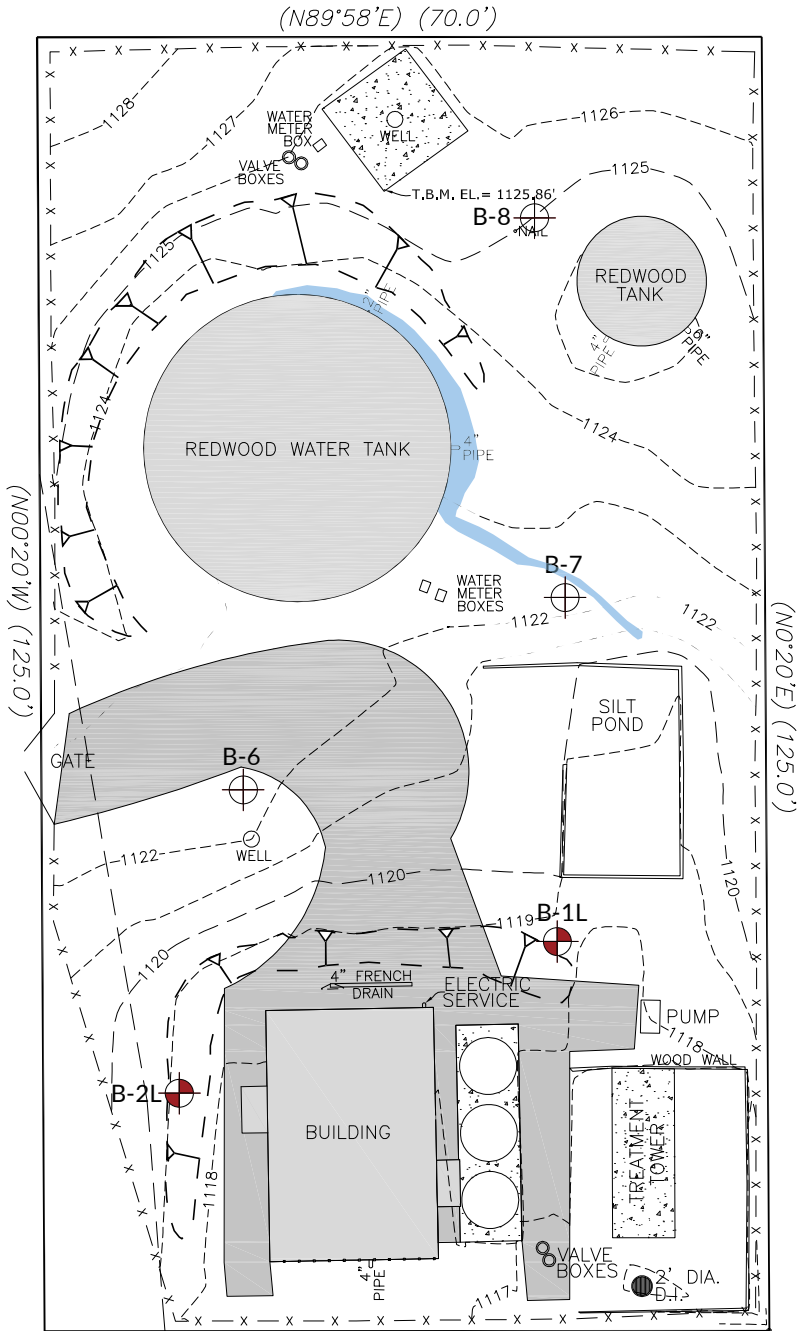
N

Base Map: Paul Jensen (2012)

Pacific Crest ENGINEERING INC

Site Map Showing Test Boring Locations- Madrone Site
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

Figure No. 3
Project No. 1886
Date: 12/10/18



EXPLANATION

B-2L	Boring performed by PCE (10/10/18)
B-8	Boring by HKA (9/2012)
	Cut Slope
	Running water observed (10/10/18)

0 12 24

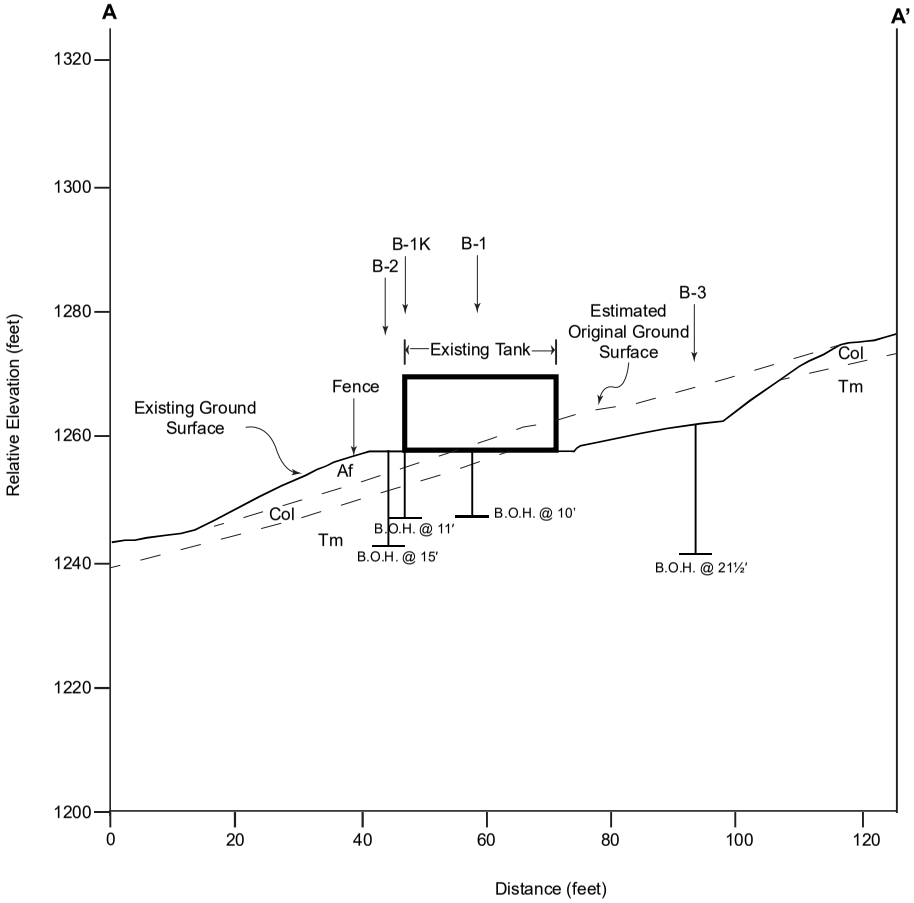
Scale: 1 inch = 12 feet

Base Map: Paul Jensen (2012)

Pacific Crest ENGINEERING INC

Site Map Showing Test Boring Locations- Lewis Site
Kaski, Madrone and Lewis Tank Sites
Santa Cruz County, California

Figure No. 4
Project No. 1886
Date: 12/10/18



LEGEND	
Af	Existing Fill
Col	Colluvium
Tm	Monterey Formation Bedrock

Note: Cross section prepared with handheld tape and inclinometer and only as accurate as the method implies

0 10

Scale: 1 inch = 20 feet

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Cross Section A-A' - Kaski Site
Lompico Tank Sites
Santa Cruz County, California

Figure No. 5
Project No. 1886
Date: 12/10/18

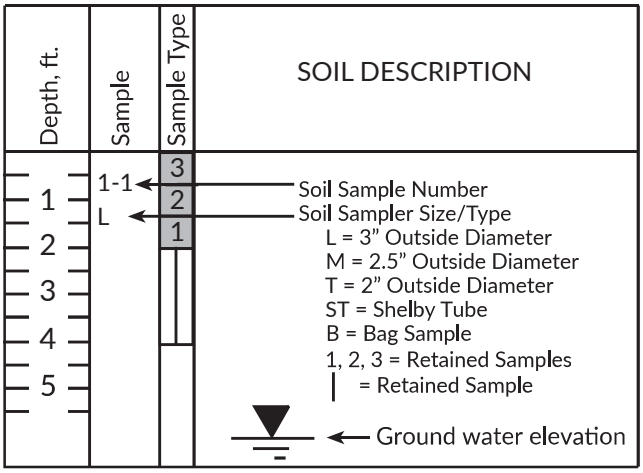
KEY TO SOIL CLASSIFICATION - FINE GRAINED SOILS (FGS)
UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2487 (Modified)

