Draft
Environmental Impact Report

SCH# 2023110442

Volume 5

Appendix C Biological Resources Technical Documentation
Appendix D Cultural Resources
Appendix E Energy
Appendix F Geology and Soils

IPG INDUSTRIAL PROJECT
by IPG Kern County 52 Holdings, LLC
(PP23405)

Precise Development Plan No. 72, Map No. 102
Zone Variance No. 57, Map No. 102

Kern County
Planning and Natural Resources Department
Bakersfield, CA

March 2025

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Technical Assistance by:

WSP USA, Inc.

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Appendix C
Biological Resources Technical Documentation

Biological Resources Assessment

IPG Kern County 52 Holdings LLC Project

JUNE 2024

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
FESA	federal Endangered Species Act
MM	Mitigation Measure
Project	IPG Kern County 52 Holdings LLC Project
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

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1 Introduction

Dudek prepared this Biological Resources Assessment for the IPG Kern County 52 Holdings LLC Project (Project) to identify and characterize biological resources on the Project site and areas immediately adjacent to the site. The particular focus of this assessment will be on the potential for the site to support special-status plant and wildlife species and/or other biological resources considered sensitive by state and federal resource agencies, including the California Department of Fish and Wildlife (CDFW), the U.S. Army Corps of Engineers, the Central Valley Regional Water Quality Control Board, and the U.S. Fish and Wildlife Service (USFWS). Potential impacts to on-site resources, including sensitive resources occurring or potentially occurring on the site; permits that may be required by any of the resource agencies as a result of potential impacts; and measures that could mitigate potentially significant impacts are also addressed.

1.1 Project Location

The Project site is within Kern County. The Project site is composed of two separate parcels: Assessor's Parcel Numbers 492-010-13 and 492-010-17. The Project site is bound by Hanger Way to the west, Skyway Drive to the south, Airport Drive to the east, and Boughton Road to the north (Figure 1, Project Location).

The Project site is generally flat with sloping from northeast to southwest. Elevation across the Project site ranges from approximately 543 feet to 503 feet above mean sea level.

The Project site is currently dominated by nonnative grassland of *Avena* spp. and *Bromus* spp. and has been routinely disked annually for fire and weed control by the current landowner for the last three years and the landowner before. Two areas along the east edge have been subject to a fire in 2024 totaling approximately 2.45-acres (Figure 2, Biological Resources). Soils on the site dry, sandy loam/clay. The only water the Project site receives is from rain. No irrigation is present on the Project site. The southeast edge of the site has been used as a dumping place for soil spoils and had shown signs of un-homed encampments. Surrounding land uses consist of industrial buildings associated with Meadows Field Airport to the west and south. Apartments and a storage facility to the east and northeast. And undeveloped nonnative grassland that has been annually disked or mowed for fire and weed control to the north (Google Earth Pro 2023).

1.3 Project Description

The Project site consists of two parcels totaling 49.05 acres. The proposed Project would include a 908,130-square-foot state-of-the-art Class "A" industrial warehouse facility. Its primary function would be high-cube storage, with a secondary application of cold storage occupying up to 20% of the facility. Additionally, there would be 15,000 square feet of ancillary office functions, contributing to a total of 923,130 square feet. This Project would support approximately 437 employees over 3 shifts operating 24 hours a day, 7 days per week, with primary activity occurring from 5 a.m. to 9 p.m., Monday through Friday. The buildings would be primarily constructed from architecturally enhanced concrete panels, with a maximum height of 56 feet above the finish floor elevation. Architectural glazing would be integrated at key locations to enhance internal office lighting and exterior appearance.

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Figure 1 Project Location

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2 Regulatory Setting

This chapter outlines federal, state, and local regulations pertinent to the biological resources occurring or potentially occurring on the Project site and immediate vicinity. Because regulations associated with state and federal resource agencies generally focus on biological resources considered to be special status by the resource agencies, the following discussions concerning vegetation communities, special-status plants and wildlife, and aquatic/hydrological features, such as drainages, streambeds, riparian habitat, and wetlands, occurring or potentially occurring on the Project site are those that are typically regulated by the resource agencies.

2.1 Sensitive Vegetation Communities Defined

For the purpose of this report, sensitive vegetation communities are defined as follows:

- Vegetation alliances on CDFW's California Natural Community List with a state rank of S1, S2, or S3 (CDFW 2023a)
- Vegetation communities or habitats listed in the California Natural Diversity Database (CNDDB) (CDFW 2023b)

2.2 Special-Status Plant and Wildlife Species Defined

For the purpose of this report, special-status plant and wildlife species are defined as follows:

- Designated as either rare, threatened, or endangered by CDFW, USFWS, or the National Marine Fisheries Service and protected under either the California Endangered Species Act (CESA) (California Fish and Game Code Section 2050 et seq.) or the federal Endangered Species Act (FESA) (16 USC Section 1531 et seq.), or meets the California Environmental Quality Act (CEQA) definition for endangered, rare, or threatened (California Code of Regulations, Title 14, Section 15380[b], [d]); or
- California Species of Special Concern as designated by CDFW (2023b); or
- Vertebrate species that are Fully Protected species, as described in the California Fish and Game Code; or
- Candidate species being considered or proposed for listing under these same acts; or
- Of expressed concern to resource/regulatory agencies or local jurisdictions. This includes plants included on the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2023c), as well as species with a California Rare Plant Rank of 1, 2, 3, or 4 in the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2023a). Plants included on the CNPS Inventory are classified as follows:
  - List 1A: Plants presumed extinct in California
  - List 1B: Plants rare, threatened, or endangered in California and elsewhere
  - List 2: Plants rare, threatened, or endangered in California, but more common elsewhere
  - List 3: Plants about which we need more information – A review list
  - List 4: Plants of limited distribution – a watch list

2.3 Endangered Species Acts

2.3.1 California Endangered Species Act

CDFW administers CESA, which prohibits the "take" of plant and animal species designated by the California Fish and Game Commission as endangered or threatened in California. Take under CESA is defined as any of the following: "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (California Fish and Game Code Section 86). Unlike FESA, CESA does not include harassment or harm (e.g., habitat degradation) in its definition of take. Species determined by the State of California to be candidates for listing as threatened or endangered are treated as if listed as threatened or endangered and are, therefore, protected from take. Section 2081 of the California Fish and Game Code provides for the application of an Incidental Take Permit for take of species protected under CESA that occurs incidentally during otherwise lawful activities.

2.3.2 Federal Endangered Species Act

FESA prohibits the taking, possession, sale, or transport of threatened or endangered species. "Take" is defined to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC Section 1532[19]). Projects that would result in "take" of any federally listed threatened or endangered wildlife species are required to obtain authorization from the National Marine Fisheries Service and/or USFWS through either Section 7 (interagency consultation) or Section 10(a) (Incidental Take Permit) of FESA, depending on whether the federal government is involved in permitting or funding the project.

2.4 Migratory Bird Protections

The Migratory Bird Treaty Act (MBTA) was originally passed in 1918 as four bilateral treaties, or conventions, for the protection of a shared migratory bird resource (16 USC 703–712). The primary motivation for the international negotiations was to stop the "indiscriminate slaughter" of migratory birds by market hunters and others. Each of the treaties protects selected species of birds and provides for closed and open seasons for hunting game birds. The MBTA protects more than 800 species of birds, which are listed in the Code of Federal Regulations (50 CFR 10.13). The MBTA prohibits the "take" of any migratory bird or any part, nest, or eggs of any such bird. Under the MBTA, take is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so.

Pursuant to Section 3503.5 of the California Fish and Game Code, it is unlawful to take, possess, or destroy any birds of prey; or to take, possess, or destroy any nest or eggs of such birds. "Birds of prey" refer to species in the orders Falconiformes, Strigiformes, and Accipitriformes. Active nests of all other native birds are similarly protected under Sections 3503 and 3513 of the California Fish and Game Code. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by CDFW. This statute does not provide for the issuance of an Incidental Take Permit.

2.5 Jurisdictional Waters of the United States/State, Including Wetlands

Three primary agencies regulate activities within coastal streams, wetlands, and riparian areas in California: the U.S. Army Corps of Engineers Regulatory Program regulates activities pursuant to Section 404 of the federal Clean Water Act; CDFW regulates activities under Sections 1600–1616 of the California Fish and Game Code; and the

California Regional Water Quality Control Board regulates activities under the Porter–Cologne Water Quality Control Act and Section 401 of the Clean Water Act. The following discussion provides information on each agency's regulatory program. In addition, Section IV, Appendix G (Environmental Checklist Form) of the CEQA Statutes and Guidelines requires an evaluation of impacts to "federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means."

2.6 Local Laws, Ordinances, Regulations, and Standards

2.6.1 Metropolitan Bakersfield General Plan

The Metropolitan Bakersfield General Plan has Conservation/Biological Resources, Land Use, and Open Space and Parks Elements goals and policies that provide guidance for decision makers regarding the future affects to biological resources within the Metropolitan Bakersfield planning area (City of Bakersfield 2016). Goals, policies, and implementation measures that are applicable to the proposed Project are as follows:

Chapter V, Conservation/Biological Resources Element

Goals

Goal 1 Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.

Goal 2 To conserve and enhance habitat areas designated 'sensitive' animal and plant species.

Policies

Policy 1 Direct development away from 'sensitive biological resource' areas, unless effective mitigation measures can be implemented.

Policy 5 Determine the locations and extent of suitable habitat areas required for the effective conservation management of designated 'sensitive' plant and animal species.

Implementation Measure

Implementation Measure 1 When considering discretionary development proposals, consult available biological resource data covering the area. Determine the potential impacts and necessary mitigation measures for identified biological resources, as required in the California Environmental Quality Act. Regularly consult with resource agencies.

2.6.2 Kern County General Plan

The Kern County General Plan outlines federal and state ordinances and policies for the conservation of biological resources considered by the County of Kern when deciding the effects of a project on biological resources. These goals and policies within the Land Use, Open Space, and Conservation Element provide guidance for decision makers regarding the future effects to these resources within the County of Kern planning area (County of Kern

2009). Goals, policies, and implementation measures that are applicable to the proposed Project, and the Project's consistency according to these goals, were reviewed as part of the Project literature review and are detailed below.

Chapter 1: Land Use, Open Space, and Conservation Element

Section 1.10: General Provisions; 1.10.5: Threatened and Endangered Species

Goal

Goal 1 Ensure that the County can accommodate anticipated future growth and development while maintaining a safe and healthful environment and a prosperous economy by preserving valuable natural resources, guiding development away from hazardous areas, and assuring the provision of adequate public services.

Policies

Policy 27 Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws.

Policy 28 County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts to fish, wildlife, and botanical resources.

Policy 29 The County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.

Policy 31 Under the provisions of the California Environmental Quality Act (CEQA), the County, as lead agency, will solicit comments from the California Department of Fish and Game and the U.S. Fish and Wildlife Service when an environmental document (Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report) is prepared.

Policy 32 Riparian areas will be managed in accordance with United States Army Corps of Engineers, and the California Department of Fish and Game rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.

Implementation Measures

Measure Q Discretionary projects shall consider effects to biological resources as required by the California Environmental Quality Act.

Measure R Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to the California Environmental Quality Act.

Measure S Pursue the development and implementation of conservation programs with State and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs.

Goal 1.10.7 Light and Glare

Policy 47 Ensure that light and glare from discretionary new development projects are minimized in rural as well as urban areas.

Policy 48 Encourage the use of low-glare lighting to minimize nighttime glare effects on neighboring properties.

Implementation Measure

Measure AA The County shall utilize CEQA Guidelines and the provisions of the Zoning Ordinance to minimize the impacts of light and glare on adjacent properties and in rural undeveloped areas.

2.6.3 Chapter 19.81, Dark Skies Ordinance (Outdoor Lighting)

In November 2011, the County of Kern approved a Dark Skies Ordinance. The purpose of this ordinance is to maintain the existing character of Kern County by requiring a minimal approach to outdoor lighting, recognizing that excessive illumination can create a glow that may obscure the night sky, and that excessive illumination or glare may constitute a nuisance. The ordinance provides requirements for outdoor lighting within specified unincorporated areas of Kern County to accomplish the following objectives:

Objective 1: Encourage a safe, secure, and less light-oriented night-time environment for residents, businesses and visitors.

Objective 2: Promote a reduction in unnecessary light intensity and glare, and to reduce light spillover onto adjacent properties.

Objective 3: Protect the ability to view the night sky by restricting unnecessary upward projections of light.

Objective 4: Promote a reduction in the generation of greenhouse gases by reducing wasted electricity that can result from excessive or unwanted outdoor lighting.

3 Methods

Dudek personnel conducted a literature review and subsequent field surveys to assess the potential for the presence or absence of sensitive biological resources on the Project site. This section describes the methods associated with the literature review and field survey efforts conducted by Dudek.

3.1 Literature Review

Documented sensitive vegetation communities, special-status plant species, and special-status wildlife species present at the Project site and the area within 5 miles of the Project site, and that have potential to occur, were identified, in part, through the following:

- CNDDB (CDFW 2023b)
- USFWS Information for Planning and Consultation (IPaC) (USFWS 2023a)
- California Native Plant Society's online Inventory of Rare and Endangered Plants (CNPS 2023a)
- CDFW's California Natural Community List with vegetation alliances that have a state rank of S1, S2, or S3 (CDFW 2023a)
- Calflora: Information about California Plants for Education, Research, and Conservation (Calflora 2023)

In addition, Dudek staff reviewed the following available resources to assess the potential for sensitive biological and wetland resources within the Project site and vicinity:

- U.S. Geological Survey National Hydrography Dataset (USGS 2023)
- USFWS National Wetlands Inventory (USFWS 2023b)
- U.S. Department of Agriculture, Natural Resources Conservation Service Web Soil Survey (USDA-NRCS 2023)

3.2 Field Surveys

3.2.1 Biological Habitat Assessment

Dudek biologists conducted a biological resources habitat assessment throughout the Project site (Figure 2, Biological Resources) on March 4, 2023, to identify and characterize existing natural resources on the site and determine the potential for special-status plant and wildlife species; sensitive vegetation communities; and regulated aquatic resources, such as wetlands, to occur on the site. The survey was conducted during favorable conditions, with temperatures ranging from 54°F to 60°F, 20%–25% cloud cover, and wind speeds averaging 4 to 6 miles per hour. Based on the results of this initial assessment, priority areas were identified for further investigation, including focused surveys. The Project site was observed to have several California ground squirrel (*Otospermophilus beecheyi*) burrows, which have the potential to support special-status burrowing mammals, such as burrowing owl (*Athene cunicularia*) and San Joaquin kit fox (*Vulpes macrotis mutica*). The biologist conducting the survey has demonstrable experience in San Joaquin kit fox and burrowing owl biology, identification, and survey techniques.

A visual survey was conducted using binoculars of the surrounding private properties because legal access was not requested. All plant and wildlife species observed directly (visually or from vocalizations) or from sign, such as tracks, scat, or feathers, were recorded. A formal delineation of aquatic resources was not conducted.

3.2.2 Soil

According to the U.S. Department of Agriculture's Natural Resource Conservation Service Web Soil Survey, two soil mapping units occur within the Project site: Delano sandy loam, 1% to 5% slopes, and Kimberlina-Urban land-Cajon complex, 0% to 2% slopes (USDA 2023b). Below are details for the soils found within the Project site (USDA 2023b):

- **Delano Series:** The Delano series consists of very deep, well drained soils formed in alluvium derived from weathered granidoid rock (USDA 2023b). These soils are primarily for irrigated citrus, fruits, nuts, and row crops. Vegetation associated with this series are annual grasses and forbs.
- **Kimberlina Series:** The Kimberlina series consists very deep, well drained soils on flood plains and recent alluvial fans. These soils are primarily for growing irrigated field, forage, and row crops. Some areas used for livestock grazing. When not irrigated, vegetation is annual grasses, forbs, and *Atriplex* spp. (USDA 2023b).

3.2.3 Vegetation Mapping

Vegetation mapping was conducted during the initial habitat assessment based on the California Natural Community List (CDFW 2023a) and the web-based version of the Manual of California Vegetation (CNPS 2023b), which use the scientific name of the dominant species in that alliance as the alliance name. Both are based on the Manual of California Vegetation, Second Edition (Sawyer et al. 2009). The California Natural Community List and Manual of California Vegetation focus on a quantified, hierarchical approach to vegetation classification that includes both floristic (plant species) and physiognomic (community structure and form) factors as currently observed (as opposed to predicting climax or successional stages). CNPS's web-based version of the Manual of California Vegetation provides up-to-date rankings and vegetation community descriptions (CNPS 2023b).

3.2.4 Flora

All plant species encountered during the field survey were identified to subspecies or variety, if possible, to determine sensitivity status. Latin and common names for plant species with a California Rare Plant Rank follow the CNPS Inventory of Rare, Threatened, and Endangered Plants of California (CNPS 2023a). For plant species without a California Rare Plant Rank, Latin names follow the Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California (Jepson Flora Project 2023), and common names follow the U.S. Department of Agriculture Natural Resources Conservation Service Plants Database (USDA 2023). Appendix A provides a list of all plant species observed on the Project site.

3.2.5 Fauna

All wildlife species, as detected during the field survey by sight, calls, tracks, scat, or other signs, were identified and recorded. In addition to species actually observed, expected wildlife usage of the site was determined according to known habitat preferences of regional wildlife species and knowledge of their relative distributions in the area. No trapping or focused surveys for special-status or nocturnal species was conducted. Latin and common names for vertebrate species referred to in this report follow Crother (2017) for amphibians and reptiles, Wilson and Reeder (2005) for mammals, and the American Ornithological Society's Checklist of North and Middle American Birds (AOS 2023) for birds. Appendix B provides a complete list of wildlife species observed during the survey effort.

3.2.6 Special-Status and Regulated Resources

For the purposes of this report, special-status biological resources are those defined as follows: (1) species that have been given special recognition by federal, state, or local resource agencies and environmental organizations due to limited, declining, or threatened population sizes; (2) species and habitat types recognized by local and regional resource agencies as special status; (3) habitat areas or vegetation communities that are unique, are of relatively limited distribution, or are of particular value to wildlife; (4) wildlife corridors and habitat linkages; and (5) U.S. Army Corps of Engineers jurisdictional waters of the United States (including wetlands), CDFW jurisdictional streams, and waters of the state subject to the permitting authority of the Central Valley Regional Water Quality Control Board. Each of these are discussed in more detail below.

3.2.6.1 Special-Status Plants

Focused plant surveys were conducted following the CNPS's Botanical Survey Guidelines (CNPS 2001), CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Populations and Natural Communities (CDFG 2009), or USFWS's General Rare Plant Survey Guidelines (Cypher 2002). However, habitat characteristics present with the Project site were evaluated to determine the potential to support special-status plant species. All plant species encountered during the field survey were identified to subspecies or variety, if applicable, to determine sensitivity status.

There are a number of special-status plant species known to occur within the Project vicinity. Priority special-status plant species were reviewed during the database searches described above. Habitat suitability was evaluated for special-status species based on their potential to occur based on the presence of associated habitat for each species, elevation, and soils present on the Project site.

3.2.6.1.1 Floristic Surveys for Special-Status Plant Species

Based on the literature/database review and the results of the initial site assessment, Dudek conducted focused protocol-level surveys for special-status plant species with potential to occur on the Project site. however, based on timing for the year, the survey were conducted June 2024, and were timed to coincide with the blooming period of the late year target plant species. Table 2, below, provide a summary of the botanical survey conducted on the Project site, personnel, and conditions.

Table 1. Summary of Botanical Surveys, Personnel, and Conditions

Date	Time	Personnel	Site Conditions
06/05/2024	0900-1450	Russell Sweet	85°F to 102°F, 0% cloud cover, 5-7 mph winds
06/07/2024	0630-0850	Russell Sweet	75°F to 83°F, 0% cloud cover, 2 mph winds

Notes: mph – miles per hour

The floristic botanical surveys were conducted by Dudek in accordance with USFWS, CDFW, and CNPS guidelines (USFWS 2000; CDFW 2023c; CNPS 2001). These surveys involved pedestrian transects spaced approximately 32 to 65 feet (approximately 15 to 20 meters) apart, depending on topography and vegetative cover. During the surveys, any special-status species that was observed was mapped using ESRI FieldMaps.

3.2.6.2 Special-Status Wildlife

3.2.6.2.1 Burrowing Owl

A burrowing owl survey was conducted during the reconnaissance survey throughout the Project site. A Dudek biologist performed an initial survey pass in April 2023, walking in parallel transects with a maximum spacing of approximately 20 meters (65 feet). Using ESRI ArcGIS Field Maps, the biologist recorded the location of all burrows approximately 4 inches or greater in diameter at the entrance. Burrows were investigated for burrowing owl sign, including regurgitated castings (pellets) of prey remains, scat (whitewash), and feathers, and the locations of any burrowing owl individuals were recorded. Areas of California ground squirrel activity were also noted, as their burrows could be used by burrowing owl.

3.2.6.2.2 San Joaquin Kit Fox

As a federally listed endangered and state-listed threatened species, San Joaquin kit fox is protected by federal and state statutes (FESA, CESA). To determine presence/absence of kit fox in the Project region, USFWS established the San Joaquin Kit Fox Survey Protocol for the Northern Range (Northern Range Protocol) (USFWS 1999). The Northern Range Protocol calls for an early evaluation of a site and its potential to support San Joaquin kit fox to determine whether protocol surveys are necessary. The entire Project site was walked to assess the site and the potential for use by San Joaquin kit fox.

A Dudek biologist conducted San Joaquin kit fox pedestrian survey transects, spaced approximately 20 meters (65 feet) apart. During these transects, the biologists inspected all areas of the ground surface between transect lines to ensure full visual coverage of the Project site. When any burrow opening measuring a minimum of 4 inches in diameter was located, the biologist recorded the location of the burrow, burrow dimensions, any sign of recent activity, and any other sign to indicate species involved, including American badger (*Taxidea taxus*), burrowing owl, and coyote (*Canis latrans*). Sign and burrow characteristics noted included scat, tracks, shape of the burrow opening, and the orientation of claw marks (a potential indication of whether a canid or a badger excavated a burrow). The locations of burrows were marked using ESRI ArcGIS Field Maps.

According to the Northern Range Protocol (USFWS 1999), burrows were identified as being either natal dens, active dens, or potential dens. “Natal dens” are dens at which the presence of pups was confirmed either by observation or sign such as scat and tracks. “Active dens” refers to dens presumed to be occupied at the time of examination, or to have been recently occupied, due to sign such as recent digging, tracks, and/or fresh scat. “Potential dens” include those that were judged to be of a particular size, but that were not recently active, as well as dens that were not confirmed to have been excavated by the species identified due to a lack of definitive sign.

3.2.6.2.3 Crotch Bumble Bee

A Crotch bumble bee survey was conducted within two 3-acre parcels representing approximately 10% of potentially suitable floral resource and nesting habitat within the Project site. The survey was conducted in accordance with the CDFW (June 2023) *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee*

Species. Crotch's bumble bee forage widely and may be capable of flying great distances, however, as central-place foragers their nest is the important life cycle feature during the flight season while the hibernacula is ½ of their life cycle during overwintering and is in a separate location. While there is a low probability that a nest would be detected during surveys, this protocol was developed to identify the species, forage plants within the survey area, and potential nest sites. Further, this protocol was developed to maintain a high chance of detectability while protecting the queen from disturbance to the greatest degree feasible.