MAJOR DIVISIONS		SYMBOL	FINES	COARSENESS	SAND/GRAVEL	GROUP NAME
SILT AND CLAY	*LL < 35% Low Plasticity	**CL** Lean Clay PI > 7 Plots Above A Line -OR- **ML** Silt PI > 4 Plots Below A Line	<30% plus No. 200	<15% plus No. 200		Lean Clay / Silt
				15-30% plus No. 200	% sand ≥ % gravel	Lean Clay with Sand / Silt with Sand
					% sand < % gravel	Lean Clay with Gravel / Silt with Gravel
			≥30% plus No. 200	% sand ≥ % gravel	< 15% gravel	Sandy Lean Clay / Sandy Silt
					≥ 15% gravel	Sandy Lean Clay with Gravel / Sandy Silt with Gravel
				% sand < % gravel	< 15% sand	Gravelly Lean Clay / Gravelly Silt
					≥ 15% sand	Gravelly Lean Clay with Sand / Gravelly Silt with Sand
		CL - ML 4 < PI < 7	<30% plus No. 200	<15% plus No. 200		Silty Clay
				15-30% plus No. 200	% sand ≥ % gravel	Silty Clay with Sand
					% sand < % gravel	Silty Clay with Gravel
			≥30% plus No. 200	% sand ≥ % gravel	< 15% gravel	Sandy Silty Clay
					≥15% gravel	Sandy Silty Clay with Gravel
				% sand < % gravel	< 15% sand	Gravelly Silty Clay
					≥ 15% sand	Gravelly Silty Clay with Sand
	35% ≤ *LL < 50% Intermediate Plasticity	**CI**	<30% plus No. 200	<15% plus No. 200		Clay
				15-30% plus No. 200	% sand ≥ % gravel	Clay with Sand
					% sand < % gravel	Clay with Gravel
			≥30% plus No. 200	% sand ≥ % gravel	< 15% gravel	Sandy Clay
					≥ 15% gravel	Sandy Clay with Gravel
				% sand < % gravel	< 15% sand	Gravelly Clay
					≥ 15% sand	Gravelly Clay with Sand
	*LL > 50% High Plasticity	**CH** Fat Clay Plots Above A Line -OR- **MH** Elastic Silt Plots Below A Line	<30% plus No. 200	<15% plus No. 200		Fat Clay or Elastic Silt
				15-30% plus No. 200	% sand ≥ % gravel	Fat Clay with Sand Elastic Silt with Sand
					% sand < % gravel	Fat Clay with Gravel / Elastic Silt with Gravel
			≥30% plus No. 200	% sand ≥ % gravel	< 15% gravel	Sandy Fat Clay / Sandy Elastic Silt
					≥ 15% gravel	Sandy Fat Clay with Gravel / Sandy Elastic Silt with Gravel
				% sand < % gravel	< 15% sand	Gravelly Fat Clay / Gravelly Elastic Silt
					≥ 15% sand	Gravelly Fat Clay with Sand / Gravelly Elastic Silt with Sand

* LL = Liquid Limit

* PI = Plasticity Index

BORING LOG EXPLANATION



MOISTURE

DESCRIPTION	CRITERIA
DRY	Absence of moisture, dusty, dry to the touch
MOIST	Damp, but no visible water
WET	Visible free water, usually soil is below the water table

CONSISTENCY

DESCRIPTION	UNCONFINED SHEAR STRENGTH (KSF)	STANDARD PENETRATION (BLOWS/FOOT)
VERY SOFT	< 0.25	< 2
SOFT	0.25 - 0.5	2 - 4
FIRM	0.5 - 1.0	5 - 8
STIFF	1.0 - 2.0	9 - 15
VERY STIFF	2.0 - 4.0	16 - 30
HARD	> 4.0	> 30

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 6
Project No. 1886
Date: 12/10/18

KEY TO SOIL CLASSIFICATION - COARSE GRAINED SOILS
UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2487 (Modified)

MAJOR DIVISIONS		FINES	GRADE/TYPE OF FINES	SYMBOL	GROUP NAME *
GRAVEL	More than 50% of coarse fraction is larger than No. 4 sieve size	<5%	Cu ≥ 4 and 1 ≤ Cc ≤ 3	GW	Well-Graded Gravel / Well-Graded Gravel with Sand
			Cu < 4 and/or 1 > Cc > 3	GP	Poorly Graded Gravel/Poorly Graded Gravel with Sand
		5-12%	ML or MH	GW - GM	Well-Graded Gravel with Silt / Well- Graded Gravel with Silt and Sand
				GP - GM	Poorly Graded Gravel with Silt / Poorly Graded Gravel with Silt and Sand
			CL, CI or CH	GW - GC	Well-Graded Gravel with Clay / Well-Graded Gravel with Clay and Sand
				GP - GC	Poorly Graded Gravel with Clay / Poorly Graded Gravel with Clay and Sand
		>12%	ML or MH	GM	Silty Gravel / Silty Gravel with Sand
			CL, CI or CH	GC	Clayey Gravel/Clayey Gravel with Sand
			CL - ML	GC - GM	Silty, Clayey Gravel/Silty, Clayey Gravel with Sand
SAND	50% or more of coarse fraction is smaller than No. 4 sieve size	<5%	Cu ≥ 6 and 1 ≤ Cc ≤ 3	SW	Well-Graded Sand / Well-Graded Sand with Gravel
			Cu < 6 and/or 1 > Cc > 3	SP	Poorly Graded Sand / Poorly Graded Sand with Gravel
		5-12%	ML or MH	SW - SM	Well-Graded Sand with Silt / Well- Graded Sand with Silt and Gravel
				SP - SM	Poorly Graded Sand with Silt / Poorly Graded Sand with Silt and Gravel
			CL, CI or CH	SW - SC	Well-Graded Sand with Clay / Well-Graded Sand with Clay and Gravel
				SP - SC	Poorly Graded Sand with Clay / Poorly Graded Sand with Clay and Gravel
		>12%	ML or MH	SM	Silty Sand / Silty Sand with Gravel
			CL, CI or CH	SC	Clayey Sand / Clayey Sand with Gravel
			CL - ML	SC - SM	Silty, Clayey Sand / Silty, Clayey Sand with Gravel

* The term "with sand" refers to materials containing 15% or greater sand particles within a gravel soil, while the term "with gravel" refers to materials containing 15% or greater gravel particles within a sand soil.

US STANDARD SIEVE SIZE:	3 inch	¾ inch	No. 4	No. 10	No. 40	No. 200	0.002 µm
	COARSE	FINE	COARSE	MEDIUM	FINE		
COBBLES AND BOULDERS	GRAVEL		SAND			SILT	CLAY

RELATIVE DENSITY

DESCRIPTION	STANDARD PENETRATION (BLOWS/FOOT)
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	> 50

MOISTURE

DESCRIPTION	CRITERIA
DRY	Absence of moisture, dusty, dry to the touch
MOIST	Damp, but no visible water
WET	Visible free water, usually soil is below the water table

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 7
Project No. 1886
Date: 12/10/18

LOGGED BY CLA DATE DRILLED 10/10/2018 BORING DIAMETER 3½" SS BORING NO. 1K

DRILL RIG Minuteman with Tripod HAMMER TYPE 140 lb Hammer & Cat Head

Depth (feet)	Sample	Sample Type	Soil Description	USCS	Field Blow Counts	SPT "N" Value	Pocket Pen. (tsf)	% Passing #200 Sieve	Dry Density (pcf)	Moisture Content (%)	Additional Lab Results
1	1K-1 L		**FILL: SANDY LEAN CLAY:** Black (10YR 2/1), very fine-grained sand, clay appears to exhibit low plasticity, trace rootlets, scattered completely weathered siltstone clasts up to ½" sliightly moist, very stiff	CL	8						
2		2			8						0.0% Gravel
		1			12						90.1% Sand
	1K-2 L				12	18	4.3	78	57	37	9.9% Fines
3					13						
					12						0.0% Gravel
		2			15						90.1% Sand
4		1	**NATIVE: SANDY SILT:** Light yellowish-brown (10YR 6/4) and brownish-yellow (10YR 6/8), very fine-grained sand, thinly laminated, trace subvertical clay veins, completely weathered bedrock, slightly moist, very stiff	ML	17	24	4.5	53	67	37	9.9% Fines
	1K-3 M				9						
5					11						
		2			19						
6		1	**BEDROCK: MONTEREY FORMATION SILTSTONE:** Light yellowish-brown (10YR 6/4) and brownish-yellow (10YR 6/8), very fine-grained sand, thinly laminated, trace subvertical clay veins, moderately severely weathered, slightly moist, very soft rock hardness		34	44	4.5		58	38	
	1K-4 M				18						
7					49						0.0% Gravel
		2			40						90.1% Sand
8		1	At 6' Lack of clay veins, closely fractured		50/3"	50/3"	4.3	32	64	48	9.9% Fines
	1K-5 T		At 7' Yellowish-brown (10YR 5/4) and dark gray (10YR 4/1) and white (2.5Y 8/1), moderately hard		34						
9			At 8' Trace subvertical dark gray clay veins, severely to very severely weathered		29						
					31						
10					24	55					0.0% Gravel
	1K-6 T				42						90.1% Sand
11					50/6"	50/6"		12		40	9.9% Fines
12			Boring terminated at 11 feet. No groundwater encountered.								
			NOTE: Sampling was performed in 24 inch long drives. No drilling was performed between samples.								
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 8
Project No. 1886
Date: 12/10/18

LOGGED BY CLA DATE DRILLED 10/10/2018 BORING DIAMETER 3½" SS BORING NO. 1M

DRILL RIG Minuteman with Tripod HAMMER TYPE 140 lb Hammer & Cat Head

Depth (feet)	Sample	Sample Type	Soil Description	USCS	Field Blow Counts	SPT "N" Value	Pocket Pen. (tsf)	% Passing #200 Sieve	Dry Density (pcf)	Moisture Content (%)	Additional Lab Results
1	1M-1L		**BEDROCK: BUTANO SANDSTONE:** Pink (7.5YR 7/4), very fine- to fine-grained with trace medium grains, poorly-graded, quartz rich, trace thin subvertical siltstone, very fine-grained sandstone beds, slightly moist, very soft rock hardness (friable), upper two feet weathered to a medium dense, silty sand		14						
					23						
		2			26						
2		1			22	25		24	113	6	
	1M-2L				20						
3					26						
		2	Moderately weathered, scattered mica flakes		29						
4		1			34	32			110	9	
	1M-3M				31						
5					37						
		2			47						
6		1			60/5"	60/5"			113	9	
	1M-4T		Light brown (7.5YR 6/4) and pink (7.5YR 7/4), very friable, lack of subvertical bedding, moderate rock hardness		54						
7					34						
					25						
8					27	52					
	1M-5T		Variegated white (WHITE 9/N2) and redish-yellow (7.5YR 6/8), slightly cemented, slightly moist to dry		26						
9					22						
					21						
10					19	40		42		10	
			Boring terminated at 10 feet. No groundwater encountered.								
11											
			NOTE: Sampling was performed in 24 inch long drives. No drilling was performed between samples.								
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 9
Project No. 1886
Date: 12/10/18

LOGGED BY CLA DATE DRILLED 10/10/2018 BORING DIAMETER 3½" SS BORING NO. 1L

DRILL RIG Minuteman with Tripod HAMMER TYPE 140 lb Hammer & Cat Head

Depth (feet)	Sample	Sample Type	Soil Description	USCS	Field Blow Counts	SPT "N" Value	Pocket Pen. (tsf)	% Passing #200 Sieve	Dry Density (pcf)	Moisture Content (%)	Additional Lab Results
1	1L-1 L	2	**FILL: SAND WITH SILT:** Light yellowish-brown (2.5Y 6/3), fine- to medium-grained, sub-rounded shaped, poorly-graded, quartz rich, poorly indurated, few rootlets, dry, loose	SP-SM	3						
		1			3						
2					3						
	1L-2 L		Sand fines slightly with depth, sub-rounded sandstone gravel up to ½" in diameter at 3½'		4	4		10	89	5	
3					3						
		2			5						
		1			7						
4					10	9		10	92	4	
	1L-3 L		**NATIVE: SILTY SAND:** Light yellowish-brown (2.5Y 6/3), fine- to medium-grained, sub-rounded shaped, poorly-graded, quartz rich, poorly indurated, slightly moist to dry, medium dense	SM	7						
5		2			7						
		1			10						
6	1L-4 L		Light yellowish-brown (2.5Y 6/3) and yellowish-brown (10YR 5/4), fine-grained		11	17					
		2			12						
7		1			12						
					14						
8	1L-5 L		**BEDROCK: SANTA MARGARITA SANDSTONE:** Pale brown (2.5Y 7/4 & 7/3), fine-grained, poorly-graded, quartz rich, massive, friable, moderately to slightly weathered, slightly moist, very soft rock hardness		15	23		16		6	
		2			12						
9		1			12						
					15						
10	1L-6 L		Pale brown (2.5Y 7/4 & 7/3) and white (2.5Y 8/1), dense		15	30					
					21						
11					22						
		2			24						
12		1			26	50					
13			Boring terminated at 12 feet. No groundwater encountered.								
			NOTE: Sampling was performed in 24 inch long drives. No drilling was performed between samples.								
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 10
Project No. 1886
Date: 12/10/18

LOGGED BY CLA DATE DRILLED 10/10/2018 BORING DIAMETER 3½" SS BORING NO. 2L

DRILL RIG Minuteman with Tripod HAMMER TYPE 140 lb Hammer & Cat Head

Depth (feet)	Sample	Sample Type	Soil Description	USCS	Field Blow Counts	SPT "N" Value	Pocket Pen. (tsf)	% Passing #200 Sieve	Dry Density (pcf)	Moisture Content (%)	Additional Lab Results
1	2L-1 L	2	**NATIVE: SAND WITH SILT:** Brown (10YR 4/3), light yellowish-brown (2.5Y6/4) and brownish-yellow (10YR 6/8), fine- to medium-grained, sub-rounded shaped, poorly-graded, quartz rich, poorly indurated, slightly moist to dry, loose	SP-SM	2 4 6						
2		1			11	9		6	96	4	
	2L-2 L		Light yellowish-brown (2.5Y6/4), medium dense		10 11						
3		2			15						
4		1			16	16			97	3	
	2L-3 L		No sample recovered. Recovered sample using sand catcher, highly disturbed. (Tsm?)		21 21						
5		2			22						
6		1			25	38					
	2L-4 L		**BEDROCK: SANTA MARGARITA SANDSTONE:** Pale brown (2.5Y 8/3), fine-grained, poorly-graded, quartz rich, massive, manganese oxide staining, slightly moist to dry, very soft rock hardness		21 21						
7		2			22						
8		1			25	43			98	7	
	2L-5 L				18 17						
9		2			19						
10		1			19	38		14		8	
	2L-6 L				19 18						
11		2			19						
12		1			25	44					
13			Boring terminated at 12 feet. No groundwater encountered.								
14			NOTE: Sampling was performed in 24 inch long drives. No drilling was performed between samples.								
15											
16											
17											
18											
19											
20											
21											
22											
23											

Pacific Crest ENGINEERING INC

Log of Test Borings
Lompico Tank Sites
Santa Cruz County, California

Figure No. 11
Project No. 1886
Date: 12/10/18

APPENDIX B

Haro Kasunich & Associates (2012) Log of Test Borings

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS — LIQUID LIMIT IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

GRAIN SIZES

U.S STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4"	3"	12"	
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4-10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH**	BLOWS/FT*
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D) split spoon (ASTM D-1586)

** Unconfined compressive strength in tons/ft² as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation

HARO, KASUNICH & ASSOCIATES | FIGURE NO. 6 KEY TO LOGS

Haro, Kasunich & Associates, Inc.

Lompico-Kaski Tank Site

PROJECT NO. SC10325

LOGGED BY CG DATE DRILLED May 15, 2012 BORING DIAMETER 4" BORING NO. B-1

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0	1-1 (L)		Dark brown black SILT with Clay (loam), roots, very moist, fim	MH	16		61	51.4	(1-1) Atterberg Limits LL = 61.6% PI = 19 (1-1) Qu = 1.85 ksf
	1-2 (T)		Yellow brown fine SILTSTONE (blocky) moist, hard	ML	31			49.1	
5									
	1-3 (T)		Tan brown Sandy SILTSTONE, moist, very hard	ML	52/6"			39.1	
10			Boring terminated at 10 feet						
15									
20									
25									
30									
35									

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk FIGURE NO. 7

Lompico-Kaski Tank Site

Haro, Kasunich & Associates, Inc.

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 15, 2012 | BORING DIAMETER 4" | BORING NO. B-2

Depth, ft.	Sample No. and type	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0		Fill, Black brown SILT with Clay & roots very moist, stiff	MH					
	2-1 (L)			17		62	56.9	(2-1) GSA % Gravel = 10.5 % Sand = 14.9 % Silt = 49.4% Clay = 25.3
	2-2 (T)	Mixed yellow brown SILTSTONE and dark brown Sandy SILT, very moist, stiff		13				
5	2-3 (L)	Mixed dark brown SILT with Clay and Siltstone clasts, very moist, stiff	ML	39			47.6	(2-1) Atterberg Limits LL = 69.7% PI = 24
	2-4 (T)	Native, Yellow brown weathered SILTSTONE, very moist, stiff	ML	15				
10	2-5 (T)	Yellow brown weathered SILTSTONE with trace of Clay, very moist, stiff	ML	16			50.8	
	2-6 (L)			31		67	39.3	(2-6) Qu = 2.29 ksf
15	2-7 (T)	Brown blocky SILTSTONE with orange stains, very moist, hard	ML	39			42.7	
		Boring terminated at 15 feet						
20								
25								
30								
35								

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 8

Haro, Kasunich & Associates, Inc.
Geotechnical Consulting Engineers

Lompico-Kaski Tank Site

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 15, 2012 | BORING DIAMETER 4" | BORING NO. B-3

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0	3-1 (T)		Native, Dark brown Clayey SILT with Siltstone clasts, moist, medium dense	MH	17			49.6	
5	3-2 (T)		Mottled light and dark brown Clayey SILT with Siltstone clasts (very weathered bedrock) very moist, very stiff	ML	25			61.1	
	3-3 (T)		Light brown fractured SILTSTONE, moist, very stiff	ML	27			32.1	
10	3-4 (T)		Light brown fractured Sandy SILTSTONE, moist, very hard	ML	55			45.2	
15			Harder drilling from 15' - 17'						
			Light brown Sandy SILTSTONE, moist, hard	ML					
20	3-5 (T)		Light brown rust stained, lightly cemented SILTSTONE, moist-very moist, hard	ML	33				
			Boring terminated at 21.5 feet						
25									
30									
35									

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 9

Haro, Kasunich & Associates, Inc.
Geotechnical Engineers

Lompico-Madrone Tank Site

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 15, 2012 | BORING DIAMETER 4" | BORING NO. B-4

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0	4-1 (L)		Fill, brown and yellow Silty SAND with trace of Clay, very moist, loose	SM	9				(4-1) Atterberg Limits Non Plastic
	4-2 (T)				6			14.4	(4-1) GSA % Sand = 69.0 % Silt = 24.2 % Clay = 6.7
5			Brown uncemented Silty SAND with Sandstone clasts, very moist, loose	SM	8				
	4-3 (T)		Native, Orange brown uncemented medium to coarse SAND with Silt, very moist, loose-medium dense	SM				13.7	
	4-4 (L)				23		112	15.7	(4-4) Qu = 2.16 ksf
	4-5 (T)		Orange and light brown uncemented Silty SAND with trace Clay (weathered Sandstone) very moist, dense	SM	31			14.7	
10									
	4-6 (T)		White and orange weathered SANDSTONE and Siltstone, very moist, very dense	SM	50/3"				
15									
20	4-7 (T)		Light brown & orange SANDSTONE, moist, very dense	SM	50/6"			9.7	
			Boring terminated at 21.5 feet						
25									
30									
35									

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 10

Haro, Kasunich & Associates, Inc.
Geotechnical & Mineral Engineers

Lompico-Madrone Tank Site

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 15, 2012 | BORING DIAMETER 4" | BORING NO. B-5

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Fill, brown SAND with SILT, very moist, loose	SM	11		109	16.1	(5-1) GSA
	5-1 (L)		Native, Orange uncemented Silty SAND (weathered Sandstone) very moist, loose	SM	8			16.4	% Sand = 60.0 % Silt = 29.4 % Clay = 10.6
5	5-2 (T)								
	5-3 (T)		Orange, uncemented Silty SAND (weathered Sandstone) very moist, medium dense	SM	15			9.2	
10	5-4 (T)		Orange & light brown slightly cemented SAND, (less weathered Sandstone), very moist, medium dense	SM	24			13.0	
15	5-5 (T)		Orange brown slightly cemented SAND, very moist, dense		36			9.4	
			Boring terminated at 16.5 feet						
20									
25									
30									
35									

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 11

Haro, Kasunich & Associates, Inc.