A Dudek biologist experienced with Crotch bumble bee survey protocols and identification conducted the surveys on June 5, 2024. Surveys were conducted in favorable conditions for detecting bumble bees. The survey consisted of a minimum of one person hour per 3-acres of suitable habitat. Each 3-acre parcel was walked through focusing on flowering resources and foraging bumble bees. In addition, a nest survey was also conducted within each 3-acre parcel for potential nesting bumble bees. Surveys consisted of transects spaced 16-feet (5 meters) apart in a north/south direction. Table 3, below, provide a summary of the bumble bee survey conducted on the Project site, personnel, and conditions.

Table 2. Summary of Botanical Surveys, Personnel, and Conditions

Date	Time	Parcel	Personnel	Site Conditions
06/05/2024	0700-0800	1	Russell Sweet	78°F to 82°F, 0% cloud cover, 2-3 mph winds
06/05/2024	0800-0900	2	Russell Sweet	82°F to 85°F, 0% cloud cover, 3-5 mph winds

3.3 Aquatic Jurisdictional Resources

A formal evaluation of the potential for jurisdictional waters of the United States and waters of the state, including wetlands, to occur on site was not conducted. However, the habitat assessment did take into consideration all potential jurisdictional features that would need to be formally evaluated, such as vegetation communities dominated by hydrophytic vegetation and stream channels or other evidence of an ordinary high-water mark within the Project site. Connectivity to local water conveyance features to determine the discharge points and their connection to regional waterways was also considered to be formally evaluated.

4 Results

This chapter provides results of vegetation community and land cover mapping, general plant and wildlife observations, plant and wildlife surveys, assessments of the potential occurrence of special-status plants and wildlife, and potential use of the site as a wildlife movement corridor. Photographic documentation is provided in Appendix C.

4.1 Land Covers

One land cover type was mapped within the Project site and is discussed below. The Project site is disked annually for fire prevention and weed control. Un-homed encampments have been part of the landscape in the recent past. Soil spoil piles dumped on site are located on the southeast edge of the property. During the 2023 survey, no native vegetation communities, including any sensitive vegetation communities, were identified within the Project site. The land cover type and acreage within the Project site are discussed below. Note that the land cover type acreage provided was calculated using Kern County GIS Assessor Maps.

4.1.1 Avena spp. – Bromus spp. Alliance

Approximately 49.05 acres of the Project site is considered Avena spp. – Bromus spp. alliance. This general habitat is grassland that is dominated by non-native species which typically occur in areas with a history of disturbance. Some associated species include wild oats (*Avena* spp.), bromes (*Bromus* spp.), and barleys (*Hordeum* spp.) (CNPS 2023a). It is not given a rarity ranking by CDFG (2009), CDFW (2023a), or CNPS (2023a) because it is a non-native plant community that is widespread; therefore, it is not considered sensitive.

Vegetation community composition in the Project site coincides with this vegetation community description because no vegetation association or alliance in A Manual of California Vegetation, Second Edition (Sawyer et al. 2009) appropriately characterizes this type of vegetation. Although annual brome grasses and wild oat grassland form the dominant portion of the plant species composition, native annual forbs constitute a significant cover. Non-native grassland occurs widely throughout the Project site and is the dominant natural vegetation community on site, as shown in Figure 2.

4.2 Plants

During the survey, 24 plant species were observed, 33% of which are native plant species and 67% are non-native plant species. A cumulative list of the plant species observed is provided in Appendix A.

4.3 General Wildlife

Four common bird species and one common mammal species were audibly or visually detected, or observed by presence of sign (e.g., scat, burrows/dens, prey remains, whitewash), during the on-site survey. As noted above, the Project site is dominated by non-native grassland, which is typically used by common wildlife species.

The mature trees along the residences and power lines and towers adjacent to the Project site provide suitable nesting habitat for raptors; however, the site provides low to marginal suitable foraging habitat for raptor species.

Bird species observed on the site were common raven (*Corvus corax*), mourning dove (*Zenaida macroura*), western kingbird (*Tyrannus verticalis*), and red-tailed hawk (*Buteo jamaicensis*). No active nests of any of these or other avian species were observed.

Amphibians require standing or flowing water for part or all of their life cycle. Ponds, seasonal pools, and drainages provide suitable habitat for common amphibian species. The Project site does not contain any ponds or drainages. No amphibian species were observed during the field survey.

Most reptiles prefer a variety of habitats in which to breed and forage. They typically inhabit small burrows, which they also use as a refuge from differing ambient temperatures and for predator avoidance. Due to a history of ongoing disking practices for weed or fire control, the Project site provides marginally suitable habitat for reptile species. One reptile, common side-blotched lizard (*Uta stansburiana*), was observed during the field survey.

The grassland that dominates the Project site is expected to be used by various small mammal species that are often associated grassland, such as pocket gophers (*Thomomys bottae*), deer mice (*Peromyscus maniculatus*), house mouse (*Mus Musculus*), and western harvest mouse (*Reithorodontomys megalotis*). However, intensive practices, such as disking, limits their abundance within these areas. Very few small mammal burrows were observed throughout the area surveyed. California ground squirrel burrows and burrow complexes were found to be the most abundant burrows on the Project site. The highest concentrations were along road margins and the east edge of the Project site where dirt spoil piles have been illegally dumped over time. One mammal species, California ground squirrel, was observed during the survey.

Coyotes and foxes (*Vulpes* ssp.) may occasionally use the Project site to hunt for small mammals. The federally endangered and state threaten San Joaquin kit fox may also occur on occasion but is unlikely to be resident on the site. San Joaquin kit fox is discussed in more detail in Section 4.4.2.2.

Appendix B provides a list of all wildlife species observed during the site visit.

4.4 Special-Status and Regulated Resources

This section discusses the sensitive resources on the Project site, including special-status plants and wildlife, sensitive vegetation communities, and aquatic resources.

4.4.1 Special-Status Plants

Based on Dudek's habitat suitability analysis, of the fourteen special-status plant species that have been documented within the Oildale and surrounding eight quadrangles associated with the Project site. none have potential to occur on the site based on habitat suitability, soils, topography, and lack of previous documented occurrences of the species on or adjacent to the site. In particular, ongoing disking precludes these species from occurring on the site. Special-status plant species documented within the Oildale and surrounding eight quadrangles associated with the Project and their potential to occur on the Project site are detailed in Table 2. Species with a low potential to occur or species that are not expected to occur are not discussed further because no significant direct, indirect, or cumulative impacts are expected to result from the proposed project.

As stated above, 24 plant species were observed during the site survey, of which none are considered special status by any regulatory agency. The list of plant species identified during the survey is provided in Appendix A.

4.4.2 Special-Status Wildlife

This section discusses results of the survey conducted and the literature review and assesses the potential for special-status wildlife to occur on the Project site. To determine the potential for special-status wildlife to occur on the Project site, Dudek compiled a list of wildlife species through a query of the CNDDB (CDFW 2023b). Three species were determined to have some potential to occur based on habitat suitability and previously documented occurrences of the species in the Project vicinity. Dudek rejected other wildlife species from consideration based on factors such as lack of suitable aquatic or terrestrial habitat, or the site being outside of the species' known range. In addition, many special-status wildlife species that occur in the area are avian species that may occasionally only fly over or forage on the site but are not expected to nest on the site. Those special-status wildlife species that are not expected or have low potential to occur in the project site are not discussed further because no significant direct or indirect impacts are expected.

Table 3 lists the potential for occurrence of the special-status wildlife species that are recorded within the Oildale U.S. Geological Survey quadrangle, where the Project is located. A cumulative list of wildlife species is included in Appendix B.

Table 3. Special-Status Plant Species and their Potential to Occur on the Project Site

Scientific Name	Common Name	Status (Federal/ State/CRPR)	Primary Habitat Associations / Life Form / Blooming Period / Elevation Range (feet)	Potential to Occur
Allium howellii var. howellii	Howell's onion	None/None/4.3	Valley and foothill grassland; Clay (sometimes), Serpentinite (sometimes)/perennial bulbiferous herb/Mar–Apr/165–7,220	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Astragalus hornii var. *hornii*	Horn's milk-vetch	None/None/1B.1	Meadows and seeps, playas; lake margins, alkaline/annual herb/May–Oct/197–2,785	Not expected to occur. Meadows, seeps, playas are not present within the Project site.
Atriplex tularensis	Bakersfield smallscale	None/SE/1A	Chenopod scrub/annual herb/June–Oct/295–655	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Azolla microphylla	Mexican mosquito fern	None/None/4.2	Marshes and swamps (ponds, slow water)/annual/perennial herb/Aug/100–330	Not expected to occur. The Project site does not provide suitable habitat, marshes and swamps, for this species.
Calochortus striatus	alkali mariposa-lily	None/None/1B.2	Chaparral, Chenopod scrub, Meadows and seeps, Mojavean desert scrub; Alkaline, Mesic/perennial bulbiferous herb/Apr–June/230–5,235	Not expected to occur. Meadows, seeps, chaparral and chenopod scrub are not present within the Project site. Additionally, this species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Caulanthus californicus	California jewelflower	FE/SE/1B.1	Chenopod scrub, Pinyon and juniper woodland, Valley and foothill grassland; Sandy/annual herb/Feb–May/200–3,280	Not expected to occur. The Project site does not provide suitable soils for this species.
Chloropyron molle ssp. *hispidum*	hispid bird's-beak	None/None/1B.1	Meadows and seeps, playas, valley and foothill grassland; alkaline/annual herb (hemiparasitic)/June–Sep/3–510	Absent. This species was not observed on the Project site during a botanical focused survey in June

Table 3. Special-Status Plant Species and their Potential to Occur on the Project Site

Scientific Name	Common Name	Status (Federal/ State/CRPR)	Primary Habitat Associations / Life Form / Blooming Period / Elevation Range (feet)	Potential to Occur
				2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Clarkia exilis	slender clarkia	None/None/4.3	Cismontane woodland/annual herb/Apr–May/395–3280	Not expected to occur. The Project site does not provide suitable habitat, cismontane woodland, for this species. Annual disking of the field has greatly reduced the potential for this species to occur.
Convolvulus simulans	small-flowered morning-glory	None/None/4.2	Chaparral (openings), Coastal scrub, Valley and foothill grassland; Clay, Seeps, Serpentinite/annual herb/Mar–July/100–2,430	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Delphinium recurvatum	recurved larkspur	None/None/1B.2	Chenopod scrub, Cismontane woodland, Valley and foothill grassland; Alkaline/perennial herb/Mar–June/10–2,590	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Diplacus pictus	calico monkeyflower	None/None/1B.2	Broadleafed upland forest, Cismontane woodland; Disturbed areas, Granitic/annual herb/Mar–May/330–4,690	Not expected to occur. The Project site does not provide suitable habitat, upland forest, cismontane woodland, for this species.
Eremalche parryi ssp. kernensis	Kern mallow	FE/None/1B.2	Chenopod scrub, Pinyon and juniper woodland, Valley and foothill grassland; Clay (sometimes), Dry, Openings, Sandy (sometimes)/annual herb/Jan(Feb)Mar–May/230–4,230	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Eriastrum hooveri	Hoover's eriastrum	None/None/4.2	Chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; sometimes gravelly/annual herb/(Feb)Mar–July/ 164–3,000	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has

Table 3. Special-Status Plant Species and their Potential to Occur on the Project Site

Scientific Name	Common Name	Status (Federal/ State/CRPR)	Primary Habitat Associations / Life Form / Blooming Period / Elevation Range (feet)	Potential to Occur
				greatly reduced the potential for this species to occur.
Eriogonum gossypinum	cottony buckwheat	None/None/4.2	Chenopod scrub, valley and foothill grassland; clay/annual herb/Mar–Sep/328–1,800	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur.
Eschscholzia lemmonii ssp. kernensis	Tejon poppy	None/None/1B.1	Chenopod scrub, Valley and foothill grassland/annual herb/(Feb)Mar–May/525–3280	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.
Goodmania luteola	golden goodmania	None/None/4.2	Meadows and seeps, Mojavean desert scrub, Playas, Valley and foothill grassland; Alkaline (sometimes), Clay (sometimes)/annual herb/Apr–Aug/65–7,220	Not expected to occur. The Project site does not provide suitable habitat, meadows and seeps, for this species.
Hesperevax caulescens	hogwallow starfish	None/None/4.2	Valley and foothill grassland (mesic clay), Vernal pools (shallow); Alkaline (sometimes)/annual herb/Mar–June/0–1,655	Not expected to occur. The Project site does not provide suitable habitat, vernal pools, for this species.
Hordeum intercedens	vernal barley	None/None/3.2	Coastal dunes, Coastal scrub, Valley and foothill grassland (depressions, saline flats), Vernal pools/annual herb/Mar–June/15–3280	Not expected to occur. The Project site does not provide suitable habitat for this species.
Imperata brevifolia	California satintail	None/None/2B.1	Chaparral, Coastal scrub, Meadows and seeps (often alkali), Mojavean desert scrub, Riparian scrub; Mesic/perennial rhizomatous herb/Sep–May/0–3,985	Not expected to occur. The Project site does not provide suitable habitat for this species.
Lasthenia ferrisiae	Ferris' goldfields	None/None/4.2	Vernal pools (alkaline, clay)/annual herb/Feb–May/65–2295	Not expected to occur. The Project site does not provide suitable habitat, vernal pools, for this species.
Layia leucopappa	Comanche Point layia	None/None/1B.1	Chenopod scrub, Valley and foothill grassland/annual herb/Mar–Apr/330–1150	Low potential to occur. Annual disking of the field has greatly

Table 3. Special-Status Plant Species and their Potential to Occur on the Project Site

Scientific Name	Common Name	Status (Federal/ State/CRPR)	Primary Habitat Associations / Life Form / Blooming Period / Elevation Range (feet)	Potential to Occur
				reduced the potential for this species to occur.
Monolopia congdonii	San Joaquin woollythreads	FE/None/1B.2	Chenopod scrub, valley and foothill grassland (sandy)/annual herb/Feb–May/197–2,620	Not expected to occur. The Project site does not contain the necessary subalkaline sandy soils required by San Joaquin woolly-threads. "San Joaquin woolly-threads is essentially restricted to sandy soils, and thus was always somewhat limited distribution (Taylor 1993)." In addition, there are no observations within 5-miles and would consider this potential to occur if the adjacent properties had any occurrences of this species to have a seed bank present.
Navarretia setiloba	Piute Mountains navarretia	None/None/1B.1	Cismontane woodland, Pinyon and juniper woodland, Valley and foothill grassland; Clay (sometimes), Gravelly (sometimes), Loam (sometimes)/annual herb/Apr–July/935–6,890	Absent. This species was not observed on the Project site during a botanical focused survey in June 2024. Annual disking of the field has greatly reduced the potential for this species to occur. Additionally, the Project site is outside the known elevation range for this species.
Opuntia basilaris var. *treleasei*	Bakersfield cactus	FE/SE/1B.1	Chenopod scrub, cismontane woodland, valley and foothill grassland; sandy or gravelly/ perennial stem succulent/Apr–May/328–4,755	Absent. This species was not observed on the Project site during the survey effort. Annual disking of the field has greatly reduced the potential for this species to occur.
Stylocline citroleum	oil neststraw	None/None/1B.1	Chenopod scrub, Coastal scrub, Valley and foothill grassland; Clay/annual herb/Mar–Apr/165–1,310	Low potential to occur. Annual disking of the field has greatly reduced the potential for this species to occur.

Table 3. Special-Status Plant Species and their Potential to Occur on the Project Site

Scientific Name	Common Name	Status (Federal/ State/CRPR)	Primary Habitat Associations / Life Form / Blooming Period / Elevation Range (feet)	Potential to Occur
Stylocline masonii	Mason's neststraw	None/None/1B.1	Chenopod scrub, Pinyon and juniper woodland; Sandy/annual herb/Mar–May/330–3,935	Not expected to occur. The Project site does not provide suitable habitat for this species.
Tortula californica	California screw moss	None/None/1B.2	Chenopod scrub, Valley and foothill grassland; Sandy/moss/N.A./35–4,790	Not expected to occur. The Project site does not contain suitable soils for this species.
Trichostema ovatum	San Joaquin bluecurls	None/None/4.2	Chenopod scrub, valley and foothill grassland/ annual herb/(Apr–June) July–Oct/213–1,045	Occurs. Several small populations were observed along access roads and the earthen ditches around the site. None were observed within the larger areas subject to annual disking of the project site.

Status Legend:
FE: Federally listed as endangered
SE: State listed as endangered
California Rare Plant Rank (CRPR)
1B: Plants rare, threatened, or endangered in California and elsewhere
2B: Plants rare, threatened, or endangered in California but more common elsewhere
3: Watch List: Plants about which more information is needed
4: Watch List: Plants of limited distribution
.1 Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Moderately threatened in California (20%–80% occurrences threatened / moderate degree and immediacy of threat)

Table 4. Special-Status Wildlife Species and their Potential to Occur on the Project Site

Species Name	Common Name	Status (Federal/ State)	Habitat	Potential to Occur
Invertebrates				
Bombus crotchii	Crotch bumble bee	None/None	Open grassland and scrub communities supporting suitable floral resources.	Low to moderate potential to occur. Open grassland habitat is present, but no known floral resources, such as host plants, are present. Limited nectar producing plants occur on site. Several California ground squirrel burrows were observed which could potentially be used as a nest site. There is one occurrence within approximately 2.5 miles from 1979 of the Project site per the California Natural Diversity Database (CNDDB) (CDFW 2023b).
Branchinecta lynchi	vernal pool fairy shrimp	FT/None	Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats.	Not expected to occur. There are no vernal pools on the Project site. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Danaus plexippus	monarch butterfly	Candidate/None	Wind-protected tree groves with nectar sources and nearby water sources.	Not expected to occur. No suitable habitat present. No wind-protected tree groves with nectar sources and nearby water sources. No milkweed (*Asclepias sp.*) were observed onsite during a botanical focused survey conducted in June 2024.No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Amphibians				
Spea hammondii	western spadefoot	None/SSC	Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal scrub, valley–foothill woodlands, pastures, and other agriculture.	Not expected to occur. No suitable habitat present on the Project site. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).

Table 4. Special-Status Wildlife Species and their Potential to Occur on the Project Site

Species Name	Common Name	Status (Federal/ State)	Habitat	Potential to Occur
Reptiles				
Anniella grinnelli	Bakersfield legless lizard	None/SSC	Southern San Joaquin Valley. Known from two disjunct areas: the east side of the Carrizo Plain and portions of the city limits of Bakersfield. Often found underneath leaf litter, rocks, and logs (CDFW 2023b).	Not expected to occur. The Project site lacks suitable habitat required for this species. In addition, there are no occurrences within approximately 5 miles of the Project site (CDFW 2023b).
Arizona elegans occidentalis	California glossy snake	None/SSC	Arid scrub, rocky washes, grasslands, chaparral, open areas with loose soil.	Not expected to occur. No suitable habitat present on the Project site. In addition, there are no occurrences within approximately 5 miles of the Project site (CDFW 2023b).
Gambelia sila	blunt-nosed leopard lizard	FE/FP, SE	Sparsely vegetated alkali and desert scrubs, including semi-arid grasslands, alkali flats, and washes.	Not expected to occur. The Project site is regularly maintained for weed or fire protection purposes by annual disking. In addition, the surrounding areas have been regularly disked for fire and weed abatement from the Project site approximately 0.5-mile north to Merle Haggard Rd. Because of the annual disturbances and alteration to the landscape from annual maintenance, it is considered that this species is not expected to occur. Small mammal burrows observed on the site are disked annually for weed and fire abatement. The closest and most recent documentation of this species is from 1992 and is approximately 3.25 miles north of the Project site (CDFW 2023b).
Birds				
Athene cunicularia (burrow sites and some wintering sites)	burrowing owl	BCC/SSC	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows.	Moderate potential to occur. The Project site provides suitable habitat where this species may forage or den. Several California ground squirrel burrows and complexes were observed throughout the Project site, most in the east

Table 4. Special-Status Wildlife Species and their Potential to Occur on the Project Site

Species Name	Common Name	Status (Federal/ State)	Habitat	Potential to Occur
				edge of the site where dirt spoil piles have accumulated over the years. No sign of presence was observed during a survey conducted in 2023 or 2024. The closest documented record of this species is within 1.2 miles of the Project site (CDFW 2023b).
Buteo swainsoni (nesting)	Swainson's hawk	None/ST	Nests in open woodland and savanna, riparian, and in isolated large trees; forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture.	Low potential to occur. No suitable nesting habitat on the Project site. Several large trees are associated with the residences to the east. The Project site provides marginally suitable foraging for this species. One historical occurrence from 1935 was recorded within the vicinity of the Kern River, approximately 3.25 miles south of the Project site (CDFW 2023b).
Coccyzus americanus occidentalis (nesting)	western yellow-billed cuckoo	FT/SE	Nests in dense, wide riparian woodlands and forest with well-developed understories.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Empidonax traillii extimus (nesting)	southwestern willow flycatcher	FE/SE	Nests in dense riparian habitats along streams, reservoirs, or wetlands; uses variety of riparian and shrubland habitats during migration.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Gymnogyps californianus	California condor	FE/FP, SE	Nests in rock formations, deep caves, and occasionally in cavities in giant sequoia trees (*Sequoiadendron giganteus*); forages in relatively open habitats where large animal carcasses can be detected.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).

Table 4. Special-Status Wildlife Species and their Potential to Occur on the Project Site

Species Name	Common Name	Status (Federal/ State)	Habitat	Potential to Occur
Mammals				
Aeorestes cinereus	northern hoary bat	None/None	Forest, woodland riparian, and wetland habitats; also juniper scrub, riparian forest, and desert scrub in arid areas; roosts in tree foliage and sometimes cavities, such as woodpecker holes.	Not expected to occur. No suitable nesting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Eumops perotis californicus	western mastiff bat	None/SSC	Chaparral, coastal and desert scrub, coniferous and deciduous forest, and woodland; roosts in crevices in rocky canyons and cliffs where the canyon or cliff is vertical or nearly vertical, trees, and tunnels.	Not expected to occur. No suitable roosting or foraging habitat is present. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Perognathus inornatus	San Joaquin pocket mouse	None/None	Open grassland and scrub areas on fine-textured soils.	Not expected to occur. The Project site is regularly maintained, providing low-quality habitat for this species. No suitable burrows for were observed. In addition, there are no occurrences within approximately 5 miles of the Project site (CDFW 2023b).
Sorex ornatus relictus	Buena Vista Lake ornate shrew	FE, BCC/SSC	Marshes, wetlands, streams, and sloughs along lake basins in southern San Joaquin Valley; historical occurrences include Buena Vista, Tulare, and Kern Lakes; distribution poorly known.	Not expected to occur. No suitable habitat present on the Project site. No CNDDB records have been recorded of this species within 5 miles of the Project site (CDFW 2023b).
Taxidea taxus	American badger	None/SSC	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils.	Not expected to occur. The Project site is regularly maintained, providing low-quality habitat for this species. Although CNDDB records indicate presence within 0.1 miles of the site, no burrows suitable for this species was observed on site. In addition, the CNDDB record is from 1900 (CDFW 2023b).