Lompico-Lewis Tank Site

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 16, 2012 | BORING DIAMETER 6" | BORING NO. B-6

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Brown Silty SAND (colluvium), damp, loose	SM					
	6-1 (L)				10		106	4.3	(6-1) GSA% Sand = 90.7 % Fines = 9.3
	6-2 (T)		Brown Silty SAND, moist, loose	SP-SM	7				
5			Yellow brown SAND with Silt (colluvium) moist, loose	SM	16		105	7.3	
	6-3 (L)								
	6-4 (T)		Medium dense at 7 feet		15				
10	6-5 (T)		Very light brown Silty SAND with slight orange stains, moist, medium dense	SM	22			8.4	
15	6-6 (T)		Very light brown (white) with orange stains, moist, dense	SM	35			9.2	(6-6) GSA % Sand = 85.5 % Fines = 14.5
20	6-7 (T)		Very light brown Silty SAND with orange stains, moist, dense	SM	30			8.6	
25	6-8 (T)		Very light brown Silty SAND with orange stains with angular 1/2" to 1" diameter Gravels, moist, very loose	SM	1			8.9	
	6-9 (T)				1			9.3	
30	6-10 (T)		Very light brown SAND with orange stains, moist, dense	SM	28			9.8	
	6-11 (T)				31				
35			Boring terminated at 31.0 feet						

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 12

Haro, Kasunich & Associates, Inc.

Lompico-Lewis Tank Site

PROJECT NO. SC10325

LOGGED BY: CG | DATE DRILLED: May 16, 2012 | BORING DIAMETER: 4" | BORING NO. B-8

Depth, ft.	Sample No. and type	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0		Brown Silty SAND with roots (colluvium), damp, very loose	SM					
5	8-1 (T)			5		6.4		
		Color change to yellow brown						
10	8-2 (T)	Yellow brown SAND with Silt, moist, medium dense (Santa Margarita Formation)	SM	24				
15	8-3 (T)	Very light brown Silty SAND with orange stains, moist, dense		35		10.5		
20		Same						
25	8-4 (T)	Very light brown Silty SAND orange stains, moist, very dense	SM	48		9.0		
30		Same						
35								

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk | FIGURE NO. 14

Haro, Kasunich & Associates, Inc.

Lompico-Lewis Tank Site

PROJECT NO. SC10325

LOGGED BY CG | DATE DRILLED May 16, 2012 | BORING DIAMETER 4" | BORING NO. B-8

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
35	8-5 (T)		Very light brown Silty SAND with orange stains and pockets of orange Sand, moist, very dense	SM	60		16.8		
			Boring terminated at 36.5 feet						
40									
45									
50									
55									
60									
65									
70									

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk FIGURE NO. 15

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Appendix C

Limited Asbestos Inspection Report for Pre-Demolition/Renovation Purposes at Lewis Treatment Plant Building in Lompico, California

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AERO-ENVIRONMENTAL
CONSULTING

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831.394.1199 Fax 831.394.1627 Jorge@Aero-Enviro.com

July 21st, 2019

Greg Unger
Field Services and System Coordinator
San Lorenzo Valley Water District
13060 Highway 9
Boulder Creek, CA 95006-9119

Re: Asbestos/Lead Survey for a small water treatment plant building located at the top of West Drive in Lompico, California.
Aero-Environmental Project Name: SLVWD-LEWIS TREATMENT PLANT-ASBESTOS/LEAD SURVEY

Mr. Unger:

We are pleased to enclose this Asbestos/Lead inspection report for the above referenced property.

Thank you for this opportunity to be of service to you. If you have any questions regarding the survey or report, please do not hesitate to contact me at (831) 394-1199

Sincerely,
Aero-Environmental Consulting

Jorge Vizcaino
Owner/Director
Certified Industrial Hygienist No. 9814
Certified Asbestos Consultant No. 04-3554
CDPH Lead Inspector/Assessor No. 15393

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AERO-ENVIRONMENTAL CONSULTING

MONTEREY BRANCH
1426 VIA ISOLA
MONTEREY, CALIFORNIA 93940
(831) 394-1199

LIMITED ASBESTOS INSPECTION REPORT FOR PRE-DEMOLITION/RENOVATION PURPOSES AT LEWIS TREATMENT PLANT BUILDING LOMPICO, CALIFORNIA

JULY 21ST, 2019

PREPARED FOR:

GREG UNGER
FIELD SERVICES AND SYSTEM COORDINATOR
SAN LORENZO VALLEY WATER DISTRICT
13060 HIGHWAY 9
BOULDER CREEK, CA 95006-9119

AERO-ENVIRONMENTAL PROJECT NAME: SLVWD-LEWIS TREATMENT PLANT-ASBESTOS/LEAD SURVEY

PREPARED BY:

Jorge I. Vizcaino
Certified CDPH Lead Consultant 15393
Certified Asbestos Consultant No. 04-3554
Certified Industrial Hygienist No. 9814
Certified Hazardous Material Manager No. 19631

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AERO-ENVIRONMENTAL
CONSULTING

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1.0 EXECUTIVE SUMMARY

At the request of Mr. Greg Unger with San Lorenzo Valley Water District, Aero-Environmental conducted an assessment of Suspect Asbestos-Containing Materials (ACM) and Lead-Containing Materials that may be impacted during planned demolition/renovation activities for National Emission Standards for Hazardous Air Pollutants (NESHAP) and CAL-OSHA compliance located at the top of West Drive in Lompico, California. This survey was limited in its complete scope as full demolition of all walls, hard ceilings, and electrical panels was not conducted. There was also a heavy infestation of rodents at the time of our site assessment.

The small building of this water treatment site is scheduled for renovation/demolition activities in the near future. The building consists of exterior wood siding over wood framing, roofing metal panels over asphalt roofing felt paper, interior concrete slab, interior wood framing and panels with no drywall, and ceiling wood panels. No Asbestos/Cement (A/C) pipes were observed in this building.

No suspect thermal system insulation (TSI) was observed in this building. Any thermal system insulation that is encountered that is not fiberglass should be assumed to be asbestos-containing.

During the survey seven (7) homogeneous suspect ACMs were identified in this building. All identified ACMs are listed below in Table I below.

Table I summarizes the materials identified as ACMs or Suspect ACMs in this building. Table II summarizes the materials that were determined to be negative for asbestos content. Table III summarizes the materials that were identified as suspect Lead-Containing Materials.

2.0 SCOPE OF WORK

Aero-Environmental's Mr. Jorge Vizcaino, Certified Industrial Hygienist No. 9814/State of California, CAL-OSHA Certified Asbestos Consultant No. 04-3554 performed the inspection on July 15th, 2017. The assessment included the following services:

2.01 Asbestos/Lead

- Conducting all work in accordance with the USEPA NESHAP, CAL-OSHA, and AHERA regulations.

- A walk through of the entire property and all associated areas and the collection of samples by an EPA/CAL-OSHA certified asbestos inspector from

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each suspect ACM that might be impacted by future demolition.

- Conducting semi-destructive sampling of the interior and exterior materials of this building.

- Evaluation of material condition, friability, reporting of findings, and remediation alternatives.

- Analysis of samples by a state certified laboratory (accredited under the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) and the California DHS Environmental Laboratory Accreditation Program (ELAP) using polarized light microscopy (PLM) according to the EPA-recommended method. Chrysotile, Crocidolite as well as types of non-asbestos fibrous material identified.

- Collect samples of bulk materials and paint chips of the primary painted surfaces suspected to be lead containing for purposes of compliance with California Department of Occupational Safety and Health (DOSH) Lead in Construction Standard. Bulk samples and paint chips were analyzed at an accredited laboratory by Flame Atomic Absorption (AA) for Total Lead reported in parts per million (ppm) or percentage by weight (%wt).

- Preparation of a report that includes a description of our assessment, results of sample analysis, a discussion of these results.

- Recommendations for future actions, as appropriate.

3.0 METHODS AND SAMPLING STRATEGY

3.01 Visual Inspection

Accessible building materials were visually inspected using the methods presented in the federal Asbestos Hazard Emergency Response Act (AHERA) regulations (40 CFR, Part (763) as a guideline. AHERA was originally only applicable to schools, however state and federal Occupational Safety and Health Administration (OSHA) and Asbestos School Hazard Abatement and Reauthorization Act (ASHARA) have adopted the AHERA sampling methodology for all buildings subject to demolition or renovation.

3.02 *Bulk Sampling of Asbestos*

Bulk samples of all homogeneous materials from identified functional spaces containing suspect ACM were collected. A homogeneous material is defined as a surfacing material, thermal system insulation, or miscellaneous material that is

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uniform in use, color and texture. Examples of homogeneous materials include: pipe insulation produced by the same manufacturer and installed during the same time period; floor tile of identical size, color and pattern; and sprayed-on acoustical ceiling materials located in contiguous areas. Homogeneous materials of thermal system insulation and surfacing materials are typically sampled in at least three locations, creating a sample set, in accordance with the 3-5-7 sample rule as outlined in OSHA.

A functional space is defined as any spatially distinct unit within a building that contains identifiable populations of building occupants. Examples of functional spaces include office areas; storage areas; mechanical rooms; and roofs.

Once the inspector identified a suspect material, an optimal area was selected from which to collect a sample. Prior to obtaining the sample, the suspect material was sprayed with amended (surfactant added) water to minimize fiber release. Samples were then placed into individual polyethylene sampling bags and labeled for transport under chain of custody procedures to the laboratory. A field-sampling log was filled out (depicting sample number, description of the material, location, condition, accessibility, friability and quantity), and the location of each sample was placed on a floor plan. A unique sample number was assigned to each sample. Throughout the process special care was taken to prevent cross-contamination of the collected samples by cleaning sampling equipment prior to taking each sample. All field documentation, and laboratory reports, is archived by Aero-Environmental.

3.03 Bulk Sample Analysis - Asbestos

EMLAB P&K is accredited under the National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) for determination of asbestos fibers in bulk materials.

All samples were analyzed using polarized light microscopy (PLM) techniques in accordance with methodology approved by the U.S. Environmental Protection Agency (EPA). As set forth in the Code of Federal Regulations, 40 CFR Part 763, Appendix A to Subpart F, Section 1.2 and 1.7.2.4, the lower limit of reliability detection for asbestos using the PLM method is approximately one percent (1%) by volume. Cal-OSHA defines asbestos containing construction materials (ACCM) as those materials having asbestos content of greater than one tenth of one percent (>0.1%).

When None Detected (ND) appears in this report, it should be interpreted as meaning no asbestos was observed in the sample material above the reliable limit of detection for the PLM method.

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Note: under EPA assessment criteria, if a single sample of a homogeneous material tests positive for asbestos, all homogeneous materials within that building are considered to be asbestos containing.

3.04 Bulk Sampling - Lead Containing Materials

Paint chip and/or suspected lead containing materials were collected using a hand scraper and were placed into individual plastic sampling containers. Each sample was provided a discreet sample number, which was recorded on a chain-of-custody form. The samples were then sent to EMLAB P&K in Irvine, California.

4.0 REPORTING GUIDELINES AND DEFINITIONS

4.01 DEFINITIONS

4.01.1 Asbestos

ACM is defined by Cal/EPA and Cal/OSHA as materials containing greater than one percent (>1%) concentrations of asbestos.

4.02 NESHAPs

The USEPA asbestos NESHAP (Title 40 Code of Federal Regulations [CFR] Part 61, Subpart M) regulation applies to certain demolition and renovation projects in *facilities* containing ACM. Under NESHAP, owners of buildings and/or their contractors are required to notify applicable state and local agencies before renovation of "facilities" where asbestos material will be disturbed. In addition, the NESHAP requires special removal, handling, and disposal practices to be followed during demolition and renovation of all facilities.

NESHAP defines facilities as any institutional, commercial, public, industrial or residential structure, installation or building containing condominiums, or individual dwelling units operated as residential cooperatives, but excluding residential buildings having four or fewer dwelling units); ships; or active or inactive waste disposal sites.

Notifications are mandatory for the following:

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- For every demolition even where no RACM is present, for each renovation operation where the amount of RACM is greater than or equal to 100 square feet, and for all dry removals, a written plan or notification of intent to demolish or renovate shall be provided to the Monterey Bay Air Resources District (MBARD) at least ten (10) working days prior to commencement of demolition or renovation. Notification shall be as early as possible prior to commencement of emergency demolition or renovation. Such notification shall include the following information. Failure to provide such information shall constitute failure to notify.
- Indicate whether the notification is the original or a revision.
- The name, address and telephone numbers of both the owner(s) of the structure and the operator of the demolition or renovation.
- A description of the structure being renovated, including the size, number of floors, age of the oldest portion, and the present and prior use of the structure.
- An estimate of the approximate amount of RACM to be removed from the structure or portion thereof, in terms of length of pipe in linear feet, surface area in square feet, or volume in cubic feet.
- The name, address and telephone number of the person who completed the asbestos survey including the CAL-OSHA certification number as applicable as specified in Section 11-2-303.8
- The procedures used, including the analytical laboratory method employed, to locate and identify the presence of RACM and Category I and Category II non-friable asbestos-containing material.
- The address and location (including building number or name and floor or room number, as applicable) of each structure where demolition or renovation will occur.
- Accurate starting and completion dates of demolition or renovation.
- A description of planned demolition or renovation and method(s) to be employed.
- A description of work practices and engineering controls to be used including emission control procedures for asbestos removal and waste handling.
- The name, address and location of the waste disposal site where the asbestos-containing waste material will be deposited.
- A copy of the order to demolish including the name, title, and authority of the state or local governmental representative who has ordered a demolition pursuant to Section 11-2-303.11.
- Effective November 20, 1991, certification that at least one person, trained as required by Section 11-2-303.9, will supervise the asbestos removal described in this plan.
- Description of the procedures to be followed in the event that unexpected RACM is found or Category II non-friable asbestos-containing material becomes friable.
- The name, address and telephone number of the waste transporter. Such notification shall be typewritten or computer printed and submitted on a District-approved form or facsimile thereof.

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Exceptions

Notifications to the MBARD must be postmarked at least ten working days prior to the start of any demolition (including demolition activities where no asbestos is present) or renovation activity that will disturb asbestos.

The NESHAP rule usually requires that all friable ACM and some categories of non-friable ACM be removed before a building is demolished, and may require localized removal before or as part of a renovation. For renovation projects where ACM will be disturbed, the NESHAP rule may require appropriate work practices or procedures for the control of emissions that may include a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the stripping and removal of asbestos material. The system must exhibit no visible emissions to the outside air. The following NESHAP definitions of ACM are very important in interpreting which NESHAP requirements may apply to your building:

- **Asbestos-containing material (ACM):** Any material that contains more than 1% asbestos as determined using PLM analysis.

- **Demolition:** The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

- **Facility:** Any institutional, commercial, public, industrial or residential structures, installation or building containing condominiums, or individual dwelling units operated as residential cooperatives, but excluding residential buildings having four or fewer dwelling units; ships; or active or inactive waste disposal site. Any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation or building.

- **Friable ACM**: Any material containing more than 1% asbestos, determined using PLM analysis, that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

- **Category I non-friable ACM**: Asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1% asbestos as determined using PLM. NESHAP allows these materials to be demolished in place using standard demolition techniques

- **Category II non-friable ACM**: Any material excluding Category I non-friable ACM, containing more than 1% asbestos as determined using PLM that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure (such as Transite®, asbestos cement products).

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- **Regulated Asbestos-Containing Material (RACM)**: (1) friable ACM; (2) Category I non-friable ACM that has become friable; (3) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or (4) Category II non friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the materials in the course of demolition or renovation operations regulated by NESHAP. NESHAP requires these materials to be removed prior to demolitions.

- **Renovation: A**ltering a facility or one or more facility components in any way, including the stripping or removal of RACM from facility components. Operations in which load supporting structural members are wrecked or taken out are demolitions.

NESHAP requires that prior to commencement of the demolition or renovation the owner or operator of a demolition or renovation activity *thoroughly inspect* the affected facility or part of the facility where renovation operations will occur for the presence of asbestos.

4.03 Monterey Bay Air Resources District

The MBARD under rule 3050 has adopted regulations and policies to implement the asbestos demolition and renovation requirements developed by the EPA under the NESHAP regulation. An asbestos notification must be submitted to MBUAPCD at least ten working days prior to; (1) any regulated demolition, or (2) any renovation disturbing at least 160 square feet of RACM, 260 linear feet of asbestos-containing pipe insulation, or 35 cubic feet of RACM (where the length or area could not be measured previously) from facility components.

4.04 Title 8 – 1529 California Code Of Regulations

The State of California also has specific regulations regarding asbestos. California standards for the workplace are issued primarily by Cal/OSHA. Specific asbestos requirements are contained in Title 8 of the California Code of Regulations (CCR) and in the California Health and Safety Code. Under Cal/OSHA, an ACM means any material containing 1% asbestos. Any manufactured construction materials (friable and non-friable) containing more than 0.1% asbestos by weight are defined as Asbestos Containing Construction Material (ACCM)**.** The ACCM designation is applicable only to reporting (user registration, temporary worksite notification, and incident reporting). The removal or disturbance of 100 square feet or more of ACCM must be performed by a contractor certified by the California Contractor's State License Board to conduct asbestos-related work and/or an employer/contractor registered with the California Division of Occupational Safety and Health (DOSH) to

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perform asbestos-related work. Some portions of the Cal/OSHA standard apply when materials contain any amount of asbestos.

4.05 Assembly Bill 3713 – Notifications

On January 1, 1989, Assembly Bill 3713 mandated the addition to the California Health and Safety Code of Chapter 10.4, which affects owners of buildings constructed prior to 1979. The regulation details notification requirements for owners of buildings with known ACM. The bill requires owners to provide written notices to employees, contractors, and lessees concerning matters related to ACM. The notice must include (1) existence of, conclusion from, and contents of asbestos building surveys, (2) specific locations of ACM, (3) general procedures and handling restrictions to minimize asbestos disturbance, (4) results of any bulk analysis of air monitoring conducted, and (5) potential health risks associated with asbestos exposure.

For non-friable materials (i.e., material in which asbestos fibers are completely encapsulated) such as asbestos-containing resilient floor covering, notice must include (1) information described in Items 1 and 2 in the preceding paragraph, and (2) warning that activities such as removing, sanding, scraping, etc. are restricted and should not be performed by unqualified employees.