Table 4. Special-Status Wildlife Species and their Potential to Occur on the Project Site

Species Name	Common Name	Status (Federal/ State)	Habitat	Potential to Occur
Vulpes macrotis mutica	San Joaquin kit fox	FE/ST	Grasslands and scrublands, including those that have been modified; oak woodland, alkali sink scrubland, vernal pool, and alkali meadow.	Moderate to high potential to occur. The Project site provides suitable habitat where this species may forage or den. Several California ground squirrel burrows and complexes were observed throughout the Project site, most in the east edge of the site where dirt spoil piles have accumulated over the years. Although no sign of presence of San Joaquin kit fox was observed during the survey of the site, several historical records of this species have been documented within 0.1 miles to 5 miles from the Project site (CDFW 2023b).

Status Abbreviations
FE: Federally Endangered
FT: Federally Threatened
BCC: U.S. Fish and Wildlife Service Bird of Conservation Concern
SSC: California Species of Special Concern
FP: California Fully Protected Species
SE: State Endangered
ST: State Threatened

4.4.2.1 Burrowing Owl

Burrowing owl is a California Species of Special Concern. With a relatively wide-ranging distribution throughout the west, burrowing owls are considered to be habitat generalists (Lantz et al. 2004). In California, burrowing owls are yearlong residents of open, dry grassland and desert habitats, and in grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner et al. 1990). Preferred habitat is typified by short, sparse vegetation with few shrubs, level to gentle topography, and well-drained soils (Poulin et al. 2011).

The presence of burrows is the most essential component of burrowing owl habitat because they are required for nesting, roosting, cover, and caching prey (Coulombe 1971; Green and Anthony 1989; Martin 1973; Poulin et al. 2011). In California, western burrowing owls most commonly live in burrows created by California ground squirrels. Burrowing owls may occur in human-altered landscapes, such as agricultural areas, ruderal grassy fields, vacant lots, and pastures, if the vegetation structure is suitable (i.e., open and sparse); useable burrows are available; and foraging habitat occurs in close proximity (Gervais et al. 2008). Debris piles, riprap, culverts, and pipes can be used for nesting, secondary shelter sites, and roosting.

Potentially suitable burrowing owl burrows (burrow openings approximately 4 inches in diameter or greater) or burrow complexes were observed during the survey effort (Figure 2). However, no burrowing owls or burrowing owl sign (whitewash, pellets, feathers, or prey remains) was observed during the survey. Nevertheless, burrowing owls could move onto the site between the time of the site survey and proposed ground disturbance activities.

4.4.2.2 San Joaquin Kit Fox

San Joaquin kit fox is in the family Canidae and is a year-round resident of arid and semi-arid regions of the San Joaquin Valley and surrounding valleys, Sierra Nevada foothills, and Coast Ranges from northern Santa Barbara and Ventura Counties north to Contra Costa and San Joaquin Counties (USFWS 1998). This species lives in annual grasslands or grassy open habitats with scattered shrubby vegetation. It requires loose-textured sandy soils for burrowing and a suitable prey base of rodents. Kit foxes in the northern portion of the range are mostly associated with annual grassland and valley oak woodland (USFWS 1998). Where kit foxes are found in annual grassland, such as in surrounding valleys, they are generally associated with brome grasses, fescue (*Festuca* spp.), wild oats (*Avena fatua*), barley (*Hordeum* spp.), and filaree (*Erodium* spp.).

During the survey, several burrows meeting the minimum size criteria (openings 4 inches in diameter or greater) were identified and examined (Figure 2). None were confirmed to be San Joaquin kit fox natal dens or active dens. Furthermore, none of these burrows were determined to be occupied or otherwise used by kit fox based on the lack of sign (e.g., scat, prey remains, digging, claw marks) of kit fox.

Because the number of kit foxes can vary greatly from year to year, and successful dispersal may allow individuals to occupy areas between established populations, it is possible that transient individual San Joaquin kit foxes could occur intermittently on the Project site during foraging or dispersal events.

4.4.2.3 Crotch Bumble Bee

Crotch's bumble bee (*Bombus crotchii*) is a state candidate for listing as threatened. This species ranges throughout much of central and Southern California, along the central and Southern California coasts, through the Central Valley, and in the surrounding foothills. However, it now appears to be absent from much of its former range, and its population appears to have declined drastically, especially in its former stronghold in the Central Valley (Xerces Society et. al. 2018; CDFW 2023d).

Crotch's bumble bee occurs in open grassland and scrub communities supporting suitable floral resources. Data from a variety of resources states that Crotch's bumble bee is most commonly associated with the species from the following families, in descending order based on number of observations: Fabaceae, Apocynaceae, Asteraceae, Lamiaceae, and Boraginaceae (Richardson 2014 as cited in Xerces Society et. al. 2018). Williams et. al. (2014) cited the genera *Asclepias*, *Chaenactis, Lupinus, Medicago, Phacelia*, and *Salvia* as example food plants. The species nests primarily underground and may be reliant on small mammal burrows. Little is known about winter hibernacula, but the species is presumed to rely on microhabitats for overwintering similar to those of other bumble bees, including loose disturbed soil, leaf litter, and other debris (Xerces Society et. al. 2018; CDFW 2019a).

Crotch's bumble bee has a low to moderate potential to occur within the study area, as it contains open grassland; however, there is limited floral resources including the genera *Phacelia, Clarkia, Eriogonum*, and *Eschscholzia* species present due to annual disking of the site for fire and weed abatement. Crotch's bumble bee is a generalist forager and could forage anywhere within the study area where suitable floral resources are present. Although the study area supports limited suitable floral resources, the actual area occupied by specific resources with potential to support nesting for the species is likely a much smaller portion of the entire study area. Nesting is primarily located underground in abandoned holes made by ground squirrels, mice, and rats, but may be aboveground in abandoned bird nests or empty cavities (Osborne et al. 2008, Williams et al. 2014).

Surveys were conducted within two 3-acre parcels representing approximately 10% of the Project site (Figure 2). Surveys were conducted for one hour per 3-acre parcel. During the survey, several burrows (openings 4 inches in diameter or greater) were identified and examined (Figure 2). Additionally, small mammal burrows observed throughout the Project site during a botanical pass were also evaluated for presence of nesting Crotch bumble bee. None were confirmed to be used by Crotch bumble bee for nesting during a site-specific survey conducted in June 2024. Furthermore, because the survey was conducted later in the nesting season, many of the spring blooming floral species have died. Late spring/summer floral flowering species were sparse on site. Nevertheless, there is a low to moderate potential for this species to occur on the Project site.

4.4.3 Sensitive Vegetation Communities

Sensitive vegetation communities include riparian corridors, wetlands, habitats for state and/or federally protected species and other special-status species, areas of high biological diversity, areas providing important wildlife habitat, and/or unusual or regionally restricted habitat types. Sensitive vegetation communities are evaluated by CDFW and are assigned global (G) ranks and state (S) ranks based on rarity of, and threats to, these vegetation communities over their entire distributions (G-rank) and within California (S-rank). Vegetation communities with ranks of S1, S2, or S3 are considered sensitive and are typically addressed under CEQA. No sensitive vegetation communities occur on the Project site.

4.4.4 Aquatic Resources

The literature review identified no features within the Project site considered sensitive aquatic resource per the National Wetlands Inventory (USFWS 2023b) (Figure 3, USFWS National Wetlands Inventory). The field reconnaissance survey resulted in no on-site observations of sensitive aquatic resources.

4.5 Wildlife Corridors and Movement

Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration and dispersal of terrestrial animal species. Wildlife corridors contribute to population viability by ensuring continual exchange of genes between populations, providing access to adjacent habitat areas for foraging and mating, and providing routes for recolonization of habitat after local extirpation or ecological catastrophes (e.g., wildfires). Small patches of habitats that serve to connect larger blocks of habitat can often serve as movement corridors and help reduce the adverse effects of habitat fragmentation. Such linkages may be continuous habitat or discrete habitat islands that function as steppingstones for dispersal.

Formal wildlife movement studies were not conducted for the Project site. Given the expanse of open agricultural lands surrounding the Project site, the site itself is not considered an important linkage between larger open space areas that serve as wildlife habitat; in addition, the site and immediate area are not recognized as an important regional migratory corridor by the County of Kern or state resource agencies. Although some animals may pass through or along the site during localized movement events in search of food or shelter, the location of the Project site and surrounding developed areas to the east, south, and west pose as restrictions to movement. San Joaquin kit foxes are accustomed to urban settings and would not constrain their movement due to implementation of the Project.

Figure 2 Biological Resources

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Figure 3 USFWS National Wetlands Inventory

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5 Potential Constraints to Development and Recommendations

As noted in Section 2.6, the Metropolitan Bakersfield General Plan, Kern County General Plan, and the Dark Skies Ordinance provide a framework to guide development projects in the portion of Kern County where the Project is located. In addition, several federal and state statutes and regulations are relevant (or potentially relevant) to the plant and wildlife resources located on the Project site, including the following: CESA (California Fish and Game Code Section 2050 et seq), FESA (16 USC 1531 et seq), MBTA (16 USC 703–712), federal Clean Water Act, and CEQA Guideline Section 15380.

This chapter addresses potential biological resource constraints to implementation of the Project, particularly those considered to be special status or that are otherwise regulated by the resource agencies noted above. Recommendations to address potential constraints are provided below.

5.1 Thresholds of Significance

The significance criteria used to evaluate Project impacts to biological resources are based on CEQA Guidelines Appendix G. Potential Project-related impacts analyzed in this section account for biological resources that occur or have the potential to occur on the Project site. According to CEQA Guidelines Appendix G, a significant impact related to biological resources would occur if the Project would:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal wetlands and drainages, etc.) through direct removal, filling, hydrological interruption, or other means.
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

The significance of impacts to biological resources was assessed by comparing the potential changes resulting from the proposed Project to these significance thresholds. An evaluation of whether or not an effect on biological resources would be "substantial" with respect to the significance thresholds generally considers the following:

- Amount and/or extent of the resource (e.g., numbers, acres) to be affected versus preserved.
- The relative biological value (rarity, functions and values) and/or sensitivity status of the resource and its relevance within a specified geographical area.
- The type and severity of impact (i.e., would the Project adversely affect wildlife through mortality, injury, displacement, or habitat loss or adversely impact vegetation through destruction of a sensitive plant population?).
- Timing of the impact (i.e., would the impact occur at a critical time in the life cycle of a special-status plant or animal, such as breeding, nesting, or flowering periods?).
- Duration of the impact (i.e., whether the impact is temporary or permanent).

The analysis of direct and indirect impacts covers construction, operation, and maintenance of the proposed Project and associated infrastructure. Direct impacts include those that occur immediately as a result of the proposed Project on a particular biological resource. Indirect impacts include those that are caused by the proposed Project later in time, but that are still reasonably certain to occur.

5.2 Impacts Analysis

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

Less-than-Significant Impact with Mitigation Incorporated. The following evaluates the Project's potential direct and indirect effects on special-status plant and wildlife species as defined above.

Special-Status Plant Species

Direct and Indirect Impacts

Special-status plant species are not expected to occur on the Project site; therefore, there is no potential for direct or indirect impacts to special-status plant species from Project implementation. The Project site is currently dominated by non-native grassland and is subject to disturbance from management practices. No special-status plant species were observed during the survey conducted in March 2023, and special-status plants are not expected to occur on the Project site. Therefore, construction of the proposed Project would have no direct or indirect impacts on special-status plants.

Special-Status Wildlife

The following evaluates the Project's potential direct and indirect effects on three special-status wildlife species that could potentially occur on site during construction activities: burrowing owl, San Joaquin kit fox and Crotch bumble bee.

Direct Impacts

Burrowing Owl

The Project site provides suitable foraging and nesting habitat for burrowing owls. Several suitable burrowing owl burrows (burrow openings approximately 4 inches in diameter or greater) or burrow complexes were observed during the survey effort. As previously noted, no burrowing owls or their sign (e.g., whitewash, pellets, prey remains, feathers) were observed during the biological survey conducted on the Project site. However, the potential for burrowing owls to use the ground squirrel burrows on site as temporary shelter, nesting, or over-wintering prior to Project implementation cannot be entirely ruled out. In the unlikely event that burrowing owls move onto the site prior to construction, ground-disturbance activities could result in injury or mortality to burrowing owls. Because this species is a CDFW Species of Special Concern and is protected by provisions in the California Fish and Game Code addressing active bird nests and raptors, such injury or mortality would constitute a potentially significant impact under CEQA. Mitigation Measure (MM) BIO-1 includes a requirement for a pre-construction survey for burrowing owls on the site, prescribes buffers for avoidance of occupied burrows, and describes when passive relocation may be used, if necessary, to exclude owls from the Project site.

With implementation of MM-BIO-1 (Pre-Construction Surveys for Burrowing Owl and Avoidance), potential direct impacts to burrowing owl would be reduced.

San Joaquin Kit Fox

Several burrows or burrow complexes meeting the minimum size criteria were identified and examined (Figure 2). Of these, none were confirmed to be San Joaquin kit fox natal dens or active dens. Furthermore, none of these burrows were occupied by kit fox, and none showed sign (e.g., scat, prey remains, digging) of recent use by kit fox. In addition, no sign (e.g., tracks, scat, dens, prey remains) of kit fox presence was observed during the field survey. The loss of the site as foraging and habitat for kit fox is not expected to substantially affect populations of this species in the region. Per the results of the CNDDB search, several historical records of this species have been documented within 0.1 miles to 5 miles from the Project site (CDFW 2023b). Although this species is not expected to den and/or breed on the Project site, individual foxes could temporarily move through the site in search of prey or during movements between larger open space areas in the region with more suitable foraging habitat. In the unlikely event that an individual kit fox temporarily moves onto or through the site prior to or during construction, Project activities could result in injury or mortality to individual kit foxes. Because of the rarity of this species, which is federally listed as endangered and state-listed as threatened, the loss of a San Joaquin kit fox would be a potentially significant impact under CEQA. Implementation of MM-BIO-2 includes a requirement for pre-construction surveys and standard measures recommended by USFWS to avoid impacts to San Joaquin kit fox prior to and during construction activities.

With implementation of MM-BIO-2 (Pre-Construction Survey for San Joaquin Kit Fox and Avoidance), potential impacts to San Joaquin kit fox would be reduced.

Crotch Bumble Bee

Crotch bumble bee is a state candidate for listing an endangered. It occurs in open grassland and scrub communities supporting suitable floral resources. It was not observed during surveys but has potential to occur on the project site. The proposed project could result in direct impacts to individuals of this uncommon species or loss of suitable floral resources.

Implementation of MM-BIO-3 would reduce potential direct impacts by requiring a pre-construction survey for Crotch bumble bee and avoidance of nesting resources, if present, until the nesting period has concluded.

Nesting Migratory Birds and Raptors

Similar to most other sites containing trees, shrubs, and other vegetation, the Project site contains opportunities for birds of prey (raptors) and other avian species to nest on site. Native nesting bird species with potential to occur within the Project site are protected by California Fish and Game Code Sections 3503 and 3503.5, and by the federal MBTA (16 USC 703–711). In particular, California Fish and Game Code Section 3503 provides that it is unlawful to take, possess, or needlessly destroy the active nests or eggs of any bird in California; Section 3503.5 protects all raptors and their eggs and active nests; and the MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of native migratory bird species throughout the United States. Currently, California considers any nest that is under construction or modification, or is supporting eggs, nestlings, or juveniles as “active.” Therefore, impacts to nesting migratory birds and raptors would be significant under CEQA absent mitigation.

To ensure compliance with the California Fish and Game Code and MBTA and to avoid potential impacts to nesting birds, it is recommended that vegetation removal activities be conducted outside the general bird nesting season (February 1 through August 31, depending on the species). If vegetation cannot be removed outside the bird nesting season, a pre-construction nesting bird survey by a qualified biologist is required prior to vegetation removal; if active nests are found, appropriate non-disturbance buffers would be established around any active nests until young have successfully fledged.

With implementation of MM-BIO-4 (Pre-Construction Nesting Bird Surveys and Avoidance), direct impacts to nesting migratory birds and raptors would be reduced.

Indirect Impacts

Burrowing Owl

Construction activities have the potential to result in indirect impacts to burrowing owls both on and immediately adjacent to the Project site if this species occurs prior to and/or during Project construction. These impacts include dust, noise and vibration, trash and debris, increased human presence, vehicle collisions, and chemical spills. These potential short-term or temporary indirect impacts to burrowing owls would be potentially significant under CEQA.

MM-BIO-1 would require burrowing owl surveys to be conducted prior to ground-disturbance activities and appropriate construction buffers established around any burrowing owl burrows found on or immediately adjacent to the Project site, thus minimizing most short-term indirect impacts. Additionally, MM-BIO-5, MM-BIO-6, and MM-BIO-8 would require ongoing biological monitoring, require workers to complete a worker environmental awareness training, and would minimize night lighting hazards to wildlife. MM-BIO-7 would ensure that a prompt and effective response to any accidental chemical spills would be implemented, and that repair and clean-up of any hazardous waste occurs. To reduce fugitive dust resulting from Project construction and to minimize adverse air quality impacts, the Project would employ mitigation to limit the amount of fugitive dust generated during construction. MM-BIO-9 would require trash and debris to be removed regularly from the site during construction activities and would require animal-resistant trash receptacles to avoid attracting urban-related, predator species.

Implementation of MM-BIO-1 (Pre-Construction Surveys for Burrowing Owl and Avoidance), MM-BIO-4 (Pre-Construction Nesting Bird Surveys and Avoidance), MM-BIO-5 (Compliance Monitoring), MM-BIO-6 (Worker

Environmental Awareness Program), MM-BIO-7 (Hazardous Waste), and MM-BIO-9 (Trash and Debris) would reduce potential indirect impacts to burrowing owls would be reduced.

San Joaquin Kit Fox

Construction activities have the potential to result in short-term indirect impacts to San Joaquin kit fox, should any be passing through or foraging on the Project site during construction. Those impacts could include construction-associated dust, noise and vibration, trash and debris, increased human presence, vehicle collisions, and chemical spills. Short-term or temporary indirect impacts to kit foxes could occur should individual kit foxes occupy the Project site prior to construction.

MM-BIO-2 would require a pre-construction survey for San Joaquin kit fox and, if determined present, would result in establishment of a San Joaquin kit fox monitoring and mitigation plan that would include avoidance and minimization measures to reduce potential indirect impacts. MM-BIO-5, and MM-BIO-6 would require that all workers complete a Worker Environmental Awareness Program and would require ongoing biological monitoring and compliance with all biological resource mitigation requirements. MM-BIO-7 would ensure that a prompt and effective response to any accidental chemical spills would be implemented, and that repair and clean-up of any hazardous waste occurs. To reduce fugitive dust resulting from construction and to minimize adverse air quality impacts, the Project would employ dust mitigation measures that would limit the amount of fugitive dust generated during construction.

Implementation of MM-BIO-2 (Pre-Construction Survey for San Joaquin Kit Fox and Avoidance), MM-BIO-5 (Compliance Monitoring), MM-BIO-6 (Worker Environmental Awareness Program), MM-BIO-7 (Hazardous Waste), and MM-BIO-9 (Trash and Debris) would reduce potential indirect impacts to San Joaquin kit fox.

Crotch Bumble Bee

The proposed project could result in indirect impacts to individuals of Crotch bumble bee due to noise and vibration and other indirect effects. Implementation of MM-BIO-3 would reduce potential indirect impacts from noise and vibration by requiring a preconstruction survey for Crotch bumble bee, avoidance of nesting resources, and a 100-foot buffer, if present, until the nesting period has concluded.

Implementation of MM-BIO-3 (Pre-Construction Survey for Crotch Bumble Bee), MM-BIO-5 (Compliance Monitoring), MM-BIO-6 (Worker Environmental Awareness Program), MM-BIO-7 (Hazardous Waste), and MM-BIO-9 (Trash and Debris) would reduce potential indirect impacts to Crotch bumble bee.

Nesting Migratory Birds and Raptors

Construction activities have the potential to result in indirect impacts to nesting migratory birds and raptors. Those impacts could include the loss of an active nest through increased dust, noise and vibration, increased human presence, and nighttime lighting. Potential short-term or temporary indirect impacts to active bird nests would be significant under CEQA.

Potential post-construction (long-term) activities that have the potential to result in indirect impacts to migratory birds and raptors include nighttime lighting that may adversely affect active nests.

To ensure compliance with the California Fish and Game Code and MBTA, and to avoid potential indirect impacts to nesting birds, vegetation removal activities would be conducted outside the general bird nesting season (February 1 through August 31, depending on the species). If vegetation cannot be removed outside the bird nesting season, a pre-construction nesting bird survey (MM-BIO-4) by a qualified biologist would be required prior to vegetation removal. Indirect impacts would include increased dust, noise and vibration, human presence, nighttime lighting, and vehicle collisions. MM-BIO-5, MM-BIO-6, and MM-BIO-8 would require that all construction workers complete a Worker Environmental Awareness Program, ongoing biological monitoring, and compliance with all biological resource mitigation requirements.

Implementation of MM-BIO-4 (Pre-Construction Nesting Bird Surveys and Avoidance), MM-BIO-5 (Compliance Monitoring), MM-BIO-6 (Worker Environmental Awareness Program), and MM-BIO-8 (Lighting) would reduce potential indirect impacts to nesting birds and raptors.

Threshold b: Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

As stated in Section 4.1, Land Covers, one land cover was identified on site, which is not considered sensitive pursuant to local, state, and federal guidelines and policies. The Project would result in permanent impacts to 49.05 acres of non-native grassland, which is not considered sensitive by CDFW (see Figure 2). Therefore, impacts to habitat or vegetation communities identified in local or regional plans, policies, or regulations, or by CDFW or USFWS would occur.

Threshold c: Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

As detailed in Section 4.4.4, Aquatic Resources, there are no sensitive aquatic features within the Project site.

Threshold d: Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

As discussed above, because the Project site does not provide for regional wildlife movement or serve as a regional wildlife corridor, nor include any streams or water courses, Project development would not impede local or seasonal wildlife movement between large open space areas in the Project region. Therefore, no adverse or significant impacts would occur to wildlife movement corridors. In addition, because no native wildlife nursery sites, such as bat colony roosting sites or colonial bird nesting areas, occur on the Project site, development of the site would not impede the use of wildlife nursery sites by native species, and impacts to native resident or migratory wildlife corridors.

Threshold e: Would the Project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Following the regulations outlined in and consistent with the Metropolitan Bakersfield General Plan and Kern County General Plan Goals and Policies (see Section 2.6); measures discussed in Thresholds a and e; and implementation of Mitigation Measures provided in Chapter 6, biological resources identified in the general plans would be protected in accordance with FESA, CESA, and CEQA. Thus, the Project would not be in conflict with local policies or ordinances for protection of biological resources with the incorporation of MM-BIO-1 through MM-BIO-9.

Threshold f: Would the Project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The Project site is within the Metropolitan Bakersfield Habitat Conservation Plan Sphere of Influence. Following a pre-construction survey for biological resources, a one-time fee would be made payable to the City of Bakersfield and the County of Kern at the time the grading plans are approved or when the building permits are issued and will apply to all acres of vegetation types directly impacted by the Project.

6 Mitigation Measures and Level of Significance After Mitigation

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

Two wildlife species were determined to have a low to moderate potential to occur within the Project site and could occur during construction of the Project: burrowing owl and San Joaquin kit fox. Suitable habitat for these species would be directly impacted by the Project.

The Project could result in potentially significant impacts to species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS, including burrowing owl and San Joaquin kit fox, and nesting migratory birds and raptors. Implementation of MM-BIO-1 through MM-BIO-8 is required to reduce impacts.