Notice in writing to each individual employee must be provided within fifteen days of the receipt of information identifying the presence or location of ACM within the building; annual notification is required thereafter. The regulation also requires the posting of warning notices in building areas where construction, maintenance, or remodeling may create a release or disturbance of ACM. The warning must contain the information specified below:

CAUTION
Asbestos. Cancer and Lung Disease Hazard
Do Not Disturb Without Proper Training and Equipment

Proposition 65

Proposition 65 (Health and Welfare Agency Regulations, Title 22 CCR Division 21.5), the Safe Drinking Water and Toxic Enforcement Act of 1986, took effect February 27, 1987. This act prohibits all building owners and private businesses with ten or more employees from "knowingly" or "intentionally" exposing any individual to a listed chemical without first providing a "clear and reasonable warning" of such exposure. For asbestos, the level at which warning requirements are exempted, or the "no significant risk" level, is 100 fibers inhaled per day, or 140 million fibers ingested per

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day.

5.0 Asbestos Results

During the survey seven (7) homogeneous suspect ACMs were identified in this building. One (1) of the homogeneous materials identified in the survey had detectable levels of asbestos and is therefore considered an Asbestos Containing Materials. All identified ACMs or suspect ACMS are listed below in Table I below.

TABLE 1-ASBESTOS-CONTAINING MATERIALS

Material Description	Material Location	TSI	Surf.	Misc	Regulated Asbestos Containing Material (RACM)	Cat. I Non-Friable	Cat. II Non-Friable	% Asbestos	Approximate Quantity
Gray Roofing Penetration Mastic	Roof-Vent Pipe			X		X		5% CH	1 vent pipe observed

CH = Chrysotile, ND = None Detected

Six (6) of those suspect materials identified in the survey did not contain asbestos. The materials that were reported as negative for asbestos content are listed in Table II below.

TABLE II NON-ASBESTOS-CONTAINING MATERIALS

Material Description	Material Location (s)
Lab top Countertop Covering and adhesive	**Inside building**
Gasket O-Ring	**Water Valves**
Moisture Barrier	**Interior Walls**
Green Trim Paint	**Exterior Trim**
White Siding Paint	**Exterior Siding**
Roofing Felt Paper	**Underneath metal panels**

6.0 Lead Results

Four (4) paint chip samples were collected in the survey area to determine potential lead content. Paint chip samples were collected from the primary interior and exterior surfaces associated with the structures/areas to be renovated. Table III below summarizes the sampling locations and lead content of each material.

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Table III-Lead Sample Results

Sample #	Description/Location of Sample	Concentration of Lead
LTP-PC1	Exterior White Siding Paint	**<0.005% wt**
LTP-PC2	Exterior White trim Paint	**<0.005% wt**
LTP-PC3	Exterior Green trim Paint	**<0.005% wt**
LTP-PC4	Interior White Paint	**<0.005% wt**

7.0 Regulatory Requirements

Asbestos-containing building materials contain asbestos in concentrations greater than one tenth of one percent (0.1%). Impacting materials containing greater than 0.1% asbestos either through repair, maintenance, renovation or demolition activities triggers numerous regulations enforced by such agencies as OSHA (worker protection) and EPA (environmental exposure, transportation and disposal).

Listed below are the regulations that apply if the materials are removed:

- Any individual who contracts to provide health and safety services relating to ACMs must be certified by Cal-OSHA as either a Certified Asbestos Consultant or a Site Surveillance Technician. The activities they are certified to provide include: conducting asbestos surveys; writing work plans or specifications for abatement; monitoring the work of abatement contractors; collecting air samples; and determining if the work area is safe for re-occupancy by non-asbestos workers. Regulation: Cal-OSHA 8 CCR 1529 (q)(1).

- If more than 100 square feet of materials that contain greater than 0.1% asbestos will be abated, they must be abated by a Cal-OSHA registered asbestos abatement contractor. Regulation: Cal-OSHA 8 CCR 1529 (R).

- Suspect ACMs that are classified by OSHA as other/miscellaneous materials are present. Removal of these materials is considered a Class II activity according to Cal-OSHA regulations. Work practices and engineering controls for Class II work are specified in Cal-OSHA 8 CCR 1529 (g) (7-8).

- ACMs that are classified by OSHA as TSI/Surfacing materials are not present.

- For all Class II jobs, where the employer cannot produce a negative exposure assessment pursuant to subsection (f)(2)(C) of this section (CCR-Title 8, 1529), or where employees are working in areas adjacent to the regulated area, while the

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Class II work is or being performed, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:

1. Critical barriers shall be placed over all the openings to the regulated area, except where activities are performed outdoors; or

2. The employer shall use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area surveillance during each work shift at each boundary of the regulated area, showing no visible asbestos dust; and perimeter area monitoring showing that clearance levels contained in 40 CFR Part 763, Subpart E, of the EPA Asbestos in Schools Rule are met, or that perimeter area levels, measured by Phase Contrast Microscopy (PCM) are no more than background levels representing the same area before the asbestos work began. The results of such monitoring shall be made known to the employer no later than 24 hours from the end of the work shift represented by such monitoring.

Exception: For work completed outdoors where employees are not working in areas adjacent to the regulated areas, this subsection (g)(4)(B) is satisfied when the specific control methods in subsection (g)(5) of this section are used.

Class II Asbestos Roofing work

There must be at least one EPA certified supervisor competent person on the job at all times, all other workers must be trained in the hazards of asbestos disturbance and roofing safety.

- Roofing material that has been identified as ACM using analytical techniques must be removed intact to the extent feasible.
- Wet methods shall be used anytime the removal of intact materials is not feasible.
- Wet method shall be used at all times unless a competent person determines that the utilization of water will become additional job hazard.
- Any time a cutting machine is used the competent person will be in charge of determining how much water is needed and when the wet methods result into safety hazards.
- Removed roofing material shall not be dropped or thrown to the ground. This material shall be kept wet and placed in a 6 mil plastic bag or wrapped in plastic sheeting while waiting for disposal. It will be lowered to the ground as soon as practical, at least by the end of the work shift, by hand, crane, hoist, or dust tight chute.

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- Upon being lowered all roofing shall be immediately transferred to a close bin or dumpster nearby taking care not to release dust from the debris.

- Remove all objects not fastened to the roof from the work area prior to commencement of disturbance activities.

- Utilize plastic sheeting catch devices, secured at the structure foundation, to contain incidental falling roof debris, as needed.

- Cover all stationary objects and surfaces not intended for removal of asbestos containing roofing material. Cover and render air-tight all passageways such as doors, windows, skylight, vents, or registers, in or near the work area, with 6 mil plastic sheeting, or hardwood barriers with studded support. Confine all debris associated with roofing removal activities and prevent dispersal into the facility.

Lead-Standards, Guidelines, and Recommendations

- Any layer of paint or material containing >0.5% or >5000 ppm (mg/Kg) by weight of lead is considered lead based paint (LBP) or lead-based material and should be removed by a certified lead abatement contractor. However, any work involving construction work where an employee may be occupationally exposed to lead is regulated under the California Code of Regulations (8 CCR 1532.1) Cal/OSHA Lead in Construction Standard. Construction work is defined as work for construction, alteration and/or repair, including painting and decorating.

- Therefore lead-based paint/lead-containing regulations do NOT apply for removal or abatement of the exterior and interior paint since lead-based paint/lead containing paint was NOT detected in the samples collected.

7.01 Recommendations to Implement Regulatory Requirements

- Retain a Certified Asbestos Consultant or Site Surveillance Technician to provide onsite construction supervision of the asbestos abatement contractor to ensure utilization of proper work practices as stated in the work plan or specification. The Consultant also ensures that all local, state and federal regulations are followed. The on-site Consultant generates documentation of contractor work practices and training, and asbestos air sampling results. The on-site Consultant also ensures that all asbestos materials are removed by the abatement contractor and properly manifested. Alternatively, the owner may rely solely on a licensed asbestos abatement contractor to perform work as stipulated in the project specifications.

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Aero-Environmental recommends that prior to renovation/demolition activities that will impact Asbestos-Containing Materials (ACM) identified in this report:

1. These materials should be removed and disposed of by a California, DOSH registered, licensed asbestos abatement contractor using certified asbestos abatement workers, proper engineering controls, and worker protection.
2. The removal of the above listed Category I Asbestos Containing Materials- Gray Roofing Penetration Mastic listed in Table 1), should be conducted using Class II Asbestos OSHA work methods described above.
3. "Suspect" asbestos insulated pipes were not observed during this survey but these pipes can be located behind wall/ceiling cavities or in attic areas. Removal of these materials should follow strict OSHA, Class I work methods
4. This survey was limited in its complete scope as full demolition of all walls, hard ceilings, and electrical panels was not conducted.
5. The purpose of the asbestos inspection was to respond to the Monterey Bay Air Resources District (MBARD) and Cal/OSHA requirement for a comprehensive survey to be conducted for ACM prior to any planned renovation/demolition in accordance with the United States Environmental Protection Agency (USEPA) National Emission Standard for Hazardous Air Pollutants (NESHAP) regulation (Title 40 Code of Federal Regulations [CFR] Part 61 Subpart M).
6. A notification should be provided to MBARD and Cal/OSHA prior to demolition/abatement of any of the above asbestos/suspect asbestos-containing materials.

   Health and Safety Code 25914
7. This regulation requires that a separate contract be generated if asbestos-related work or hazardous substance removal is required to be performed if these materials were not revealed in the original contract documents. It also requires a contractor to immediately stop work if a hazardous substance/material is discovered that was not noted in the original contract documents and inform the owner in writing.

8.0 LIMITATIONS

Reasonable effort is made by Aero-Environmental personnel to locate and sample suspect ACM/Hazardous Materials as directed by the Client (San Lorenzo Valley Water District-SLVWD). However, for any facility the existence of unique or concealed ACM and debris is a possibility. In addition, sampling and laboratory analysis constraints may impact the investigation. Aero-Environmental does not warrant, guarantee or profess to have the ability to locate or identify all ACM in a facility. Aero-Environmental does not guarantee or warrant that the areas surveyed are safe, nor does Aero-Environmental involvement in this property relieve the Owner of any continuing responsibility of providing a safe environment. Testing results are applicable for the time that testing was conducted and for the condition of surfaces

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at the time they were tested. During demolition/renovation operations, materials may be uncovered which were not identified during our assessment. Personnel in charge of demolition/renovations should be alerted to note materials uncovered during these operations, which differ substantially from those included in this assessment. This report is not intended to be a construction document.

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APPENDIX A

LABORATORY RESULTS

ASBESTOS/LEAD BULK LOGS

CHAIN OF CUSTODY

www.EMLabPK.com

EMLab P&K A TestAmerica Company

New Jersey: 3000 Lincoln Drive East, Suite A, Marlton, NJ 08053 * (866) 871-1984
Phoenix, AZ: 1501 West Knudsen Drive, Phoenix, AZ 85027 * (800) 651-4802
SSF, CA: 6000 Shoreline Court, Suite 205, South San Francisco, CA 94080 * (866) 388-6653

002205849

CONTACT INFORMATION

Company:	Aero-Environmental	Address:	1406 Via Isola, Monterey
Contact:	Jose Vizcaino	Special Instructions:	
Phone:	(831) 277-5831		

PROJECT INFORMATION

Project ID:	SVWD - Lewis Treatment Plant		
Project Description:	Lead Survey		
Project Zip Code:		Sampling Date & Time:	07/15/19
PO Number:		Sampled By:	J. Vizcaino

TURN AROUND TIME CODES (TAT)

STD – Standard (DEFAULT)
ND – Next Business Day
SD – Same Business Day Rush*
*Please call Client Services for locations with Rush services

Rushes received after 2pm or on weekends, will be considered received the next business day. Please alert us in advance of weekend analysis needs.

Sample ID	Description	Sample Type (Below)	TAT (Above)	Total Volume (Air Samples only)	Notes
LTP-001	Exterior White Dispenser	B	STD		
LTP-002	" " Trim	B	STD		
LTP-003	" Green Trim Coat	B	STD		
LTP-004	Interior White Coat	B	STD		

ASBESTOS ANALYSIS

REQUESTED SERVICES (Check boxes below)

PCM Air: Fiber Count (NIOSH 7400)	PCM Air: OSHA with TWA	PLM Bulk: EPA Method 600/R-93/116	PLM Bulk: EPA Point Count (200 Point Count)	PLM Bulk: EPA Point Count (400 Point Count)	PLM Bulk: EPA Point Count (1000 Point Count)	PLM Bulk: Gravimetric Point Count	PLM Rock & Soil: CARB 435 Method (Pre-crushed Sample)	PLM Rock & Soil: CARB 435 Method (Regular Sample)	Other Requests: Lead Analysis	Other Requests	Other Requests
☐	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☐
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SAMPLE TYPE CODES	
A – Air	W – Wipe
B – Bulk	T – Tape
D – Dust	R – Rock
SO – Soil	O – Other

RELINQUISHED BY	DATE & TIME	RECEIVED BY	DATE & TIME
[signature]	7-15-19	[signature]	7/16/19 10:55

By submitting this Chain of Custody, you agree to be bound by the terms and conditions set forth at http://www.emlab.com/s/main/serviceterms.html

EMLab P&K
A TestAmerica Company

Report for:

Mr. Jorge Vizcaino
Aero-Environmental Consulting, Seaside, CA
1426 Via Isola
Monterey, CA 93940

Regarding: Project: SLVWD-Lewis Treatment Plant; Asbestos Survey
EML ID: 2205848

Approved by:

Approved Signatory
Danny Li

Dates of Analysis:
Asbestos PLM: 07-18-2019

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

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(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: Aero-Environmental Consulting, Seaside, CA
C/O: Mr. Jorge Vizcaino
Re: SLVWD-Lewis Treatment Plant; Asbestos Survey

Date of Sampling: 07-15-2019
Date of Receipt: 07-16-2019
Date of Report: 07-18-2019

ASBESTOS PLM REPORT

Total Samples Submitted:	13
Total Samples Analyzed:	12
Total Samples with Layer Asbestos Content > 1%:	1

Location: LTPB1, Laptop Countertop Covering

Lab ID-Version‡: 10482084-1

Sample Layers	Asbestos Content
Black Countertop Covering	ND
Semi-Transparent Adhesive	ND
Sample Composite Homogeneity:	Good

Location: LTPB2, Laptop Countertop Covering

Lab ID-Version‡: 10482085-1

Sample Layers	Asbestos Content
Black Countertop Covering	ND
Semi-Transparent Adhesive	ND
Sample Composite Homogeneity:	Good

Location: LTPB3, Gasket O'ring

Lab ID-Version‡: 10482086-1

Sample Layers	Asbestos Content
White Gasket O'ring	ND
Sample Composite Homogeneity:	Good

Location: LTPB4, Wall Moisture Barrier

Lab ID-Version‡: 10482087-1

Sample Layers	Asbestos Content
Black Vapor Barrier	ND
Composite Non-Asbestos Content:	60% Cellulose
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

EMLab P&K
17461 Derian Ave, Suite 100, Irvine, CA 92614
(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: Aero-Environmental Consulting, Seaside, CA
C/O: Mr. Jorge Vizcaino
Re: SLVWD-Lewis Treatment Plant; Asbestos Survey

Date of Sampling: 07-15-2019
Date of Receipt: 07-16-2019
Date of Report: 07-18-2019

ASBESTOS PLM REPORT

Location: LTPB5, Wall Moisture Barrier

Lab ID-Version‡: 10482088-1

Sample Layers	Asbestos Content
Black Vapor Barrier	ND
Composite Non-Asbestos Content:	60% Cellulose
Sample Composite Homogeneity:	Good

Location: LTPB6, Green Trim Paint, Exterior

Lab ID-Version‡: 10482089-1

Sample Layers	Asbestos Content
Green Paint	ND
Sample Composite Homogeneity:	Good

Location: LTPB7, Green Trim Paint, Exterior

Lab ID-Version‡: 10482090-1

Sample Layers	Asbestos Content
Green Paint	ND
Sample Composite Homogeneity:	Good

Location: LTPB8, White Siding Paint

Lab ID-Version‡: 10482091-1

Sample Layers	Asbestos Content
White Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

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Client: Aero-Environmental Consulting, Seaside, CA
C/O: Mr. Jorge Vizcaino
Re: SLVWD-Lewis Treatment Plant; Asbestos Survey

Date of Sampling: 07-15-2019
Date of Receipt: 07-16-2019
Date of Report: 07-18-2019

ASBESTOS PLM REPORT

Location: LTPB9, White Siding Paint

Lab ID-Version‡: 10482092-1

Sample Layers	Asbestos Content
White Paint	ND
Sample Composite Homogeneity:	Good

Location: LTPB10, Gray Penetration Mastic, Roof

Lab ID-Version‡: 10482093-1

Sample Layers	Asbestos Content
Gray Roofing Mastic	5% Chrysotile
Sample Composite Homogeneity:	Good

Comments: Sample LTPB11 was not analyzed due to prior positive series.

Location: LTPB12, Roofing Felt Paper

Lab ID-Version‡: 10482095-1

Sample Layers	Asbestos Content
Black Roofing Felt	ND
Composite Non-Asbestos Content:	60% Cellulose
Sample Composite Homogeneity:	Good

Location: LTPB13, Roofing Felt Paper

Lab ID-Version‡: 10482096-1

Sample Layers	Asbestos Content
Black Roofing Felt	ND
Composite Non-Asbestos Content:	60% Cellulose
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

J3 Resources, Inc.
3113 Red Bluff Road Pasadena, Texas 77503
Phone: (713) 290-0223 – Fax: (832) 831-5669
j3resources.com

Lead in Paint Performed by Flame AA – USEPA SW846 7420/3050B

Angela Hetherington
EMLab P&K
17461 Derian Ave. Ste 100
Irvine, CA 92614

J3 Order #: JP191014774
Project #: 3044186
Receipt Date: 17-Jul-2019
Analysis Date: 18-Jul-2019
Report Date: 18-Jul-2019

2205849

SAMPLE ID	PAINT COLOR	LEAD CONCENTRATION (mg/kg)	LEAD CONCENTRATION (%)
LTP-PC1	Paint Chip	< 50	< 0.005%
LTP-PC2	Paint Chip	< 50	< 0.005%
LTP-PC3	Paint Chip	< 50	< 0.005%
LTP-PC4	Paint Chip	< 50	< 0.005%

Reporting Limit = 50.0 mg/kg N/A = Not Applicable
INS = Insufficient Sample Weight NS = Not Submitted

Analyst: Korry Huddleston

Scott Ward, Ph.D. Lab Director

AIHA LAP, LLC
ACCREDITED LABORATORY
INDUSTRIAL HYGIENE ENVIRONMENTAL LEAD
ENVIRONMENTAL MICROBIOLOGY
ISO/IEC 17025:2005
WWW.AIHAACCREDITEDLABS.ORG
LAB # 157714

☐ Open Lab Fee

IH CHAIN OF CUSTODY

J3 Order # (Lab use only) 14774

J3 resources, inc.

Submitter Name:	Sample Receiving	**Bill to:**	
Company:	EMLab P&K	**Address:**	
Address:	17461 Derian Ave. Suite 100		
		City/State:	**Zip:**
City/State:	Irvine, CA **Zip:** 92606	**PO #:**	3044186Per S.D./n.t.