MM-BIO-1 **Pre-Construction Surveys for Burrowing Owl and Avoidance.** The Project applicant shall have a pre-construction burrowing owl survey completed by a qualified biologist no more than 14 days before initiation of site preparation or grading activities, and a second survey shall be completed within 24 hours of the start of site preparation or grading activities. If ground-disturbing activities are delayed or suspended for more than 30 days after the pre-construction surveys, the Project site shall be resurveyed. Surveys for burrowing owl shall be conducted in accordance with protocols established in the 2012 Staff Report on Burrowing Owl Mitigation prepared by the California Department of Fish and Game (now California Department of Fish and Wildlife [CDFW]).

If burrowing owls are detected, a Burrowing Owl Relocation Plan shall be implemented in consultation with CDFW. As required by the Burrowing Owl Relocation Plan, disturbance to burrows shall be avoided during the nesting season (February 1 through August 31). Buffers shall be established around occupied burrows in accordance with guidance provided in the Staff Report on Burrowing Owl Mitigation or most current guidance. No Project activities shall be allowed to encroach into established buffers without the consent of a monitoring biologist. The buffer shall remain in place until it is determined that occupied burrows have been vacated or the nesting season has completed.

Outside of the nesting season, passive owl relocation techniques approved by CDFW shall be implemented. Owls shall be excluded from burrows in the immediate Project site and within a buffer zone by installing one-way doors in burrow entrances. These doors shall be placed at least 48 hours prior to ground-disturbing activities. The Project area shall be monitored daily for 1 week to confirm owl departure from burrows prior to any ground-disturbing activities. Compensatory mitigation for permanent loss of owl habitat shall be provided following the guidance in the Staff Report on Burrowing Owl Mitigation or most current guidance.

Where possible, burrows shall be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe shall be inserted into the tunnels during excavation to maintain an escape route for any wildlife inside the burrow.

A qualified biologist (i.e., a wildlife approved with the ability to identify the species and possessing previous burrowing owl survey and avoidance and minimization protection experience) shall be present during all initial grading and pre-construction ground disturbance activities.

MM-BIO-2 San Joaquin Kit Fox. The Project applicant shall have a qualified biologist conduct a pre-construction survey for San Joaquin kit fox no less than 14 days and no more than 30 days prior to any construction-related activities. Surveys shall be conducted on the Project site, including within a 200-foot buffer zone within areas where legal access is available to evaluate and ascertain if kit fox is using the Project site. If an active kit fox den is observed within the work area or 200-foot buffer zone, the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS) shall be contacted prior to disturbance within 200 feet of the den to determine the best course of action. If no kit fox activity is detected, work shall continue as planned and a brief memorandum shall be prepared and submitted to CDFW and USFWS after the completion of the pre-construction survey.

Although San Joaquin kit foxes are not anticipated to access the site during construction, the Project applicant shall implement precautionary measures following the Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance developed by USFWS (2011) as follows:

1. Project-related construction vehicles shall observe a 20 mph speed limit in all Project areas, except on county roads and state and federal highways; this is particularly important at night when kit foxes are most active. Nighttime construction shall be minimized. Off-road traffic outside of designated Project areas shall be prohibited.
2. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes, becoming trapped or injured. If a San Joaquin kit fox is discovered inside a pipe, that section of pipe shall not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved once to remove it from the path of construction activity until the fox has escaped.
3. All food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of in closed containers and removed regularly from the Project site during all construction activities.
4. Use of rodenticides and herbicides in the Project site shall be restricted as follows: All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation, as well as additional Project-related restrictions deemed necessary by the USFWS. If rodent control must be conducted, zinc phosphide shall be used because of proven lower risk to kit fox.
5. Escape ramps shall be provided for all open trenches or ditches deeper than 2 feet to allow animals to escape.
6. Any contractor or construction employee who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to the overall Project contractor and biologist. The

Project contractor or biologist shall contact the USFWS and CDFW immediately in the case of a dead, injured, or entrapped kit fox encountered.

7. The USFWS and CDFW shall be notified in writing within 3 working days of the accidental death or injury to a San Joaquin kit fox during Project-related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information.

MM-BIO-3 **Crotch Bumble Bee.** A qualified biologist shall conduct a survey for Crotch's bumble bee using the CDFW-approved protocol prior to commencing project activities to detect bumble bees and potential nesting sites. The survey shall be conducted within a survey area that includes a 50-foot buffer around the Project footprint. If an active Crotch's bumble bee nest is found within the survey area, the nest will be flagged, and work shall not commence within 50 feet of the active nest until the nest is no longer active (typically September or October) to avoid take of Crotch's bumble bee. Permittee shall submit survey reporting to CDFW at least seven days prior to commencing any project activities. If avoidance of Crotch's bumble bee nest(s) is not feasible, the Permittee is advised that an Incidental Take Permit for Crotch's bumble bee and amendment to this Agreement would be warranted prior to commencing or resuming the project. Alternatively, in the absence of surveys, permittee may assume presence and apply for and acquire an Incidental Take Permit for Crotch's bumble bee prior to initiating project activities.

MM-BIO-4 **Pre-Construction Nesting Bird Surveys and Avoidance.** Construction activities shall avoid the migratory bird nesting season (typically February 1 through August 31) to reduce any potential significant impact to birds that may be nesting in the survey area. If construction activities must occur during the migratory bird nesting season, the Project applicant shall have an avian nesting survey of the Project site conducted by a qualified wildlife biologist, including within 500 feet of all impact areas, to determine the presence/absence of protected migratory birds and active nests. The avian nesting survey shall be conducted within 72 hours prior to the start of construction. If an active bird nest is found, the nest shall be flagged and mapped on the construction plans, along with an appropriate "no disturbance" buffer established around the nest, which shall be determined by a biologist based on various criteria, including existing visual, noise, or topographic barriers between the disturbance area and the nest; the type, timing, and extent of the disturbance activity; and the nesting phase (e.g., nest building, incubation, age of young) of active nests being avoided. Construction personnel shall be instructed on the sensitivity of nest areas. The nest area shall be avoided until the nest is vacated and the juveniles have fledged, as determined by the biologist. The biologist shall serve as a construction monitor during those periods when construction activities shall occur near active nest areas to ensure that no inadvertent impacts on these nests shall occur. No Project activities shall encroach into established buffers without the consent of the monitoring biologist.

MM-BIO-5 **Compliance Monitoring.** A qualified biologist (i.e., with the ability to identify the species and possessing previous San Joaquin kit fox and burrowing owl survey and avoidance and minimization protection experience) shall be present during all initial grading and pre-construction ground-disturbance activities. The qualified biologist shall be on site daily, during all initial ground-disturbance activities or as otherwise determined to be necessary, if active bird nests were detected during the pre-construction nest surveys (MM-BIO-3) to ensure established no-disturbance buffers are recognized and to determine when such nests are no longer active. The qualified biologist shall also conduct compliance inspections to minimize incidental impacts to other sensitive biological resources; prevent unlawful take of those resources; ensure that signs, stakes, and fencing are intact; and ensure that impacts are only occurring within the permitted development footprint. Weekly written observation and inspection records shall be prepared by the biologist that summarize oversight activities, compliance inspections, and monitoring activities, and be submitted to the client.

MM-BIO-6 **Worker Environmental Awareness Program.** A Worker Environmental Awareness Program (WEAP) for all construction workers working in the Project area shall be administered before the initiation of any Project-associated ground disturbances occur. The WEAP shall consist of a presentation from a qualified biologist that includes a discussion of the biology and status of special-status animal species potentially occurring on the Project site and various biological resources mitigation measures described herein. Interpretation for non-English-speaking workers shall be provided if necessary, and the same instruction shall be provided to any new workers before they are authorized to perform work in the Project area. Upon completion of the WEAP, employees shall sign a form indicating attendance at the WEAP and that all protection measures are understood.

MM-BIO-7 **Hazardous Waste.** If any fuel or hazardous waste leaks or spills occurs during construction activities, the Project applicant shall immediately stop work and, pursuant to state and federal statutes and regulations, arrange for repair and clean up by qualified individuals at the time of occurrence, or as soon as it is safe to do so.

MM-BIO-8 **Nighttime Lighting.** If nighttime lighting for construction activities and operations is required and is within 50 feet of the outside edge of areas containing habitat for special-status wildlife, as determined by the qualified biologist, lighting shall be directed away from those areas that contain habitat for special-status wildlife.

MM-BIO-9 **Trash and Debris.** The following avoidance and minimization measures shall be implemented during Project construction:

1. Fully covered trash receptacles that are animal-proof shall be installed on site during construction and used by all construction workers to contain food, food scraps, food wrappers, beverage containers, and other miscellaneous trash. Trash contained within the receptacles shall be removed at least once a week from the Project site.
2. Construction work areas shall be kept clean of debris, such as cables, trash, and construction materials. All construction/contractor workers shall collect all litter, vehicle fluids, and food waste from the Project site on a daily basis and stored in a covered refuse container.

7 References

AOS (American Ornithological Society). 2023. Checklist of North American Birds (Online). Accessed April 2023. http://checklist.aou.org/taxa.

Calflora. 2023. Information on California Plants for Education, Research and Conservation [web application]. Berkeley, California: The Calflora Database [a non-profit organization]. Accessed April 2023. http://www.calflora.org/.

CDFG (California Department of Fish and Game). 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. November 2019.

CDFW (California Department of Fish and Wildlife). 2012 Staff Report on Burrowing Owl Mitigation. March 7, 2012.

CDFW. 2019. Evaluation of the Petition from the Xerces Society, Defenders of Wildlife, and the Center for Food Safety to List Four Species of Bumble Bees as Endangered under the California Endangered Species Act. April 4, 2019. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=166804&inline.

CDFW. 2023a. California Natural Community List. April 2023. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline.

CDFW. 2023b. Rarefind 5: Commercial version. Online database. California Natural Diversity Database. CDFW, Biogeographic Data Branch. Accessed April 2023. https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data.

CDFW. 2023c. *Special Vascular Plants, Bryophytes, and Lichens List*. April 2023. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline.

CDFW. 2023d. Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species. June 6, 2023.

City of Bakersfield. 2016. *Metropolitan Bakersfield General Plan*. Prepared by the City of Bakersfield and County of Kern. Adopted December 11, 2002; last updated January 20, 2016. https://content.civicplus.com/api/assets/37a2e20d-e610-431f-a222-9f4f2ecd2ddd.

CNPS (California Native Plant Society). 2001. Botanical Survey Guidelines. December 9, 1983. Revised June 2.

CNPS. 2023a. “Inventory of Rare and Endangered Plants” (online edition, v8-02). Sacramento, California: California Native Plant Society. Accessed April 2023. www.rareplants.cnps.org.

CNPS. 2023b. *Manual of California Vegetation*. Accessed April 2023. https://www.cnps.org/vegetation/manual-of-california-vegetation.

Coulombe, H.N. 1971. “Behavior and Population Ecology of the Burrowing Owl, *Speotyto cunicularia*, in the Imperial Valley of California.” *Condor* 73:162–176.

County of Kern. 2009. *Kern County General Plan*. Accessed May 2023. http://psbweb.co.kern.ca.us/planning/pdfs/kcgp/KCGP.pdf.

Crother, B. 2017. *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding*. 8th edition. Herpetological Circular, No. 43. Society for the Study of Amphibians and Reptiles, Committee on Standard English and Scientific Names.

Cypher, E.A. 2002. *General Rare Plant Survey Guidelines*. California State University, Stanislaus. Revised July 2002.

Gervais, J.A., D.K. Rosenberg, and L.A. Comrack. 2008. "Burrowing Owl (*Athene cunicularia*)." In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, edited by W.D. Shuford and T. Gardali, 218–226. Studies of Western Birds no. 1. California: Western Field Ornithologists (Camarillo), and California Department of Fish and Game (Sacramento). February 4, 2008. Accessed December 11, 2012. http://www.dfg.ca.gov/wildlife/ nongame/ssc/birds.html.

Green, G.A., and R.G. Anthony. 1989. "Nesting Success and Habitat Relationships of Burrowing Owls in the Columbia Basin, Oregon." *Condor* 91:347–354.

Jepson Flora Project. 2023. *Jepson eFlora*. Berkeley, California: University of California. Accessed April 2023. http://ucjeps.berkeley.edu/cgi-bin/get_JM_name_data.pl.

Lantz, S.J., H. Smith, and D.A. Keinath. 2004. *Species Assessment for Western Burrowing Owl* (Athene cunicularia hypugaea) *in Wyoming*. Prepared for the U.S. Department of Interior and Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. September 2004.

Martin, D.J. 1973. "Selected Aspects of Burrowing Owl Ecology and Behavior." *Condor* 75: 446–456.

Osborne, J.L., A.P. Martin, C.R. Shortall, A.D. Todd, D. Goulson, M.E. Knight, R.J. Hale, and R.A. Sanderson. 2008. "Quantifying and Comparing Bumble Bee Nest Densities In Gardens and Countryside Habitats." *Journal of Applied Ecology* 45:784–792. https://besjournals.onlinelibrary.wiley.com/doi/epdf/10.1111/ j.1365-2664.2007.01359.x.

Poulin, Ray, L. Danielle Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. "Burrowing Owl (Athene cunicularia)." *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. http://bna.birds.cornell.edu/bna/species/061.

Richardson, L.L. 2014. Data Contributors. https://www.leifrichardson.org/bbna.html.

Richardson, L.L. 2023. Bumble bees of North America occurrence records database. https://www.leifrichardson.org/ bbna.html. Data accessed 05-03-2023.

Sawyer, J., T. Keeler-Wolf, and J. Evens. 2009. *A Manual of California Vegetation,* Second Edition. Sacramento: California Native Plant Society.

Taylor, Dean W., and Roy E. Buck. 1993. Distribution of San Joaquin Wolly-threads (Lermbertia congdonii) in the Vicinity of Lost Hills, Kern County, California. April 1993

Trulio, L.A. 1995. "Passive Relocation: A Method to Preserve Burrowing Owls on Disturbed Sites." *Journal of Field Ornithology* 66(1): 99–106.

USDA (U.S. Department of Agriculture). 2023. California, State PLANTS Checklist. Accessed July 2022. http://plants.usda.gov/dl_state.html.

USDA NRCS (U.S. Department of Agriculture Natural Resource Conservation Service). 2023b. Web Soil Survey [web application]. USDA, Natural Resources Conservation Service. Accessed April 2023. http://websoilsurvey.
nrcs.usda.gov/app/.

USFWS (U.S. Fish and Wildlife Service). 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Portland, Oregon: U.S. Fish and Wildlife Service, Region One. September 1998.

USFWS. 1999. *San Joaquin Kit Fox Survey Protocol for the Northern Range*. Sacramento, California: Sacramento Fish and Wildlife Office. June 1999.

USFWS. 2000. *General Rare Plant Survey Guidelines*. California State University, Stanislaus. Ellen A. Cypher. Revised July 2002.

USFWS. 2011. *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance*. Sacramento, California.

USFWS. 2023a. Information for Planning and Consultation (IPaC). Accessed April 2023. https://ecos.fws.gov/ipac/.

USFWS. 2023b. National Wetlands Inventory. Accessed April 2023. https://www.fws.gov/wetlands/.

USGS (U.S. Geological Survey). 2023. National Hydrography Dataset, Flowline Map. Accessed April 2023. http://nhd.usgs.gov/data.html.

Williams, P.W., R. Thorp, L. Richardson, and S. Colla. 2014. *Bumble Bees of North America: An Identification Guide*. Princeton: Princeton University Press.

Wilson, D.E., and D.M. Reeder, eds. 2005. *Mammal Species of the World: A Taxonomic and Geographic Reference,* 3rd ed. Baltimore, Maryland: Johns Hopkins University Press. Accessed April 2023. http://www.bucknell.edu/msw3/.

Xerces Society, Defenders of Wildlife, and the Center for Food Safety. 2018. *A Petition to the State of California Fish and Game Commission to List the Crotch Bumble Bee (Bombus crotchii), Franklin's Bumble Bee (Bombus franklini), Suckley Cuckoo Bumble Bee (Bombus suckleyi), and Western Bumble Bee (Bombus occidentalis occidentalis) as Endangered under the California Endangered Species Act.* Submitted by the Xerces Society for Invertebrate Conservation, Defenders of Wildlife, and Center for Food Safety. October 16, 2018.

Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990. *California's Wildlife*. Vol. II. Birds. Sacramento, California: California Department of Fish and Game.

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Appendix A
Plant Species Observed

Plant Species

Vascular Species

Eudicots

APOCYNACEAE – DOGBANE FAMILY

* *Nerium oleander* – oleander

ASTERACEAE – SUNFLOWER FAMILY

Isocoma acradenia – alkali goldenbush

Matricaria discoidea – disc mayweed

BORAGINACEAE – BORAGE FAMILY

Amsinckia intermedia – common fiddleneck

Amsinckia menziesii – Menzies' fiddleneck

Plagiobothrys canescens – valley popcornflower

BRASSICACEAE – MUSTARD FAMILY

* *Hirschfeldia incana* – shortpod mustard

Lepidium densiflorum – common pepperweed

* *Sisymbrium altissimum* – tall tumblemustard

* *Sisymbrium irio* – London rocket

CHENOPODIACEAE – GOOSEFOOT FAMILY

Atriplex polycarpa – allscale

* *Salsola tragus* – prickly Russian thistle

CRASSULACEAE – STONECROP FAMILY

Crassula connata – sand pygmyweed

FABACEAE – LEGUME FAMILY

Parkinsonia florida – blue palo verde

GERANIACEAE – GERANIUM FAMILY

* *Erodium cicutarium* – redstem stork's bill

* *Erodium moschatum* – musky stork's bill

LAMIACEAE – MINT FAMILY

Trichostema ovatum – San Joaquin bluecurls

MALVACEAE – MALLOW FAMILY

* *Malva parviflora* – cheeseweed mallow

SOLANACEAE – NIGHTSHADE FAMILY

Datura wrightii – sacred thorn-apple

* *Solanum elaeagnifolium* – silverleaf nightshade

ZYGOPHYLLACEAE – CALTRIP FAMILY

* *Tribulus terrestris* – puncturevine

Monocots

ARECACEAE – PALM FAMILY

* *Washingtonia robusta* – Washington fan palm

POACEAE – GRASS FAMILY

* *Avena barbata* – slender oat
* *Bromus diandrus* – ripgut brome
* *Bromus hordeaceus* – soft brome
* *Bromus rubens* – red brome
* *Cynodon dactylon* - Bermudagrass
* *Festuca muyuros* – rat-tail fescue
* *Hordeum murinum* – mouse barley
* *Schismus barbatus* – common Mediterranean grass

* signifies introduced (non-native) species

Appendix B

Wildlife Species Observed

Wildlife Species

Birds

Finches

FRINGILLIDAE – FRINGILLIE & CARDUELINE FINCHES & ALLIES

Haemorhous mexicanus – house finch

Flycatchers

TYRANNIDAE – TYRANT FLYCATCHERS

Tyrannus verticalis – western kingbird

Hawks

ACCIPITRIDAE – HAWKS, KITES, EAGLES, AND ALLIES

Buteo jamaicensis – red-tailed hawk

Jays, Magpies and Crows

CORVIDAE – CROWS AND JAYS

Corvus corax – common raven

Old World Sparrow

PASSERIDAE – OLD WORLD SPARROWS

Passer domesticus – house sparrow*

Pigeons and Doves

COLUMBIDAE – PIGEONS AND DOVES

Zenaida macroura – mourning dove

Mammals

Squirrels

SCIURIDAE – SQUIRRELS

Otospermophilus beecheyi – California ground squirrel

Reptiles

Lizards

PHRYNOSOMATIDAE – IGUANID LIZARDS

Uta stansburiana – common side-blotched lizard

* signifies introduced (non-native) species

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Appendix C
Photographic Documentation

Photo 1. Looking west from the northeast corner.

Photo 2. Looking south from the northwest corner.

Photo 3. Looking east from the mid-west corner.

Photo 4. Looking south from the middle of the site along the southwest edge.

Photo 5. Looking east from the southwestern corner.

Photo 6. Looking north from the southeastern corner.

Photo 7. Looking north at spoil piles of dirt.

Photo 8. Looking northwest at spoil piles of dirt.

Photo 9. Looking north from the southwest corner, June 2024.

Photo 10. Looking northeast from the southwest corner, June 2024.

Photo 11. Looking south from the northeast corner, June 2024.

Photo 12. Looking southwest from the northeast corner, June 2024.

Photo 13. Looking west from the northeast corner, June 2024.

Photo 14. Looking east from the middle of the site, June 2024.

Photo 15. Looking west from the middle of the site, June 2024.

Photo 16. Looking south at one of the burned areas, June 2024.

Appendix D
Cultural Resources

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PHASE I HISTORICAL/ARCHAEOLOGICAL RESOURCES SURVEY

ASSESSOR'S PARCEL NUMBERS 492-010-13 AND-17

Near the City of Bakersfield
Kern County, California

For Submittal to:

Planning Department, Kern County
Public Services Building
2700 "M" Street, Suite 100
Bakersfield, CA 93301

Prepared for:

Industrial Property Group, Inc.
10515 20th Street Southeast
Lake Stevens, WA 98258

Prepared by:

CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

November 5, 2023
Revised June 3, 2024
CRM TECH Contract Number 4020A

Title:	Phase I Historical/Archaeological Resources Survey: Assessor's Parcel Numbers 492-010-13 and -17, near the City of Bakersfield, Kern County, California
Author(s):	Deirdre Encarnación, Archaeologist/Report Writer Terri Jacquemain, Historian/Architectural Historian Daniel Ballester, Archaeologist/Field Director
Consulting Firm:	CRM TECH 1016 East Cooley Drive, Suite A/B Colton, CA 92324 (909) 824-6400
Date:	November 5, 2023; revised June 3, 2024
For Submittal to:	Planning Department, Kern County Public Services Building 2700 "M" Street, Suite 100 Bakersfield, CA 93301 (661) 862-8600
Prepared for:	Craig Wilde, Development Manager Industrial Property Group, Inc. 10515 20th Street Southeast Lake Stevens, WA 98258 (314) 713-9516
USGS Quadrangle:	Oildale, Calif., 7.5' quadrangle (Section 13, T29S R23E, Mount Diablo Baseline and Meridian)
Project Size:	Approximately 49.05 acres
Keywords:	Southern San Joaquin valley; Phase I historical/archaeological resources survey; Isolate 4020-1*: complete mano; Isolate 4020-2*: mano fragment; Site 4020-3H*: refuse scatters, concrete pad and footings; no "historical resources" affected * *Temporary designations, pending assignment of permanent identification numbers in the California Historical Resources Inventory*

EXECUTIVE SUMMARY

Between May and November 2023, at the request of Industrial Property Group, Inc., CRM TECH performed a cultural resources study on 49.05 acres of vacant land near the City of Bakersfield, Kern County, California. The subject property of the study consists of Assessor's Parcel Numbers 492-010-13 and -17, located on the west side of Airport Drive and between Boughton Drive and Skyway Drive, in the southeast quarter of Section 2, Township 29 South, Range 27 East, Mount Diablo Baseline and Meridian, as depicted in the United States Geological Survey Oildale, California, 7.5' quadrangle.

The study is part of the environmental review process for the proposed development of two single-story logistics facilities totaling approximately 923,128 square feet, including 15,000 square feet of dedicated office space, and associated improvements on the property. The County of Kern, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the County with the necessary information and analysis to determine whether the proposed project would cause substantial adverse changes to any "historical resources," as defined by CEQA, that may exist in or around the project area. In order to identify such resources, CRM TECH initiated a cultural resources records search and a Native American Sacred Lands File search, pursued historical background research, and carried out an intensive-level field survey.

As a result of these research procedures, three previously unknown cultural resources were recorded within the project area and given temporary designations pending the assignment of permanent identification numbers in the California Historical Resources Information System. Among these were two prehistoric isolates, 4020-1 and 4020-2, representing a complete granitic mano and a granitic mano fragment, respectively. Such isolates, or localities with less than three artifacts, by definition do not qualify as archaeological sites due to the lack of contextual integrity. As such, they do not constitute potential "historical resources" and require no further consideration.

Site 4020-3H, the remains of an orchard complex constructed between circa 1935 and 1952, was recorded within the northeast portion of the project area. Consisting of a cluster of structural remains and two associated refuse scatters, the site does not appear to meet any of the criteria for listing in the California Register of Historical Resources. Therefore, it does not constitute a "historical resource" under CEQA provisions. No other potential "historical resources" were encountered within the project area throughout the course of this study.

Based on these findings, CRM TECH recommends to the County of Kern a conclusion that the proposed project will have *No Impact* on any known "historical resources." In light of the discovery of the prehistoric isolates on the property during this study, however, CRM TECH recommends that an inadvertent discoveries plan be developed and implemented for the project to address the potential for similar findings during earth-moving operations. If buried cultural materials are encountered during the project, all work within 50 feet of the discovery should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds. No additional cultural resources procedures are recommended for the project unless development plans undergo such changes as to include areas not covered by this study.

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INTRODUCTION

Between May and November 2023, at the request of Industrial Property Group, Inc., CRM TECH performed a cultural resources study on 49.05 acres of vacant land near the City of Bakersfield, Kern County, California (Fig. 1). The subject property of the study consists of Assessor's Parcel Numbers 492-010-13 and -17, located on the west side of Airport Drive and between Boughton Drive and Skyway Drive, in the southeast quarter of Section 2, Township 29 South, Range 27 East, Mount Diablo Baseline and Meridian, as depicted in the United States Geological Survey (USGS) Oildale, California, 7.5' quadrangle (Figs. 2, 3).

The study is part of the environmental review process for the proposed development of two single-story logistics facilities totaling approximately 923,128 square feet, including 15,000 square feet of dedicated office space, and associated improvements on the property. The County of Kern, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the County with the necessary information and analysis to determine whether the proposed project would cause substantial adverse changes to any "historical resources," as defined by CEQA, that may exist in or around the project area.

In order to identify such resources, CRM TECH initiated a cultural resources records search and a Native American Sacred Lands File search, pursued historical background research, and carried out an intensive-level field survey. The following report is a complete account of the methods, results, and conclusion of the study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

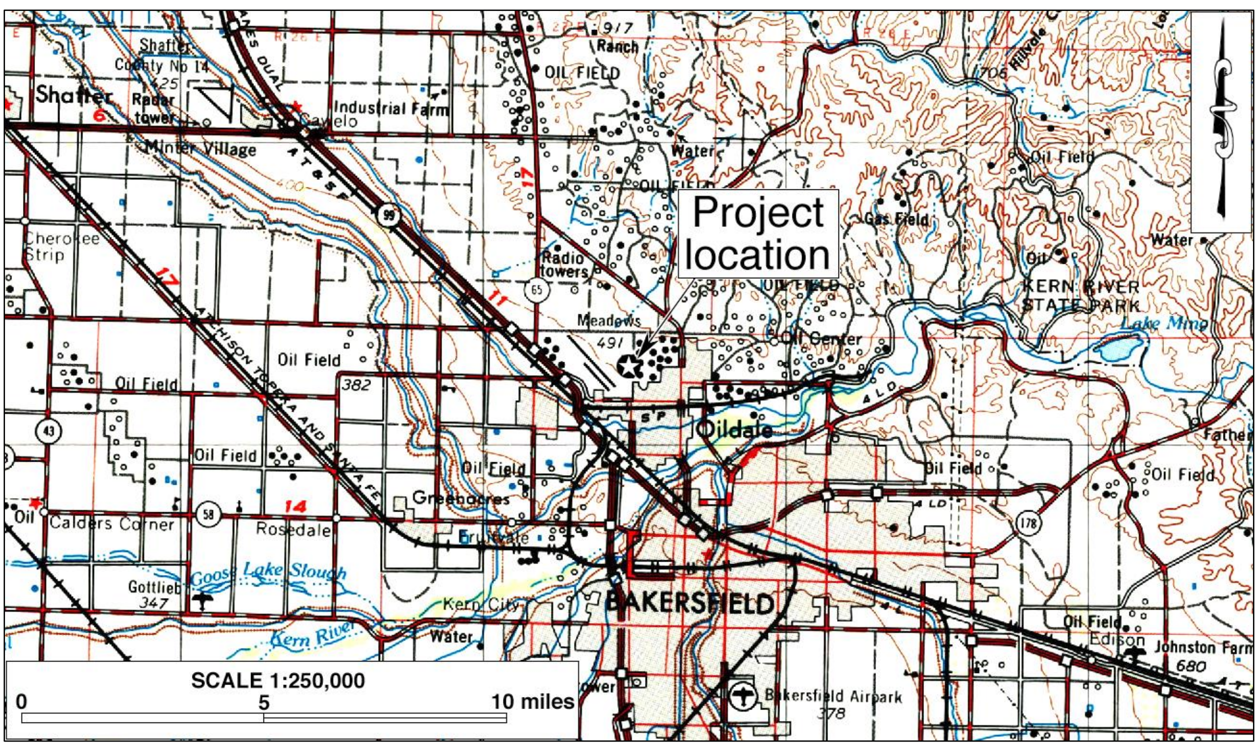

Figure 1. Project vicinity. (Based on USGS Bakersfield, Calif., 120'x60' quadrangle [USGS 1971])

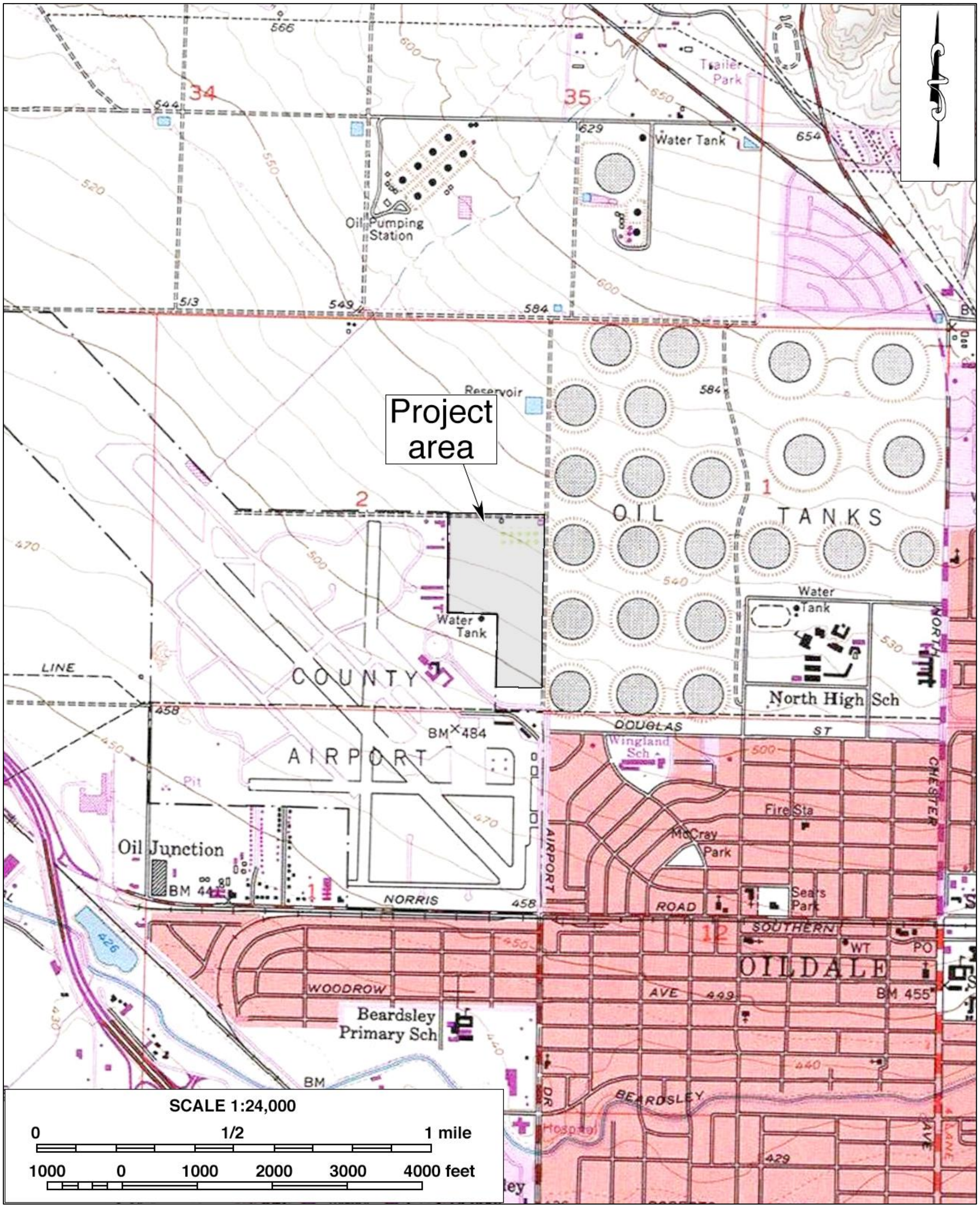

Figure 2. Project location. (Based on USGS Oildale, Calif., 7.5' quadrangle [USGS 1973])

Figure 3. Recent satellite image of the project area. (Based on Google Earth imagery)

SETTING

CURRENT NATURAL SETTING

Kern County covers a total of 8,172 square miles, measuring 66 miles from north to south and 130 miles from east to west. The county overlaps five of California's 13 geomorphic provinces, the three most prominent ones being the San Joaquin or Great Interior Valley of California, the southern Sierra Nevada, and the western portion of the Mojave Desert. The City of Bakersfield, serving as the County seat, sits at the southern end of the San Joaquin Valley, which is bound by the Coast Range on the west, the Transverse Range (San Emigdio Mountains) on the south, and the Sierra Nevada (including the Tehachapi Mountains) on the east.

The project area is surrounded by the Meadows Field Airport to the west, several apartment complexes and a self-storage facility to the east, and fallow agricultural land to the north and the south (Fig. 3). One large soil stockpile and several smaller ones are located along the eastern side of the southern half of the property. Currently there are no standing structures or groves within the project area, but broken irrigation pipes and standpipes were observed along with a concrete structural foundation. The surface soils are composed of light brown fine- and medium-grained alluvial sands with small granitic cobbles. The ground surface project area has been recently disked, and the scattered vegetation remaining includes wild mustard, string meadows, foxtails, and other small shrubs and grasses (Fig. 4).

Figure 4. Current condition of the project area, view to the north near the western project boundary after recent vegetation removal. (Photograph taken on August 2, 2023)

CULTURAL SETTING

Archaeological Context

The earliest evidence of human occupation in the southern San Joaquin Valley, discovered at the Witt locality at Tulare Lake and reported by West et al. in 1991, included some of the oldest human skeletal materials in North America (Garfinkel 2015:3). Uranium-thorium testing at the Witt locality resulted in uncalibrated dates of 11,379, 11,380, and 15,802 years before the present (B.P.; *ibid*.). The Tulare Lake area has been documented as one of the richest Paleoindian localities in the State of California (*ibid.*).

The cultural history of the region has been summarized into several chronologies, integrating available archaeological data from many studies conducted in the southern Sierra Nevada. The prehistory of the greater southern San Joaquin Valley has been the focus of McGuire and Garfinkel (1980), whose work has been utilized to create prehistoric phases for the region from 4000 B.C. to the present times (Moratto 1984:333; Getchell and Atwood 2009:6). More recently, the following general framework proposes three primary periods, based on Garfinkel (2015), although the beginning and ending dates of the recognized cultural horizons vary among different parts of the region:

- Paleoindian Period (ca. 16,000-8,550 B.P.): Native peoples of this period created fluted spearhead bases designed to be hafted to wooden shafts, possibly indicative of hunting now-extinct megafauna. The distinctive method of thinning bifaces and spearhead preforms by removing long, linear flakes left diagnostic Paleoindian markers at tool-making sites. Other artifacts associated with the Paleoindian toolkit include choppers, cutting tools, retouched flakes, and perforators. Sites from this period are very rare, and most are deeply buried.
- Archaic Period (ca. 8,550 B.P.-1000 A.D.): Archaic sites are characterized by abundant lithic scatters of considerable size with many biface thinning flakes, bifacial preforms broken during manufacture, and well-made groundstone bowls and basin metates. Diverse architectural features such as house floors and significant deposits of refuse materials reflect both land- and water-associated subsistence activities. Cultural materials from the Archaic Period include temporally diagnostic forms of beads and ornaments manufactured from *Haliotis* and *Olivella* shells. Spindle-shaped charmstones are also found. The Archaic Period can be further broken down into lower, middle, and upper phases.
- Emergent Period (ca. 1000-1776 A.D.): Sites from this period typically contain lithic scatters from the manufacture of small arrow points, expedient groundstone tools such as tabular metates and unshaped manos, wooden mortars with stone pestles, acorn or mesquite bean granaries, ceramic vessels, shell beads suggestive of extensive trading networks, and steatite implements such as pipes and arrow shaft straighteners. The bow and arrow replace the dart and atlatl at sites from the Emergent Period. Specialized sites of local shell bead manufacturing are recognized by the presence of bead blanks and manufacturing debris, a pattern that might indicate the introduction of monetized systems of exchange.

Ethnohistoric Context

The Bakersfield area is generally considered a part of the traditional homeland of the Southern Valley Yokuts, near its northern limits. The territory of the Southern Valley Yokuts extended from the southern San Joaquin Valley, between the San Joaquin River and the lower Kings River, to the Tehachapi Mountains. The Northern Valley Yokuts lived in the northern the San Joaquin Valley, and the Foothill Yokuts lived in the foothills around the valley. The main cultural differences between these groups stemmed from the availability and use of different natural resources in the areas that they occupied. The following ethnographic discussion of the Southern Valley Yokuts is based mainly on Wallace (1978).

The family formed the basic domestic and economic unit in the Southern Valley Yokuts society, although another key grouping was the patrilineal, exogamous, totemic lineage. Lineages in the northern portion of the Southern Valley Yokuts territory, where the project area is located, were also connected to one of two patrilineal moieties. There was no over-arching political grouping or unity among the Southern Valley Yokuts, and localized groups collectively controlled tribal lands with the resources shared by members. Their society differed from that of the Northern Valley Yokuts due to both ecological factors and cultural influence from the Emigdiano and Kitanemuk to the south.

The Southern Valley Yokuts sustained themselves with fish, waterfowl, shellfish, roots, and seeds found in abundance near the many rivers, lakes, sloughs, and the seasonal marshes. Baskets were important in securing and processing foods, along with nets, sinew-backed bows, stone-tipped arrows, and stone scrapers. Stone mortars, wooden mortars, and pestles were obtained through trade, as were the lithic materials used to make stone tools. Perforated marine shell disks were used as currency. There is no evidence of clay vessel manufacturing among the Southern Valley Yokuts, probably due to their skill in basket making and a preferential use of baskets in daily chores.

The native lifestyle of the Southern Valley Yokuts received little influence from early, casual contacts with Spaniards in the late 1700s and early 1800s. In 1833, however, an epidemic of introduced disease devastated the native population with an estimated 75 percent mortality rate. After the annexation of Alta California by the U.S., the decline of Southern Valley Yokuts population and culture accelerated as Euroamerican settlers overran the tribal territory and displaced the native people. Eventually, the Southern Valley Yokuts were mostly interned on the Tejon Reservation and, later, the Tule River Reservation.

Historic Context

In the accounts of their 1770s expeditions, early Spanish explorers Padro Fages (1772) and Francisco Garcés (1776) described the San Joaquin Valley as a bleak and arid expanse of barren land, which undoubtedly discouraged Spanish and later Mexican settlement in the region (Clough and Secrest 1984:25). In the early 19th century, further Spanish and Mexican explorations occurred in the San Joaquin Valley (Beck and Haase 1974:20-22). Despite the repeated explorations, the southern portion of the San Joaquin Valley remained largely devoid of any non-Native population at the time of American annexation in 1848.

During the early years of the American Period, cattle ranching was the dominant economic pursuit in the San Joaquin Valley, partially in support of the Gold Rush in the Sierra Nevada (Macko et al. 1993:39; JRP and Caltrans 2000:12). Starting in the early 1860s, as the result of a devastating drought and the increased demand for wool during the Civil War, ranchers in the region turned to sheep raising instead (Macko et al. 1993:39). The most prominent ranching "empire" to emerge in the San Joaquin Valley at that time was the partnership of Henry Miller and Charles Lux. In its heyday, the Miller and Lux Corporation, headquartered in Los Banos, owned some 1,400,000 acres of land and controlled through lease and grazing arrangements ten times that much, on which the company ran a million head of cattle and over a hundred thousand sheep (Taper 1967).

The first major "growth spur" in the southern San Joaquin Valley took place between the 1860s and the 1890s, when the ever-increasing number of settlers shifted the focus of regional economy from animal husbandry to dry farming for grains, especially wheat (Robinson 1958:21). Meanwhile, the completion of the Southern Pacific Railroad in 1873-1876 and the competing San Francisco and San Joaquin Valley Railway in 1895-1897 gave rise to a string of towns across the vast stretches of farmlands (Gustafson and Serpico 1996:159). Then, from 1890 to 1910 the grain fields gradually gave way to irrigated orchards and vineyards, which were joined after 1920 by truck farms and cotton fields (Robinson 1958:26).

Throughout the late 19th and early 20th centuries, railroad and irrigation continued to drive the growth of the region. With its nearly level valley floor, the San Joaquin Valley developed some of the richest agricultural land in the United States once large-scale irrigation began. Early farming on the plains was aided by the use of dams and weirs that diverted water from the local rivers and streams, although these were mostly seasonal flows (Small and Smith 1926:567). Demand for a more reliable water supply resulted in the organization of various water districts, many of which continue to operate today.

According to local historical accounts, non-Indian settlement in the Bakersfield area began in the early 1860s. Thomas Baker, the first Anglo-American to settle in the area, moved here from Vasalia in 1863 and acquired a large parcel of land in what is now Bakersfield with a plan to develop a navigable water way from Kern Lake (now dry) to the San Francisco Bay (Gudde 1969:19; Darling 1988:8). Baker's plan failed to materialize, but his name was bestowed on the newly formed community in 1868, when a post office was established. Like the rest of California's fertile Central Valley, the Bakersfield area experienced rapid early development in its agricultural economy, but relatively slow growth, in comparison to its southern neighbors, in terms of urbanization.

The City of Bakersfield was first incorporated in 1873 and became the county seat the next year (Darling 1988:8). Two years later, the city was disincorporated, and was not reincorporated until 1898 (*ibid.*). During the 20th century, San Joaquin Valley farmers distinguished themselves as the leading agricultural producers in California, and in some instances the entire nation. Around 1900, an oil boom along the Kern River brought the Bakersfield area to the forefront of California's budding petroleum industry (Miller 2009:3), although agriculture remained the dominant factor in the area's economy as well as its cultural heritage. However, in the most recent decades, the housing boom has played a pivotal role in the growth of the southern San Joaquin Valley region, turning much of the once-prime farmland into master-planned residential communities.

RESEARCH METHODS

RECORDS SEARCH

The records search for this study was provided by the Southern San Joaquin Valley Information Center (SSJVIC) of the California Historical Resources Information System on June 6, 2023.

Located on the campus of California State University, Bakersfield, the SSJVIC is the State of California's official cultural resource records repository for Kern County. During the records search, SSJVIC staff examined maps and records on file for previously identified cultural resources and existing cultural resources studies within a one-mile radius of the project area. Previously identified cultural resources include properties designated as California Historical Landmarks or Points of Historical Interest as well as those listed in the National Register of Historic Places, the California Register of Historical Resources, or the California Historical Resources Inventory.

HISTORICAL BACKGROUND RESEARCH

Historical background research for this study was conducted by CRM TECH historian/architectural historian Terri Jacquemain. Sources consulted during the research included published literature in local and regional history, contemporary publications, federal and local real estate records, online genealogical databases, historical maps of the Bakersfield area, and aerial/satellite photographs of the project vicinity. Among the maps consulted were U.S. General Land Office (GLO) land survey maps dated 1855 and USGS topographic maps dated 1902-1973, which are available at the websites of the U.S. Bureau of Land Management and the USGS. The aerial and satellite photographs, taken between 1952 and 2023, are available at the Nationwide Environmental Title Research (NETR) Online website and through the Google Earth software.

SACRED LANDS FILE SEARCH

On May 25, 2023, CRM TECH submitted a written request to the State of California Native American Heritage Commission (NAHC) for a records search in the commission's Sacred Lands File. The NAHC is the State of California's trustee agency for the protection of "tribal cultural resources," as defined by California Public Resources Code §21074, and is tasked with identifying and cataloging properties of Native American cultural value, including places of special religious, spiritual, or social significance and known graves and cemeteries throughout the state. The response from the NAHC is presented in Appendix 2 and summarized in the sections below.

FIELD SURVEY

The initial field inspection of the project area was carried out on July 17, 2023, by CRM TECH field director Daniel Ballester and project archaeologist Alondra Garcia. At that time, the dense vegetation cover throughout the project area created impassible conditions and extremely poor ground visibility. As a result, vegetation removal was performed prior to a second field survey attempt.

On August 2, 2023, Daniel Ballester and archaeological surveyor Ron Schmidtling conducted the intensive-level field survey of the project area by walking a series of parallel transects oriented north-south and spaced 15 meters (approximately 50 feet) apart. In this way, the ground surface in the entire project area was systematically and carefully examined for any evidence of human activities dating to the prehistoric or historic period (i.e., 50 years or older). Visibility of the native ground surface was generally good (80%) after the recent vegetation removal but remained poor (roughly 25%) in the portion of the southern half where stockpiles of soil were present.

RESULTS AND FINDINGS

RECORDS SEARCH

According to SSJVIC records, the project area had not been surveyed systematically for cultural resources prior to this study, and no cultural resources had been recorded within or adjacent to the project boundaries (see App. 3). Within the one-mile scope of the records search, SSJVIC records identify a total of 22 previous studies on various tracts of land and linear features, including a linear survey along the segment of Airport Drive adjacent to the eastern project boundary (Fig. 5). As a result of these past survey efforts, 13 cultural resources were previously recorded within the one-mile radius, including 12 sites and an isolate (i.e., a locality with fewer than three artifacts), as listed below in Table 1.

Table 1. Previously Recorded Cultural Resources within the Scope of the Records Search

Resource No.	Description
15-003322	Historic-period refuse scatter
15-003323	Historic-period refuse scatter
15-004728	Unnamed railroad siding
15-004734	Beardsley Irrigation Canal
15-008037	Building, date/description unspecified
15-008134	Building, date/description unspecified
15-008184	Building, date/description unspecified
15-008203	Building, date/description unspecified
15-008232	Building, date/description unspecified
15-008249	Building, date/description unspecified
15-008515	Building, date/description unspecified
15-009854	Isolate: piece of amethyst glass
15-021383	Foundation of four-bay parking stalls

All of these known cultural resources dated to the historic period, and no prehistoric (i.e., Native American) sites or isolates were recorded within the records search scope. The majority of the sites, numbering seven in total, represented buildings of historical age, although specific dates of construction and descriptions were not provided by the SSJVIC. Other sites included refuse scatters, structural remains, and linear features such as a railroad siding and the Beardsley Irrigation Canal. The one isolate was a piece of sun-colored amethyst glass. All of the previously recorded cultural resources were found at least ¾ mile from the project location, and thus they require no further consideration during this study.