Project Information

Project Name:	Project Manager: Angela Hetherington
Project #: 2205849	Telephone – Office/Cell 623-298-1014
Reports - Email Address: ahetherington@emlabpk.com, snast@emlabpk.com	
Invoice - Email Address: ahetherington@emlabpk.com	Notification By: Email: ☑ Verbal: ☐ Text: ☐
Special Instructions:	

Turnaround Times – Please Select One

Emergency* ☐	1 Day ☑	2 Day ☐	3 Day ☐	5 Day ☐

ASBESTOS

PLM - Bulk	PCM - Air	TEM - Air	TEM - Bulk	TEM - Water	TEM - Dust	TEM/PLM Soil/Vermiculite/Ore
EPA 600/R-93/116 ○ Visual Estimation (<1%) ○ 400 Point Count 0.25% ○ 1,000 Point Count 0.1% ○ Gravimetric Reduction ○ Matrix Reduction (+/-) ○ **NIOSH 9002** ○ **OSHA ID-191**	○ **NIOSH 7400** ○ **ASTM D7201** ○ **ISO 8672** ○ **OSHA ID-160**	○ **AHERA** ○ **NIOSH 7402** ○ **ASTM D6281** ○ **ISO 10312** ○ **ISO 13794**	○ Gravimetric Reduction (<1%) ○ Matrix Reduction (+/-) ○ Qualitative (+/-) ○ Drop Mount ○ Filtration	○ **EPA 100.2** Drinking Water ○ >10 µm fibers ○ ≥0.5 µm fibers ○ **EPA 100.2** Effluent / WW	○ **ASTM D5755** Microvac ○ **ASTM D6480** Wipe ○ **600/J-93/167** Carpet - EPA ○ Bulk Dust Qualitative	○ **ASTM 7521**-TEM (+/-) ○ **ASTM 7521**-TEM (<1%) ○ **CARB 435**-Modified ○ Soil – PLM Only (+/-) ○ Vermiculite - TEM (+/-) ○ Vermiculite-Cincinnati ○ Erionite ID

METALS

Flame AA	Graphite Furnace AA - LEAD	ICP
☒ Lead in Paint – **SW846 7420/3050B** ○ Lead in Air – **NIOSH 7082** ○ Lead in Wipes – **SW846 7420/3050B** ○ Lead in Soil – **SW846 7420/3050B**	○ Drinking Water – **EPA 200.9** ○ Wastewater – **SW846-7421** ○ Soil/Sludge – **SW846-7421** ○ Air – **NIOSH 7105**	○ Elements in Air – **NIOSH 7300** ○ Wipe/Soil – **SW846-6010B** ○ Effluent – **SW846-6010B** ○ Welding Fume – **NIOSH 7300M** ○ TCLP – **SW846-1311/6010B**

SILICA/PARTICULATES

X-Ray Diffraction / Gravimetric
○ Respirable Crystalline Silica **NIOSH 7500 / OSHA 142**
○ **NIOSH 0500** – Total Particulates
○ **NIOSH 0600** – Respirable Particulates

Total Number of Samples Submitted: 4

Positive Stop: ☐ YES ☐ NO

Signatures

Relinquished By:		**Date:** 7/16/19	**Time:** 13:12
Received By:		**Date:** 7/17/19	**Time:** 2p
Relinquished By:		**Date:**	**Time:**
Received By:		**Date:**	**Time:**

** Emergency TAT requires prior lab notification. All samples analyzed outside normal business hours are charged at Emergency rate.*
***TAT's are in Business Days rather than Hours (i.e.1 Day TAT = End of Next Business Day)*

IH CHAIN OF CUSTODY

Project Name/Number 2205849

Page 1 of 1

SAMPLE IDENTIFICATION

SAMPLE NUMBER	SAMPLE LOCATION / MATERIAL	VOLUME
LTP-PC1		
LTP-PC2		
LTP-PC3		
LTP-PC4		

Comments/Special Instructions:

J3 Resources, Inc. • 6110 West 34th Street • Houston, Texas 77092 • tel: 713/290-0221 • fax: 713/290-0248

AERO-ENVIRONMENTAL
CONSULTING

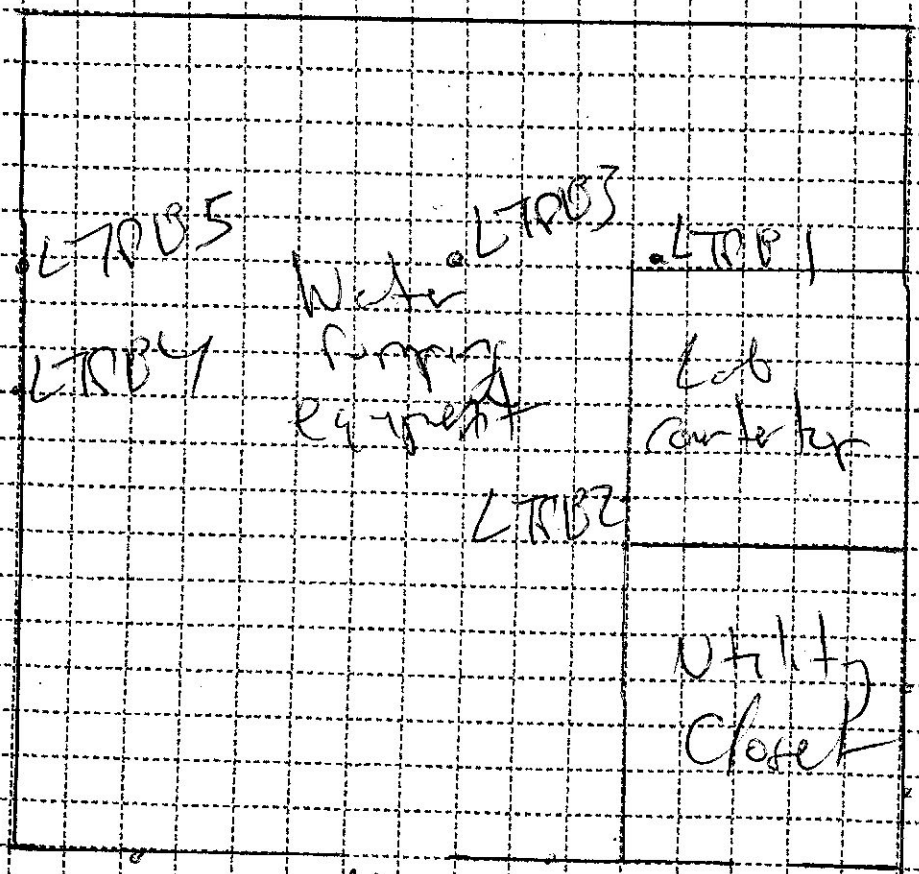
1426 Via Isola ● Monterey, California 93940
831.394.1199 Fax 831.394.1627 Jorge@Aero-Enviro.com

APPENDIX B

SAMPLE LOCATION DIAGRAMS

Sample location map - Site Diagram

Lewis Treatment Plant Building



(LTPB10 - LTPB13 - Roof)

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1426 Via Isola ● Monterey, California 93940
831.394.1199 Fax 831.394.1627 Jorge@Aero-Enviro.com

APPENDIX C
PHOTOGRAPHIC DOCUMENTATION

Photo 1-Roof

Photo 2-Roof penetration mastic

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831.394.1199 Fax 831.394.1627 Jorge@Aero-Enviro.com

Photo 3-Building

Photo 4-Exterior wood siding

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Photo 5-Exterior electrical panel

Photo 6-Utility closet

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Photo 7-Interior of building

Photo 8-Lab Countertop

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Photo 9-Valves and O-Ring

Photo 10-Wall paneling with fiberglass insulation

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831.394.1199 Fax 831.394.1627 Jorge@Aero-Enviro.com

APPENDIX D

AERO-ENVIRONMENTAL PERSONNEL CERTIFICATIONS

State of California Department of Public Health

Lead-Related Construction Certificate

Certificate Type: Inspector/Assessor

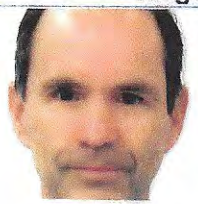
Expiration Date: 11/03/2019

Jorge I. Vizcaino

ID #: 15393

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Name: **Jorge Ignacio Vizcaino**



Certification No. **04-3554**

Expires on **04/15/20**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

INSTITUTE OF HAZARDOUS MATERIALS MANAGEMENT

THIS CERTIFIES THAT

Jorge Vizcaino

HAS SUCCESSFULLY MET ALL THE REQUIREMENTS OF EDUCATION, EXPERIENCE AND EXAMINATION, AND IS HEREBY DESIGNATED A

CERTIFIED HAZARDOUS MATERIALS MANAGER
CHMM

October 04, 2016
DATE OF CERTIFICATION

19631
CREDENTIAL NUMBER

October 31, 2021
CERTIFICATION EXPIRES

M. Patricia Bulley
ACTING EXECUTIVE DIRECTOR

VALID SO LONG AS THIS CREDENTIAL IS RENEWED ACCORDING TO SCHEDULE AND IS NOT OTHERWISE REVOKED.

ANSI Accredited Program Personnel Certification

Accredited by the American National Standards Institute and the Council of Engineering and Scientific Specialty Boards

ABIH®

american board of industrial hygiene®

organized to improve the practice of industrial hygiene
proclaims that

Jorge I. Vizcaino

having met all requirements of
education, experience and examination, and
ongoing maintenance,
is hereby certified in the

COMPREHENSIVE PRACTICE
of
INDUSTRIAL HYGIENE

and has the right to use the designations

CERTIFIED INDUSTRIAL HYGIENIST

CIH

Certificate Number	**9814 CP**
Awarded:	**October 4, 2010**
Expiration Date:	**June 1, 2021**

Nicole Greeson
Chair, ABIH

Chief Executive Officer, ABIH

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