SACRED LANDS FILE SEARCH

In response to CRM TECH's inquiry, the NAHC stated in a letter dated June 21, 2023, that the Sacred Lands File search identified no Native American cultural resources in the project vicinity. Noting that the absence of specific information does not preclude the presence of cultural resources in the vicinity, the commission recommended that local Native American groups be contacted for pertinent information and provided a referral list of nine individuals associated with five local Native American groups. The NAHC's reply is attached to this report in Appendix 2 for reference by the County of Kern in future government-to-government consultations with the pertinent tribal groups, if necessary.

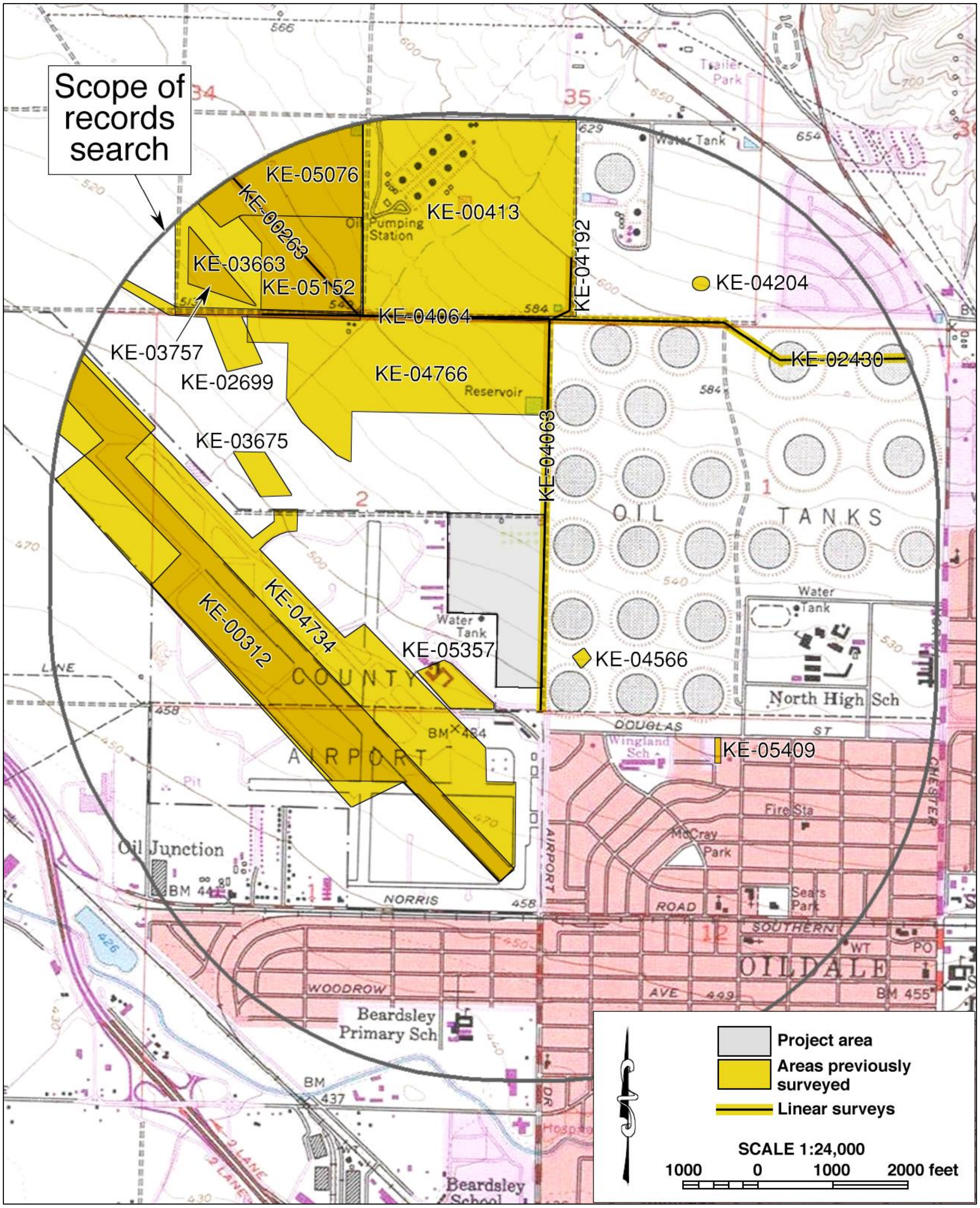

Figure 5. Previous cultural resources studies in the vicinity of the project area, listed by SSJVIC file number. Locations of historical/archaeological resources are not shown as a protective measure.

HISTORICAL BACKGROUND RESEARCH

In the mid-19th century, when the U.S. government conducted the first systematic land survey in the San Joaquin Valley, a branched road running generally north-south about a quarter-mile to the east of the project location was the only human-made feature noted in the vicinity (Fig. 6). By the turn of the century, scattered roads lined by occasional buildings and other developments had been established in the surrounding area, including an Oil City branch railway line and a canal (Fig. 7). The outskirts around the project location remained sparsely settled and presumably dominated by agriculture and oil extraction in the early and mid-20th century (Figs. 7-10).

Within project boundaries, a land patent for 40 acres, encompassing the entire southeastern quarter of Section 2, was secured in 1911by California native Thomas W. Jaynes (1869-1952; BLM n.d.; Ancestry.com n.d.). Jaynes worked as a conductor for the Southern Pacific Railroad during the age of steam-powered engines (Ancestry.com n.d.). In 1930, census records showed that the property was being farmed with the help of Hawaiian native Fred Nishimoto as a laborer. At the time of his death in 1952, Jaynes was 82 years old and married to his second wife, Matilda (1895-1977), who was then 54 years old, but apparently he had no children (Ancestry.com n.d.; FindAGrave.com n.d.).

Historical maps indicate that a building, presumably a farmstead, was in place in the project area by 1935 along today's Airport Drive, joined by two more buildings near Boughton Drive by 1952, along with an orchard (Figs. 9, 10; NETR Online 1952). Matilda Jaynes was apparently still living on the property in 1956, and may have remained the property owner for several more years after her husband passed, although by 1968 only the residence along Airport Drive and about half of the grove remained (NETR Online 1956; 1968; Ancestry.com n.d.). She was living in a senior care home in Port Angeles, Washington, when she died in 1977 (Ancestry.com n.d.). The property was clear of buildings and the grove by 1984 (NETR Online 1984).

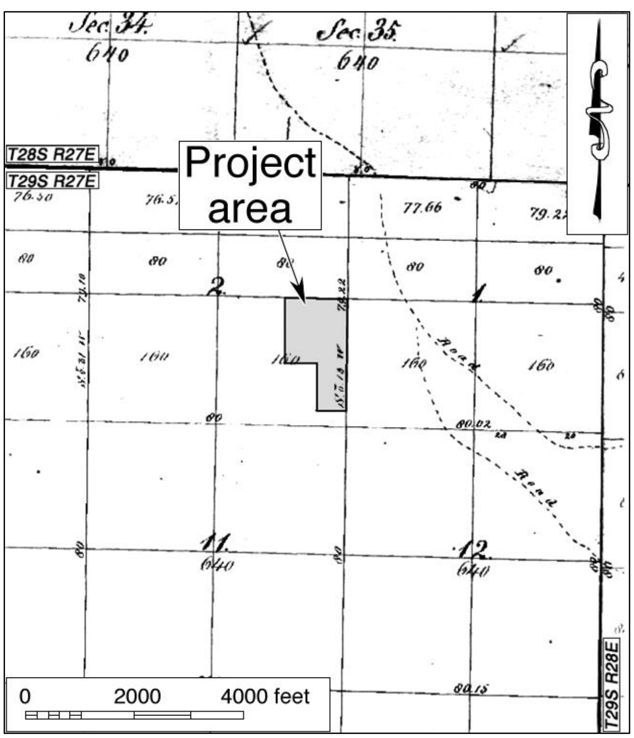

Figure 6. The project area and vicinity in 1852-1855. (Source: GLO 1855a-1855c)

In 1948, an easement was created on a portion of the Jaynes property for "establishment and use of a clearance zone for the approaches and take-offs to and from airport and incidental," presumably for use in association with nearby Meadows Field Airport (Chicago Title Company 2022:6; BFL 2021). The Meadows Field Airport was formerly known as "Kern County Airport No. 1," built by the local Chamber of Commerce in 1926 to transport mail and passengers (BFL 2021). Upon its acquisition by Kern County in 1935, it became the first county-owned airport in the nation (*ibid.*). During World War II, it became an auxiliary air training facility for the Army Air Corps, and afterward it was returned to the

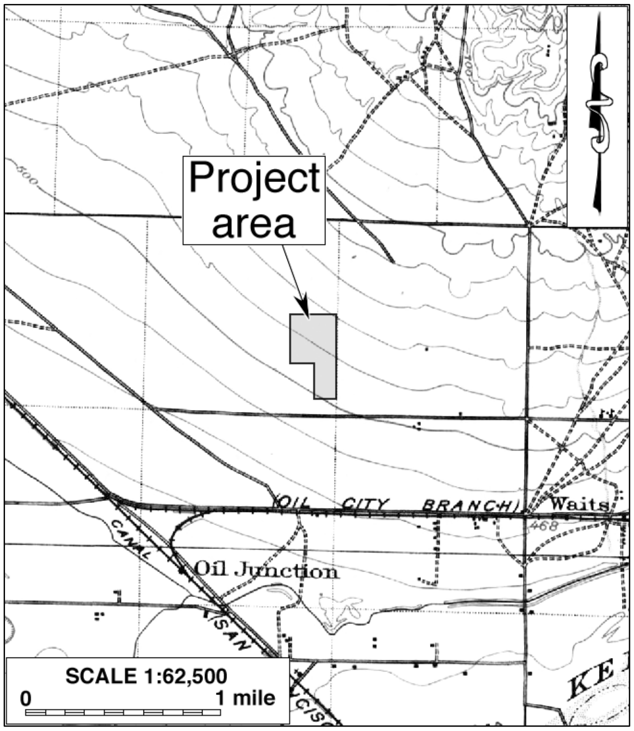

Figure 7. The project area and vicinity in 1903-1904. (Source: USGS 1906)

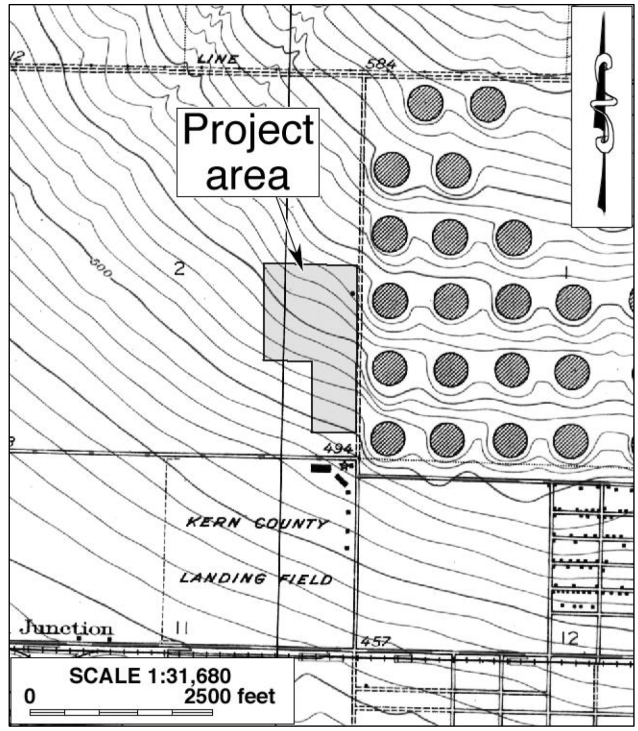

Figure 8. The project area and vicinity in 1929-1930. (Source: USGS 1935)

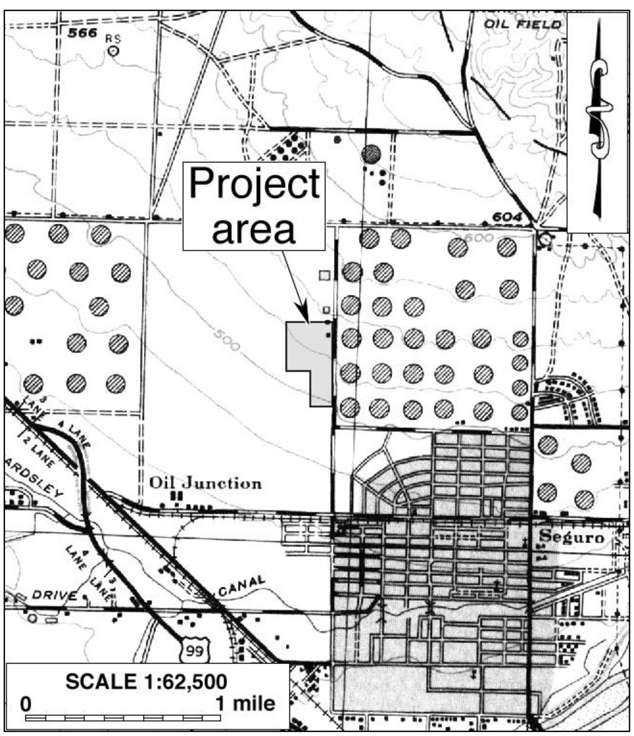

Figure 9. The project area and vicinity in 1937. (Source: USGS 1942)

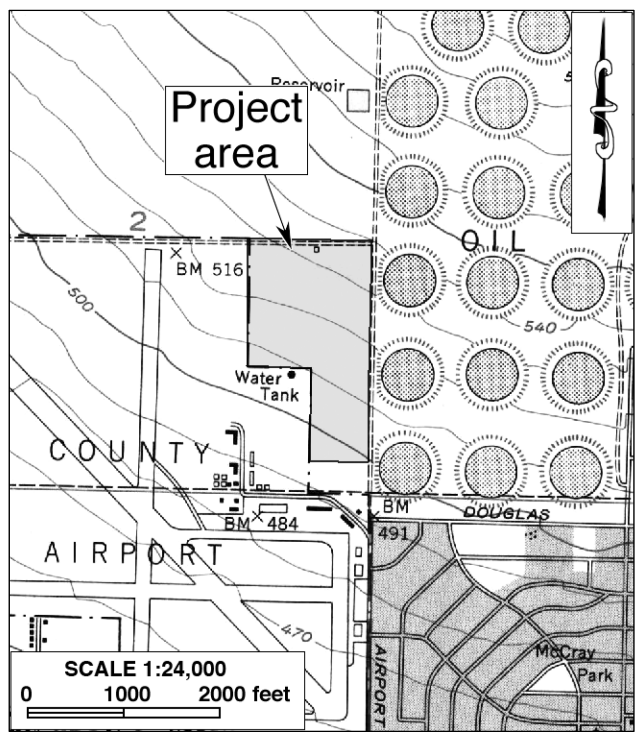

Figure 10. The project area and vicinity in 1952. (Source: USGS 1954)

County for commercial use. It was renamed in 1957 after Cecil Meadows, Kern County's then Director of Airports (*ibid*.).

In the 1980s-1990s, the surrounding area began the transformation from agriculture to suburban residential development, pushing west towards Airport Drive (NETR Online 1984; 1994). More residential development occurred on nearby properties during the ensuing decade, including several parcels directly across Airport Drive to the east (NETR Online 1994-2004; Google Earth 1996-2006). Within the project boundaries, meanwhile, while all agricultural operations had ceased by the mid-1980s, no major changes have occurred in the overall character of the property (NETR Online 1996-2020; Google Earth 1994-2023).

FIELD SURVEY

During the field survey, three previously undocumented cultural resources were recorded within the project area and given temporary designations pending assignment of permanent identification numbers in the California Historical Resources Inventory. Two of these resources were of prehistoric origin, each representing an isolated artifact. The third dated to the historic period and consisted of the remains of a former orchard. No other cultural resources were identified within or adjacent to the project area. A small amount of modern refuse was observed along the project boundaries, including cans, bottles, and construction materials, but none of the items was of any historical or archaeological interest. The three recorded cultural resources are discussed further below, with additional information presented in Appendix 4.

Isolates 4020-1 and 4020-2

Isolate 4020-1 is a rounded, complete granitic mano encountered in the northeastern corner of the project area. The mano measures approximately 14 centimeters in diameter and was found in close proximity to the concrete pad and footings recorded at Site 4020-3H. Isolate 4020-2 is a granitic unifacial mano fragment measuring approximately 10 by 9.5 by 6 centimeters in size, located in the central portion of the project area.

Site 4020-3H

This historic-period site was recorded in the northeast corner of the project area. Among the components of the site are the remains of a concrete pad and footings associated with a demolished building, likely a garage, two refuse scatters, and the fragmented remains of a concrete irrigation system used for the orchard that once occupied the property. Feature 1 of the site consists of the concrete pad and footings, which measure approximately 50 feet north-south by 33 feet east-west in total size. The concrete pad, located in the center of the feature, measures approximately 33 feet east-west by 26 feet north-south.

Two refuse scatters were also recorded at the site. One was located near the western site boundary, and the other just to the west of Feature 1. The refuse items present within the scatters included broken glass bottles, rusted can fragments, oil filters, lumber, concrete fragments, and household items such as plates and bowl fragments. Fragments of concrete irrigation pipes and standpipes were observed in the westerly refuse scatter, and also scattered across the rest of the site (see App. 4 for site map and photographs).

MANAGEMENT CONSIDERATIONS

APPLICABLE STATUTORY/REGULATORY FRAMEWORKS

The purpose of this study is to identify any cultural resources in the project area, and to assist the County of Kern in determining whether such resources meet the definition of "historical resources," as provided in the California Public Resources Code. According to PRC §5020.1(j), "'historical resource' includes, but is not limited to, any object, building, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California."

More specifically, CEQA guidelines state that the term "historical resources" applies to any such resources listed in or determined to be eligible for listing in the California Register of Historical Resources, included in a local register of historical resources, or determined to be historically significant by the Lead Agency (Title 14 CCR §15064.5(a)(1)-(3)). Regarding the proper criteria of historical significance, CEQA guidelines mandate that "generally a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources" (Title 14 CCR §15064.5(a)(3)). A resource may be listed in the California Register if it meets any of the following criteria:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
(2) Is associated with the lives of persons important in our past.
(3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
(4) Has yielded, or may be likely to yield, information important in prehistory or history. (PRC §5024.1(c)).

RESOURCE EVALUATION

Isolates 4020-1 and 4020-2

The prehistoric isolates discovered during this study consists of a complete granitic mano and a granitic mano fragment, and neither of them had any other associated artifacts or archaeological features nearby. Such isolates, or localities with fewer than three artifacts, by definition do not qualify as archaeological sites due to the lack of contextual integrity. As such, Isolates 4020-1 and 4020-2 do not constitute potential "historical resources" and require no further consideration.

Site 4020-3H

Site 4020-3H, consisting of a concrete pad and footings, two refuse scatters, and the remnants of an irrigation system for a former orchard, is the only potential "historical resource" identified in the project area that requires proper evaluation. With the removal of the buildings and orchard many decades ago, these remains lack sufficient historic integrity to relate to their period of origin. Furthermore, historical background research during this study has uncovered no evidence that these features are closely associated with any persons or events of recognized historic significance, nor do they demonstrate any special merits in design and construction or any particular potential for important archaeological data. In summary, Site 4020-3H does not appear to meet any of the criteria for listing in the California Register of Historical Resources. Therefore, it does not qualify as a "historical resource" under CEQA provisions.

CONCLUSION AND RECOMMENDATIONS

CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

In conclusion, no "historical resources," as defined by CEQA and associated regulations, were encountered within the project area throughout the course of this study. Therefore, CRM TECH presents the following recommendations to the County of Kern:

- The project as currently proposed will not cause a substantial adverse change to any known "historical resources."
- In light of the discovery of the prehistoric isolates on the property during this study, an inadvertent discoveries plan should be developed and implemented for the project to address the potential for similar findings during earth-moving operations.
- If buried cultural materials are discovered inadvertently during any earth-moving operations associated with the project, all work within 50 feet of the discovery should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.
- No additional cultural resources procedures will be necessary for the project unless development plans undergo such changes as to include areas not covered by this study.

REFERENCES

Ancestry.com
n.d. Genealogical database entries for Thomas W. and Matilda A. Jaynes (1930 and 1950 census records; 1956 voter registration; death certificate of Matilda Jaynes). https://www.ancestry.com/.

Beck, Warren A., and Ynez D. Haase
1974 *Historical Atlas of California*. University of Oklahoma Press, Norman.

BFL (Meadows Field Airport)
2021 The Untold History of Meadows Field Airport. https://www.meadowsfield.com/the-untold-history-of-meadows-field-airport/.

BLM (Bureau of Land Management, U.S. Department of the Interior)
n.d. The Official Federal Land Records Site. http://www.glorecords.blm.gov.

Chicago Title Company
2022 Title Report, Assessor's Parcel No. 492-010-13-00 and 492-010-17-00, Kern, California. Bakersfield.

Clough, Charles W., and William B. Secrest
1984 *Fresno County—The Pioneer Years*. Panorama West Books, Fresno.
Darling, Curtis
1988 *Kern County Place Names*. Kern County Historical Society, Bakersfield.
FindAGrave.com
n.d. Obituary entry for Thomas Walter Jaynes. https://www.findagrave.com/memorial/11062681/thomas-walter-jaynes.
Garfinkel, Alan P.
2015 Archaeological Background and Cultural Sequence for the San Joaquin Valley, Central California. On file, Southern San Joaquin Valley Information Center, California State University, Bakersfield.
Getchell, Barbie, and John E. Atwood
2009 Cultural Resources Report for the Kern River Valley Specific Plan Area, Kern County, California. On file, Southern San Joaquin Valley Information Center, California State University, Bakersfield.
GLO (General Land Office, U.S. Department of the Interior)
1855a Plat map: Township No. 28 South Range No. 27 East, SBBM; surveyed in 1852-1855.
1855b Plat map: Township No. 29 South Range No. 27 East, SBBM; surveyed in 1853-1855.
1855c Plat map: Township No. 29 South Range No. 28 East, SBBM; surveyed in 1853-1855.
Google Earth
1994-2023 Aerial photographs of the project vicinity; taken in 1994, 2002, 2003, 2005, 2006, 2008, 2009, 2011-2018, and 2020-2023. Available through the Google Earth software.
Gudde, Erwin G.
1998 *California Place Names: The Origin and Etymology of Current Geographical Names*. University of California Press, Berkeley.
Gustafson, Lee, and Phil Serpico
1996 *Coast Lines Depots: Valley Division*. Omni Publications, Palmdale, California.
JRP (JRP Historical Consulting Services) and Caltrans (California Department of Transportation)
2000 *Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures*. Cultural Studies Office, Caltrans Environmental Program, Sacramento.
Macko, Michael E., Jeanne D. Binning, David D. Earle, and Paul E. Langenwalter
1993 National Register Eligibility Determinations for Historic Resources along the Proposed AT&T Lightguide System, Victorville to Bakersfield, California. On file, Southern San Joaquin Valley Information Center, California State University, Bakersfield.
McGuire, K.R., and Alan P. Garfinkel
1980 Archaeological Investigations in the Southern Sierra Nevada: The Bear Mountain Segment of the Pacific Coast Trail. U.S. Bureau of Land Management, Bakersfield District.
Miller, Elena M.
2009 2008 Annual Report of the State Oil and Gas Supervisor. Publication No. PR06. California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, Sacramento.
Moratto, Michael
1984 *California Archaeology*. Academic Press, Orlando, Florida.
NETR (Nationwide Environmental Title Research) Online
1952-2020 Aerial photographs of the project vicinity; taken in 1952, 1956, 1968, 1984, 1994, 2004, 2005, 2009, 2010, 2012, 2014, 2016, 2018, and 2020. http://www.historicaerials. com.

Robinson, W.W.
1958 *The Story of Tulare County and Visalia*. Title Insurance and Trust Company, Los Angeles.
Small, Kathleen Edwards, and J. Larry Smith
1926 *History of Tulare County, California, and Kings County, California*. The S.J. Clarke Publishing Company, Chicago.
Taper, Bernard
1967 The King of Ranchers. *American Heritage* 18(5). https://www.americanheritage.com/king-ranchers.
USGS (United States Geological Survey, U.S. Department of the Interior)
1906 Map: Bakerfield, Calif. (15’, 1:62,500); surveyed in 1903-1904.
1935 Map: Oildale, Calif. (1:31,680); surveyed in 1929-1930.
1942 Map: Bakerfield West, Calif. (15’, 1:62,500); aerial photographs taken in 1937.
1954 Map: Oildale, Calif. (7.5’, 1:24,000); aerial photographs taken in 1952.
1971 Map: Bakersfield, Calif. (120’x60’, 1:250,000); 1962 edition revised.
1973 Map: Oildale, Calif. (7.5’, 1:24,000); 1954 edition photorevised in 1968, photoinspected in 1973.
Wallace, William J.
1978 Southern Valley Yokuts. In Robert F. Heizer (ed.): *Handbook of North American Indians*, Vol. 8: *California*; pp. 448-461. Smithsonian Institution, Washington, D.C.
West, G. James, O.K. Davis, and William J. Wallace
1991 Fluted Points at Tulare Lake, California. Environmental Background. In William J. Wallace and Fritz A. Riddell (eds.): *Contribution to Tulare Lake Archaeology I: Background to a Study of Lake Tulare’s Archaeological Past*; pp. 1-10. The Tulare Lake Archaeological Research Group, Redondo Beach, California.

APPENDIX 1:
PERSONNEL QUALIFICATIONS

PRINCIPAL INVESTIGATOR, HISTORY/ARCHITECTURAL HISTORY
Bai “Tom” Tang, M.A.

Education

1988-1993	Graduate Program in Public History/Historic Preservation, University of California, Riverside.
1987	M.A., American History, Yale University, New Haven, Connecticut.
1982	B.A., History, Northwestern University, Xi’an, China.

2000	“Introduction to Section 106 Review,” presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994	“Assessing the Significance of Historic Archaeological Sites,” presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1993-2002	Project Historian/Architectural Historian, CRM TECH, Riverside, California.
1993-1997	Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993	Project Historian, Archaeological Research Unit, University of California, Riverside.
1990	Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992	Teaching Assistant, History of Modern World, University of California, Riverside.
1988-1993	Research Assistant, American Social History, University of California, Riverside.
1985-1988	Research Assistant, Modern Chinese History, Yale University.
1985-1986	Teaching Assistant, Modern Chinese History, Yale University.
1982-1985	Lecturer, History, Xi’an Foreign Languages Institute, Xi’an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California’s Cultural Resources Inventory System (with Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

PRINCIPAL INVESTIGATOR, ARCHAEOLOGY
Michael Hogan, Ph.D., RPA (Registered Professional Archaeologist)

Education

1991	Ph.D., Anthropology, University of California, Riverside.
1981	B.S., Anthropology, University of California, Riverside; with honors.
1980-1981	Education Abroad Program, Lima, Peru.
2002	"Section 106—National Historic Preservation Act: Federal Law at the Local Level," UCLA Extension Course #888.
2002	"Recognizing Historic Artifacts," workshop presented by Richard Norwood, Historical Archaeologist.
2002	"Wending Your Way through the Regulatory Maze," symposium presented by the Association of Environmental Professionals.
1992	"Southern California Ceramics Workshop," presented by Jerry Schaefer.
1992	"Historic Artifact Workshop," presented by Anne Duffield-Stoll.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1999-2002	Project Archaeologist/Field Director, CRM TECH, Riverside, California.
1996-1998	Project Director and Ethnographer, Statistical Research, Inc., Redlands, California.
1992-1998	Assistant Research Anthropologist, University of California, Riverside.
1992-1995	Project Director, Archaeological Research Unit, U.C. Riverside.
1993-1994	Adjunct Professor, Riverside Community College, Mt. San Jacinto College, U.C. Riverside, Chapman University, and San Bernardino Valley College.
1991-1992	Crew Chief, Archaeological Research Unit, U.C. Riverside.
1984-1998	Project Director, Field Director, Crew Chief, and Archaeological Technician for various southern California cultural resources management firms.

Research Interests

Cultural Resource Management, Southern Californian Archaeology, Settlement and Exchange Patterns, Specialization and Stratification, Culture Change, Native American Culture, Cultural Diversity.

Cultural Resources Management Reports

Principal investigator for, author or co-author of, and contributor to numerous cultural resources management study reports since 1986.

Memberships

Society for American Archaeology; Society for California Archaeology; Pacific Coast Archaeological Society; Coachella Valley Archaeological Society.

PROJECT ARCHAEOLOGIST/REPORT WRITER
Deirdre Encarnación, M.A.

Education

2003	M.A., Anthropology, San Diego State University, California.
2000	B.A., Anthropology, minor in Biology, with honors; San Diego State University, California.
2021	Certificate of Specialization, Kumeyaay Studies, Cuyamaca College/KCC.
2001	Archaeological Field School, San Diego State University.
2000	Archaeological Field School, San Diego State University.

Professional Experience

2004-	Project Archaeologist/Report Writer, CRM TECH, Riverside/Colton, California.
2001-2003	Part-time Lecturer, San Diego State University, California.
2001	Research Assistant for Dr. Lynn Gamble, San Diego State University.
2001	Archaeological Collection Catalog, SDSU Foundation.

Presentations

2023	"The Kumeyaay-Critical Awareness, Critical Activation," Salaam, San Diego College of Continuing Education.
2023	"A Look at the Three Wise Men and their Global Celebrations," The Epiphany Project.
2022	"Voices: A Latina Advocate Shares about Life, Stereotypes, & Rising Above," Salaam online event.
2022	"The Original Beach Town: San Diego's Coastal Heritage," San Diego Archaeological Center Living Room Lecture.

Memberships

Society for California Archaeology; Society for Hawaiian Archaeology; California Native Plant Society.

PROJECT ARCHAEOLOGIST/FIELD DIRECTOR
Daniel Ballester, M.S., RPA (Registered Professional Archaeologist)

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.
2021	An Introduction to Geoarchaeology: How Understanding Basic Soils, Sediments, and Landforms Can Make You a Better Archaeologist; Society for American Archaeology online seminar.
2007	Certificate in Geographic Information Systems (GIS), California State University, San Bernardino.
2002	Historic Archaeology Workshop; presented by Richard Norwood, Base Archaeologist, Edwards Air Force Base, at CRM TECH, Riverside, California.

Professional Experience

2002-	Field Director/GIS Specialist, CRM TECH, Riverside/Colton, California.
2011-2012	GIS Specialist for Caltrans District 8 Project, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew Chief, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew, ECorp, Redlands.
1999-2002	Project Archaeologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

Cultural Resources Management Reports

Field Director, co-author, and contributor to numerous cultural management reports since 2002.

PROJECT HISTORIAN/ARCHITECTURAL HISTORIAN
Terri Jacquemain, M.A.

Education

2004	M.A., Public History and Historic Resource Management, University of California, Riverside.
2002	B.S., Anthropology, University of California, Riverside.
2001	Archaeological Field School, University of California, Riverside.
1991	A.A., Riverside Community College, Norco Campus.

Professional Experience

2003-	Historian/Architectural Historian/Report Writer, CRM TECH, Riverside/Colton, California.
2002-2003	Teaching Assistant, Religious Studies Department, University of California, Riverside.
2002	Interim Public Information Officer, Cabazon Band of Mission Indians.
2000	Administrative Assistant, Native American Student Programs, University of California, Riverside.
1997-2000	Reporter, *Inland Valley Daily Bulletin*, Ontario, California.
1991-1997	Reporter, *The Press-Enterprise*, Riverside, California.

Membership

California Preservation Foundation.

PROJECT ARCHAEOLOGIST
Alondra Garcia, M.S.

Education

2020	M.S., Geographic Information Sciences, California State University, Long Beach.
2019	B.A., Anthropology, California State University, Long Beach.
2019	Certificate in American Indian Studies; California State University, Long Beach.

Professional Experience

2023-	Archaeologist, CRM TECH, Colton, California.
2022	Cartographic GIS Technician, City and County of Honolulu, Hawaii.
2022	GIS Consultant, Maui, Hawaii.
2021-2022	Archaeologist/GIS Technician, Scientific Consultant Services, Inc.
2020-2021	GIS Research Associate, The Center for International Trade and Transportation.
2020-2021	Archaeologist, Mckeehan Environmental Consultants.
2020-2021	Archaeologist, Cogstone Resource Management.
2019-2021	Archaeologist, PNA CRM.
2019-2021	Archaeologist, Rincon Consultants, Inc.

Fieldwork/Lab Work

2018-2019	Teaching Assistant, Mt. Trumbull, Arizona. Duties included leading excavation, operating Total Station, GPR and Magnetometer survey, and cataloguing artifacts.
2018	Pedestrian Survey, Managua, Nicaragua. Duties included surveying, map creation, and operating GPR.
2018	NAGPRA cataloguing, California State University, Long Beach. Duties included background research on collections.
2018-2020	Lab Technician, Institute for Integrated Research Materials, Environments and Societies, California State University, Long Beach. Duties included soil and ceramic sample preparation for XRF, Luminescence dating, and IC-PMS analysis.

ARCHAEOLOGICAL SURVEYOR
Ron Schmidtling, M.S.

Education

1995	M.S., Geology, University of California, Los Angeles.
1991	Pasadena City College, Pasadena, California.
1985	B.A., Archaeology, Paleontology, Ancient Folklore, and Art History, University of Southern Mississippi, Hattiesburg.

Professional Experience:

2020-	Principal Paleontologist/Archaeological Surveyor, CRM TECH, Colton, California.
2014-	Instructor of Earth Science, History of Life, Ecology, and Evolutionary Biology, Columbia College Hollywood, Reseda, California.
2013, 2015	Volunteer, excavation of a camarasaur and a diplodocid in southern Utah, Natural History Museum of Los Angeles County, California.
1993-2014	Consultant, Getty Conservation Institute, Brentwood, California.
1999-2001	Archaeological and Paleontological Monitor, Michael Brandman Associates, Irvine, California.
1997	Department of Archaeology, University of California, Los Angeles.
1994	Scientific Illustrator and Teaching Assistant, Department of Earth and Space Sciences and Department of Biological Sciences, University of California, Los Angeles.

Memberships

AAPS (Association of Applied Paleontological Sciences), USA; CSEOL (Center for the Study of Evolution and the Origin of Life), Department of Earth Sciences, University of California, Los Angeles.

Publications and Reports

Author, co-author, and contributor on numerous paleontological publications and paleontological resource management reports.

APPENDIX 2

NATIVE AMERICAN SACRED LANDS FILE SEARCH RESULTS

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

June 21, 2023

Nina Gallardo
CRM TECH

Via Email to: ngallardo@crmtech.us

Re: Proposed ARB 52 Project on Assessor's Parcel Numbers 492-010-13 and-17 (CRM TECH No. 4020A), Kern County

Dear Ms. Gallardo:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Cameron.vela@nahc.ca.gov.

Sincerely,

Cameron Vela

Cameron Vela
Cultural Resources Analyst
Attachment

Native American Heritage Commission
Native American Contact List
Kern County
6/21/2023
*Federally Recognized Tribe

****Big Pine Paiute Tribe of the Owens Valley***
Danelle Gutierrez, Tribal Historic Preservation Officer
P.O. Box 700
Big Pine, CA, 93513
Phone: (760) 938 - 2003
Fax: (760) 938-2942
d.gutierrez@bigpinepaiute.org
Paiute-Shoshone

****Big Pine Paiute Tribe of the Owens Valley***
James Rambeau, Chairperson
P. O. Box 700
Big Pine, CA, 93513
Phone: (760) 938 - 2003
Fax: (760) 938-2942
j.rambeau@bigpinepaiute.org
Paiute-Shoshone

****Big Pine Paiute Tribe of Owens Valley***
Sally Manning, Environmental Director
P. O. Box 700
Big Pine, CA, 93513
Phone: (760) 938 - 2003
s.manning@bigpinepaiute.org
Paiute-Shoshone

Chumash Council of Bakersfield
Julio Quair, Chairperson
729 Texas Street
Bakersfield, CA, 93307
Phone: (661) 322 - 0121
chumashtribe@sbcglobal.net
Chumash

Kitanemuk & Yowlumne Tejon Indians
Delia Dominguez, Chairperson
115 Radio Street
Bakersfield, CA, 93305
Phone: (626) 339 - 6785
2deedominguez@gmail.com
Kitanemuk
Southern Valley
Yokut

****Tejon Indian Tribe***
Candice Garza, CRM Scheduler
4941 David Road
Bakersfield, CA, 93307
Phone: (661) 345 - 0632
cgarza@tejonindiantribe-nsn.gov
Kitanemuk

****Tule River Indian Tribe***
Neil Peyron, Chairperson
P.O. Box 589
Porterville, CA, 93258
Phone: (559) 781 - 4271
Fax: (559) 781-4610
neil.peyron@tulerivertribe-nsn.gov
Yokut

****Tule River Indian Tribe***
Kerri Vera, Environmental Department
P. O. Box 589
Porterville, CA, 93258
Phone: (559) 783 - 8892
Fax: (559) 783-8932
kerri.vera@tulerivertribe-nsn.gov
Yokut

****Tule River Indian Tribe***
Joey Garfield, Tribal Archaeologist
P. O. Box 589
Porterville, CA, 93258
Phone: (559) 783 - 8892
Fax: (559) 783-8932
joey.garfield@tulerivertribe-nsn.gov
Yokut

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Proposed ARB 52 Project on Assessor's Parcel Numbers 492-010-13 and-17 (CRM TECH No. 4020A), Kern County.

APPENDIX 3

SUMMARY OF RECORDS SEARCH RESULTS*

* See confidential attachment for further information.

California
Historical
Resources
Information
System

Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

6/6/2023

Nina Gallardo
CRM TECH
1016 E. Cooley Drive, Suite A/B
Colton, CA 92324

Re: 4020A Airport Boughton SWC Bakersfield Arch
Records Search File No.: 23-196

The Southern San Joaquin Valley Information Center received your record search request for the project area referenced above, located on the Oildale USGS 7.5' quad. The following reflects the results of the records search for the project area and the 1.0 radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☐ custom GIS maps ☒ GIS data

Resources within project area:	None
Resources within 1.0 mile radius:	13 resources (list enclosed)
Reports within project area:	None
Reports within 1.0 mile radius:	22 reports (list enclosed)

Resource Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database Records:	☒ enclosed	☐ not requested	☐ nothing listed
Resource Record Copies:	☒ enclosed	☐ not requested	☐ nothing listed
Report Copies:	☐ enclosed	☒ not requested	☐ nothing listed
OHP Built Environment Resources Directory:	☐ enclosed	☒ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
CA Inventory of Historic Resources (1976):	☐ enclosed	☐ not requested	☒ nothing listed

Caltrans Bridge Survey: Not available at SSJVIC; please see
https://dot.ca.gov/programs/environmental-analysis/cultural-studies/california-historical-bridges-tunnels

Ethnographic Information: Not available at SSJVIC

Historical Literature: Not available at SSJVIC

Historical Maps: Not available at SSJVIC; please see
http://historicalmaps.arcgis.com/usgs/

Local Inventories: Not available at SSJVIC

GLO and/or Rancho Plat Maps: Not available at SSJVIC; please see
http://www.glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1 and/or
http://www.oac.cdlib.org/view?docId=hb8489p15p;developer=local;style=oac4;doc.view=items

Shipwreck Inventory: Not available at SSJVIC; please see
https://www.slc.ca.gov/shipwrecks/

Soil Survey Maps: Not available at SSJVIC; please see
http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Celeste M. Thomson
Coordinator

SSJVIC Record Search 23-196

Reports in PA:	Reports in 0.25 Radius:	Resources in PA:	Resources in 0.25 Radius:
None	KE-00263	None	P-15-003322
	KE-00312		P-15-003323
	KE-00413		P-15-004728
	KE-02430		P-15-004734
	KE-02699		P-15-008037
	KE-02807		P-15-008134
	KE-03222		P-15-008184
	KE-03663		P-15-008203
	KE-03675		P-15-008232
	KE-03757		P-15-008249
	KE-03864		P-15-008515
	KE-04063		P-15-009854
	KE-04064		P-15-021383
	KE-04192		
	KE-04204		
	KE-04566		
	KE-04734		
	KE-04766		
	KE-05076		
	KE-05152		
	KE-05357		
	KE-05409		

APPENDIX 4

CALIFORNIA HISTORICAL RESOURCES INVENTORY RECORD FORMS

Isolate 4020-1, Isolate 4020-2, and Site 4020-3H
(Temporary Designations; Confidential)

Appendix E
Energy

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Airport Drive Warehouse

Energy Analysis

Kern County

Prepared by:

Haseeb Qureshi
hqureshi@urbanxroads.com

Michael Tirohn
mtirohn@urbanxroads.com

May 23, 2024

15369-03 EA Report

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
AQIA	Air Quality Impact Analysis
BACM	Best Available Control Measures
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
DMV	Department of Motor Vehicles
EIA	Energy Information Administration
EIR	Environmental Impact Report
EMFAC	Emissions Factor
FERC	Federal Energy Regulatory Commission
GWh	Gigawatt Hour
HHDT	Heavy-Heavy Duty
IEPR	Integrative Energy Policy Report
ISO	Independent Service Operator
ISTEA	Intermodal Surface Transportation Efficiency Act
kBTU	Kilo-British Thermal Units
kWh	Kilowatt Hour
LDA	Light Duty Auto
LDT1/LDT2	Light-Duty Trucks
MDV	Medium Duty Trucks
MHDT	Medium-Heavy Duty Trucks
mpg	Miles Per Gallon
MPO	Metropolitan Planning Organization
PG&E	Pacific Gas and Electric
Project	Airport Drive Warehouse
SDAB	San Diego Air Basin
SDG&E	San Diego Gas and Electric
sf	Square Feet
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SoCalGas	Southern California Gas
TEA-21	Transportation Equity Act for the 21st Century
VMT	Vehicle Miles Traveled

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1 INTRODUCTION

This report presents the results of the energy analysis prepared by Urban Crossroads, Inc., for the proposed Airport Drive Warehouse (Project). The purpose of this report is to ensure that energy implication is considered by the Kern County, as the lead agency, and to quantify anticipated energy usage associated with construction of the proposed Project, determine if the usage amounts are efficient, typical, or wasteful for the land use type, and to emphasize avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

1.1 SITE LOCATION

The proposed Airport Drive Warehouse (Project) is located on the southwest corner of the intersection of Airport Drive and Boughton Drive in unincorporated Kern County, as shown at Exhibit 1-A. The site is bounded to the north by Boughton Drive and vacant/undeveloped land; to the south by Skyway Drive and commercial buildings that provide services related to aircrafts; to the east by Airport Drive, residential area, and a storage provider business; and to the west by Hanger Way and Meadows Field Airport.

1.2 PROJECT DESCRIPTION

The proposed Project consists of two speculative multi-tenant warehouse buildings with a total area of 923,130 square feet. Building 1 is the northernmost building on the site and is proposed to be a 655,690-square-foot warehouse building, including 10,000 square feet of office area. Building 2 is the southernmost building on the site and is proposed to be a 267,440-square-foot warehouse, including 5,000 square feet of office area. A preliminary site plan for the proposed Project is shown at Exhibit 1-B. The proposed Project has an anticipated Opening Year of 2025.

EXHIBIT 1-A: LOCATION MAP

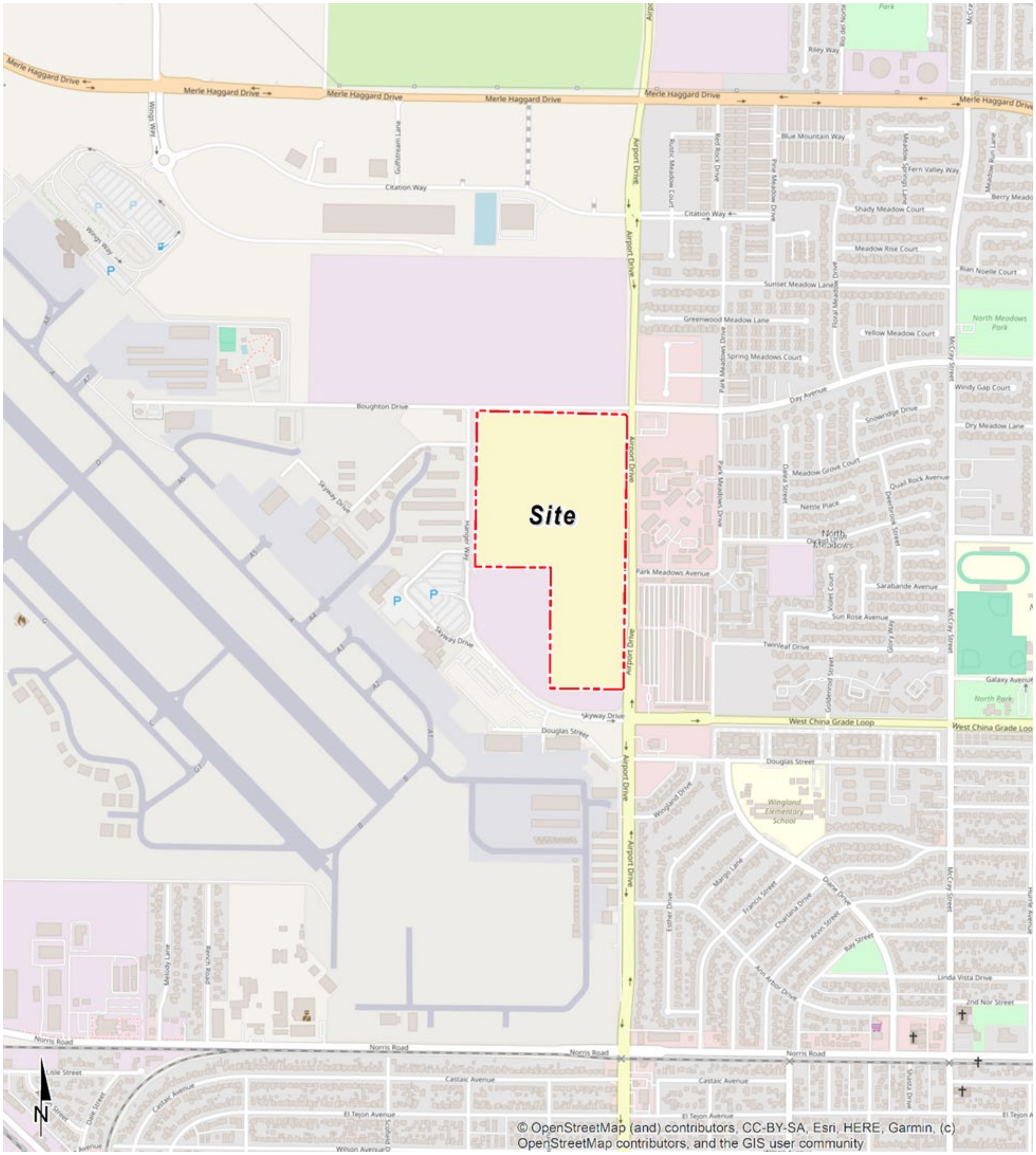

EXHIBIT 1-B: SITE PLAN

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2 EXISTING CONDITIONS

This section provides an overview of the existing energy conditions in the Project region.

2.1 OVERVIEW

The most recent data for California's estimated total energy consumption and natural gas consumption is from 2021, released by the United States (U.S.) Energy Information Administration's (EIA) California State Profile and Energy Estimates in 2021 and included (1):

- As of 2021, approximately 7,359 trillion British Thermal Unit (BTU) of energy was consumed.
- As of 2021, approximately 605 million barrels of petroleum.
- As of 2022, approximately 2,059 billion cubic feet of natural gas.
- As of 2022, approximately 1,322 thousand short tons of coal.

According to the EIA, in 2022 the U.S. petroleum consumption comprised about 90% of all transportation energy use, excluding fuel consumed for aviation and most marine vessels (2). In 2022, about 251,923 million gallons (or about 5.99 million barrels) of finished petroleum products were consumed in the U.S., an average of about 690 million gallons per day (or about 16.4 million barrels per day) (3). In 2021, California consumed approximately 12,157 million gallons in motor gasoline (33.31 million per day) and approximately 3,541 million gallons of diesel fuel (9.7 million per day) (4).

The most recent data provided by the EIA for energy use in California is reported from 2021 and provided by demand sectors as follows:

- Approximately 37.8% transportation sector.
- Approximately 23.2% industrial sector.
- Approximately 20.0% residential sector.
- Approximately 19.0% commercial sector. (5)

According to the EIA, California used approximately 247,250 gigawatt hours of electricity in 2021 (6). By sector in 2021, residential uses utilized 36.5% of the state's electricity, followed by 43.9% for commercial uses, 19.2% for industrial uses, and 0.3% for transportation. Electricity usage in California for differing land uses varies substantially by the type of uses in a building, type of construction materials used in a building, and the efficiency of all electricity-consuming devices within a building (6).

According to the EIA, California used approximately 200,871 million therms of natural gas in 2021 (7). In 2021 (the most recent year for which data is available), by sector, industrial uses utilized 33% of the state's natural gas, followed by 30% used as fuel in the electric power sector, 21% from residential, 11% from commercial, 1% from transportation uses and the remaining 3% was utilized for the operations, processing and production of natural gas itself (7). While the supply of natural gas in the United States and production in the lower 48 states has increased greatly since 2008, California produces little, and imports 90% of its supply of natural gas (7).

In 2022, total system electric generation for California was 287,220 gigawatt hours (GWh). California's massive electricity in-state generation system generated approximately 203,257 GWh which accounted for approximately 71% of the electricity it uses; the rest was imported from the Pacific Northwest (12%) and the U.S. Southwest (17%) (8). Natural gas is the main source for electricity generation at 47.46% of the total in-state electric generation system power as shown in Table 2-1.

An updated summary of, and context for, energy consumption and energy demands within the State is presented in "U.S. Energy Information Administration, California State Profile and Energy Estimates, Quick Facts" excerpted below (9):

- In 2022, California was the seventh-largest producer of crude oil among the 50 states, and, as of January 2022, the state ranked third in crude oil refining capacity.
- California is the largest consumer of jet fuel and second-largest consumer of motor gasoline among the 50 states.
- In 2020, California was the second-largest total energy consumer among the states, but its per capita energy consumption was less than in all but three other states.
- In 2022, renewable resources, including hydroelectric power and small-scale, customer-sited solar power, accounted for 49% of California's in-state electricity generation. Natural gas fueled another 42%. Nuclear power supplied almost all the rest.
- In 2022, California was the fourth-largest electricity producer in the nation. The state was also the nation's third-largest electricity consumer, and additional needed electricity supplies came from out-of-state generators.

As indicated below, California is one of the nation's leading energy-producing states, and California's per capita energy use is among the nation's most efficient. Given the nature of the Project, the remainder of this discussion will focus on the three sources of energy that are most relevant to the Project—namely, electricity, natural gas, and transportation fuel for vehicle trips associated with the uses planned for the Project.

TABLE 2-1: TOTAL ELECTRICITY SYSTEM POWER (CALIFORNIA 2022)

Fuel Type	California In-State Generation (GWh)	% of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	Total Imports (GWh)	Total California Energy Mix (GWh)	Total California Power Mix
Coal	273	0.13%	181	5,716	5,897	6,170	2.15%
Natural Gas	96,457	47.46%	44	7,994	8,038	104,495	36.38%
Oil	65	0.03%	-	-	-	65	0.2%
Other (Waste Heat/Petroleum Coke)	315	0.15%	-	-	-	315	0.11%
Unspecified	-	0.0%	12,485	7,943	20,428	20,428	7.11%
Total Thermal and Unspecified	**97,110**	**47.78%**	**12,710**	**21,653**	**34,363**	**121,473**	**45.77%**
Nuclear	17,627	8.67%	397	8,342	8,739	26,366	9.18%
Large Hydro	14,607	7.19%	10,803	1,118	11,921	26,528	9.24%
Biomass	5,366	2.64%	771	25	797	6,162	2.15%
Geothermal	11,110	5.47%	253	2,048	2,301	13,412	4.67%
Small Hydro	3,005	1.48%	211	13	225	3,230	1.12%
Solar	40,494	19.92%	231	8,225	8,456	48,950	17.04%
Wind	13,938	6.86%	8,804	8,357	17,161	31,099	10.83%
Total Non-GHG and Renewables	**106,147**	**52.22%**	**21,471**	**28,129**	**49,599**	**155,747**	**54.23%**
SYSTEM TOTALS	***203,257***	***100.0%***	***34,180***	***49,782***	***83,962***	***287,220***	***100.0%***

Source: CECs 2022 Total System Electric Generation

2.2 ELECTRICITY

The usage associated with electricity use was calculated using CalEEMod Version 2022.1. The Southern California region's electricity reliability has been of concern for the past several years due to the planned retirement of aging facilities that depend upon once-through cooling technologies, as well as the June 2013 retirement of the San Onofre Nuclear Generating Station (San Onofre). While the once-through cooling phase-out has been ongoing since the May 2010 adoption of the State Water Resources Control Board's once-through cooling policy, the retirement of San Onofre complicated the situation. California Independent Service Operator (ISO) studies revealed the extent to which the San Joaquin Valley Air Basin (SJVAB) and the San Diego Air Basin (SDAB) region were vulnerable to low-voltage and post-transient voltage instability concerns. A preliminary plan to address these issues was detailed in the 2013 Integrative Energy Policy Report (IEPR) after a collaborative process with other energy agencies, utilities, and air districts. Similarly, the subsequent 2022 IEPR's provides information and policy recommendations on advancing a clean, reliable, and affordable energy system (10).

California's electricity industry is an organization of traditional utilities, private generating companies, and state agencies, each with a variety of roles and responsibilities to ensure that electrical power is provided to consumers. The California ISO is a nonprofit public benefit corporation and is the impartial operator of the State's wholesale power grid and is charged with maintaining grid reliability, and to direct uninterrupted electrical energy supplies to California's homes and communities. While utilities still own transmission assets, the ISO routes electrical power along these assets, maximizing the use of the transmission system and its power generation resources. The ISO matches buyers and sellers of electricity to ensure that enough power is available to meet demand. To these ends, every five minutes the ISO forecasts electrical demands, accounts for operating reserves, and assigns the lowest cost power plant unit to meet demands while ensuring adequate system transmission capacities and capabilities (11).

Part of the ISO's charge is to plan and coordinate grid enhancements to ensure that electrical power is provided to California consumers. To this end, utilities file annual transmission expansion/modification plans to accommodate the State's growing electrical needs. The ISO reviews and either approves or denies the proposed additions. In addition, and perhaps most importantly, the ISO works with other areas in the western United States electrical grid to ensure that adequate power supplies are available to the State. In this manner, continuing reliable and affordable electrical power is assured to existing and new consumers throughout the State.

Electricity is currently provided to the Project site by Pacific Gas & Electric (PG&E). PG&E provides natural gas and electric power to approximately 16 million people in 47 counties, within a service area encompassing approximately 70,000 square miles. Based on PG&E's 2022 Power Content Label Mix, PG&E derives electricity from varied energy resources including: fossil fuels, hydroelectric generators, nuclear power plants, geothermal power plants, solar power generation, and wind farms. PG&E also purchases from independent power producers and utilities, including out-of-state suppliers (12).

Table 2-2 presents PG&E's specific proportional shares of electricity sources in 2022. As indicated in Table 2-2, the 2022 PG&E Power Mix has renewable energy at 35.8% of the overall energy resources. Geothermal resources are at 4.7%, wind power is at 10.8%, large hydroelectric sources are at 9.2%, solar energy is at 17.0%, and coal is at 2.1% (13).

TABLE 2-2: PG&E 2022 POWER CONTENT MIX

Energy Resources	2022 PG&E Power Mix
Eligible Renewable	**35.8%**
Biomass & Waste	2.1%
Geothermal	4.7%
Eligible Hydroelectric	1.1%
Solar	17.0%
Wind	10.8%
Coal	**2.1%**
Large Hydroelectric	**9.2%**
Natural Gas	**36.4%**
Nuclear	**9.2%**
Other	**0.1%**
Unspecified Sources of power*	7.1%
Total	**100%**

* "Unspecified sources of power" means electricity from transactions that are not traceable to specific generation sources

2.3 NATURAL GAS

The following summary of natural gas customers and volumes, supplies, delivery of supplies, storage, service options, and operations is excerpted from information provided by the California Public Utilities Commission (CPUC).

> *"The CPUC regulates natural gas utility service for approximately 10.8 million customers that receive natural gas from Pacific Gas and Electric (PG&E), Southern California Gas (SoCalGas), San Diego Gas & Electric (SDG&E), Southwest Gas, and several smaller natural gas utilities. The CPUC also regulates independent storage operators: Lodi Gas Storage, Wild Goose Storage, Central Valley Storage and Gill Ranch Storage.*
>
> *California's natural gas utilities provide service to over 11 million gas meters. SoCalGas and PG&E provide service to about 5.9 million and 4.3 million customers, respectively, while SDG&E provides service to over 800, 000 customers. In 2018, California gas utilities forecasted that they would deliver about 4740 million cubic feet per day (MMcfd) of gas to their customers, on average, under normal weather conditions.*
>
> *The overwhelming majority of natural gas utility customers in California are residential and small commercials customers, referred to as "core" customers. Larger volume gas customers, like electric generators and industrial customers, are called "noncore" customers. Although very small in number relative to core customers, noncore customers*

consume about 65% of the natural gas delivered by the state's natural gas utilities, while core customers consume about 35%.

A significant amount of gas (about 19%, or 1131 MMcfd, of the total forecasted California consumption in 2018) is also directly delivered to some California large volume consumers, without being transported over the regulated utility pipeline system. Those customers, referred to as "bypass" customers, take service directly from interstate pipelines or directly from California producers.

SDG&E and Southwest Gas' southern division are wholesale customers of SoCalGas, i.e., they receive deliveries of gas from SoCalGas and in turn deliver that gas to their own customers. (Southwest Gas also provides natural gas distribution service in the Lake Tahoe area.) Similarly, West Coast Gas, a small gas utility, is a wholesale customer of PG&E. Some other wholesale customers are municipalities like the cities of Palo Alto, Long Beach, and Vernon, which are not regulated by the CPUC.

Natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. The major interstate pipelines that deliver out-of-state natural gas to California gas utilities are Gas Transmission Northwest Pipeline, Kern River Pipeline, Transwestern Pipeline, El Paso Pipeline, Ruby Pipeline, Mojave Pipeline, and Tuscarora. Another pipeline, the North Baja - Baja Norte Pipeline takes gas off the El Paso Pipeline at the California/Arizona border and delivers that gas through California into Mexico. While the Federal Energy Regulatory Commission (FERC) regulates the transportation of natural gas on the interstate pipelines, and authorizes rates for that service, the California Public Utilities Commission may participate in FERC regulatory proceedings to represent the interests of California natural gas consumers.

The gas transported to California gas utilities via the interstate pipelines, as well as some of the California-produced gas, is delivered into the PG&E and SoCalGas intrastate natural gas transmission pipelines systems (commonly referred to as California's "backbone" pipeline system). Natural gas on the utilities' backbone pipeline systems is then delivered to the local transmission and distribution pipeline systems, or to natural gas storage fields. Some large volume noncore customers take natural gas delivery directly off the high-pressure backbone and local transmission pipeline systems, while core customers and other noncore customers take delivery off the utilities' distribution pipeline systems. The state's natural gas utilities operate over 100,000 miles of transmission and distribution pipelines, and thousands more miles of service lines.

Bypass customers take most of their deliveries directly off the Kern/Mojave pipeline system, but they also take a significant amount of gas from California production.

PG&E and SoCalGas own and operate several natural gas storage fields that are located within their service territories in northern and southern California, respectively. These storage fields, and four independently owned storage utilities - Lodi Gas Storage, Wild Goose Storage, Central Valley Storage, and Gill Ranch Storage - help meet peak seasonal and daily natural gas demand and allow California natural gas customers to secure *natural gas supplies more efficiently. PG&E is a 25% owner of the Gill Ranch Storage field. These storage fields provide a significant amount of infrastructure capacity to help meet California's natural gas requirements, and without these storage fields, California would need much more pipeline capacity in order to meet peak gas requirements.*

Prior to the late 1980s, California regulated utilities provided virtually all natural gas services to all their customers. Since then, the Commission has gradually restructured the California gas industry in order to give customers more options while assuring regulatory protections for those customers that wish to, or are required to, continue receiving utility-provided services.

The option to purchase natural gas from independent suppliers is one of the results of this restructuring process. Although the regulated utilities procure natural gas supplies for most core customers, core customers have the option to purchase natural gas from independent natural gas marketers, called "core transport agents" (CTA). Contact information for core transport agents can be found on the utilities' web sites. Noncore customers, on the other hand, make natural gas supply arrangements directly with producers or with marketers.

Another option resulting from the restructuring process occurred in 1993, when the Commission removed the utilities' storage service responsibility for noncore customers, along with the cost of this service from noncore customers' transportation rates. The Commission also encouraged the development of independent storage fields, and in subsequent years, all the independent storage fields in California were established. Noncore customers and marketers may now take storage service from the utility or from an independent storage provider (if available), and pay for that service, or may opt to take no storage service at all. For core customers, the Commission assures that the utility has adequate storage capacity set aside to meet core requirements, and core customers pay for that service.

In a 1997 decision, the Commission adopted PG&E's "Gas Accord", which unbundled PG&E's backbone transmission costs from noncore transportation rates. This decision gave customers and marketers the opportunity to obtain pipeline capacity rights on PG&E's backbone transmission pipeline system, if desired, and pay for that service at rates authorized by the Commission. The Gas Accord also required PG&E to set aside a certain amount of backbone transmission capacity in order to deliver gas to its core customers. Subsequent Commission decisions modified and extended the initial terms of the Gas Accord. The "Gas Accord" framework is still in place today for PG&E's backbone and storage rates and services and is now simply referred to as PG&E Gas Transmission and Storage (GT&S).

In a 2006 decision, the Commission adopted a similar gas transmission framework for Southern California, called the "firm access rights" system. SoCalGas and SDG&E implemented the firm access rights (FAR) system in 2008, and it is now referred to as the backbone transmission system (BTS) framework. As under the PG&E backbone transmission system, SoCalGas backbone transmission costs are unbundled from noncore

> *transportation rates. Noncore customers and marketers may obtain, and pay for, firm backbone transmission capacity at various receipt points on the SoCalGas system. A certain amount of backbone transmission capacity is obtained for core customers to assure meeting their requirements.*
>
> *Many if not most noncore customers now use a marketer to provide for several of the services formerly provided by the utility. That is, a noncore customer may simply arrange for a marketer to procure its supplies, and obtain any needed storage and backbone transmission capacity, in order to assure that it will receive its needed deliveries of natural gas supplies. Core customers still mainly rely on the utilities for procurement service, but they have the option to take procurement service from a CTA. Backbone transmission and storage capacity is either set aside or obtained for core customers in amounts to assure very high levels of service.*
>
> *In order properly operate their natural gas transmission pipeline and storage systems, PG&E and SoCalGas must balance the amount of gas received into the pipeline system and delivered to customers or to storage fields. Some of these utilities' storage capacity is dedicated to this service, and under most circumstances, customers do not need to precisely match their deliveries with their consumption. However, when too much or too little gas is expected to be delivered into the utilities' systems, relative to the amount being consumed, the utilities require customers to more precisely match up their deliveries with their consumption. And, if customers do not meet certain delivery requirements, they could face financial penalties. The utilities do not profit from these financial penalties - the amounts are then returned to customers as a whole. If the utilities find that they are unable to deliver all the gas that is expected to be consumed, they may even call for a curtailment of some gas deliveries. These curtailments are typically required for just the largest, noncore customers. It has been many years since there has been a significant curtailment of core customers in California."* (14)

As indicated in the preceding discussions, natural gas is available from a variety of in-state and out-of-state sources and is provided throughout the state in response to market supply and demand. Complementing available natural gas resources, biogas may soon be available via existing delivery systems, thereby increasing the availability and reliability of resources in total. The CPUC oversees utility purchases and transmission of natural gas to ensure reliable and affordable natural gas deliveries to existing and new consumers throughout the State.

California accounts for less than 1% of total U.S. natural gas reserves and production. As with crude oil, California's natural gas production has experienced a gradual decline since 1985. In 2021, about 33% of the natural gas delivered to consumers went to the State's industrial sector, and about 31% was delivered to the electric power sector. Natural gas fueled more than two-fifths of the State's utility-scale electricity generation in 2021. The residential sector, where three-fifths of California households use natural gas for home heating, accounted for 22% of natural gas deliveries. The commercial sector received 12% of the deliveries to end users and the transportation sector consumed the remaining 1% (15).

2.4 TRANSPORTATION ENERGY RESOURCES

The Project would generate additional vehicle trips with resulting consumption of energy resources, predominantly gasoline and diesel fuel. The Department of Motor Vehicles (DMV) identified 36.2 million registered vehicles in California (16), and those vehicles consume an estimated 17.2 billion gallons of fuel each year.[1] Gasoline (and other vehicle fuels) are commercially provided commodities and would be available to the Project patrons and employees via commercial outlets.

California's on-road transportation system includes 396,616 lane miles, more than 26.6 million passenger vehicles and light trucks, and almost 9.0 million medium- and heavy-duty vehicles (5). While gasoline consumption has been declining since 2008, it is still by far the dominant fuel. California is the second-largest consumer of petroleum products, after Texas, and accounts for 8% of the nation's total consumption. The State is the largest U.S. consumer of motor gasoline and jet fuel, and 83% of the petroleum consumed in California is used in the transportation sector (17).

[1] Fuel consumptions estimated utilizing information from EMFAC2021.

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3 REGULATORY BACKGROUND

Federal and state agencies regulate energy use and consumption through various means and programs. On the federal level, the U.S. Department of Transportation, the U.S. Department of Energy, and the U.S. Environmental Protection Agency (EPA) are three federal agencies with substantial influence over energy policies and programs. On the state level, the CPUC and the CEC are two agencies with authority over different aspects of energy. Relevant federal and state energy-related laws and plans are summarized below.

3.1 FEDERAL REGULATIONS

3.1.1 ENERGY POLICY AND CONSERVATION ACT (EPCA)

The EPCA was enacted in 1975 in response to the 1973 oil crisis. The primary goals of EPCA are to increase energy production and supply and reduce energy demand through the establishment of testing procedures, labeling requirements, and energy efficiency standards for vehicles, equipment, and appliances.

3.1.2 INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991 (ISTEA)

The ISTEA promoted the development of inter-modal transportation systems to maximize mobility as well as address national and local interests in air quality and energy. ISTEA contained factors that Metropolitan Planning Organizations (MPOs) were to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, MPOs adopted explicit policies defining the social, economic, energy, and environmental values guiding transportation decisions.

3.1.3 ENERGY POLICY ACT OF 1992

The Energy Policy Act of 1992 took effect in October 1992 and established goals and mandates to increase the use of clean energy in the United States, while also amending utility laws and requiring improvements in building and vehicles energy efficiency.

3.1.4 THE TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY (TEA-21)

The TEA-21 was signed into law in 1998 and builds upon the initiatives established in the ISTEA legislation, discussed above. TEA-21 authorizes highway, highway safety, transit, and other efficient surface transportation programs. TEA-21 continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of good transportation decisions. TEA-21 also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of Intelligent Transportation Systems, to help improve operations and management of transportation systems and vehicle safety.

3.1.5 ENERGY POLICY ACT OF 2005

The Energy Policy Act of 2005 was enacted in August 2005 and provided tax incentives and loan guarantees for alternative energy sources such as wind and geothermal. Additionally, the Act set targets for the quantity of biofuels to be mixed with gasoline, resulting in a significant increase in ethanol production.

3.1.6 SAFE, ACCOUNTABLE, FLEXIBLE, EFFICIENT TRANSPORTATION EQUITY ACT: A LEGACY FOR USERS (SAFETEA-LU)

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was a U.S. federal surface transportation funding and authorization bill. Enacted on August 10, 2005, it provided $244.1 billion to improve and maintain the surface transportation infrastructure in the United States, including highways, transit systems, bicycling and pedestrian facilities, and freight rail operations. The bill was replaced by the Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012.

3.1.7 ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

The Energy Independence and Security Act of 2007 was enacted in December 2007 with the purpose of moving the United States toward greater energy independence by increasing the production of renewable fuels, improving building and vehicle energy efficiency, and improving the energy performance of the Federal Government. Additionally, the Act sought to promote research on greenhouse gas capture and storage technologies.

3.1.8 MOVING AHEAD FOR PROGRESS IN THE 21ST CENTURY ACT (MAP-21)

The Moving Ahead for Progress in the 21st Century Act (MAP-21) is a U.S. federal surface transportation funding and authorization bill. Signed into law on July 6, 2012, it aimed to reduce crashes, injuries, and fatalities involving large trucks and buses by raising safety standards. The law provided over $105 billion for fiscal years 2013 and 2014 to guide the growth and development of the country's transportation infrastructure.

3.1.9 FIXING AMERICA'S SURFACE TRANSPORTATION ACT (FAST)

THE FAST ACT, SIGNED INTO LAW IN 2015, PROVIDES LONG-TERM FUNDING CERTAINTY FOR SURFACE TRANSPORTATION. IT ALLOCATES OVER $305 BILLION FOR PROGRAMS LIKE FEDERAL-AID HIGHWAYS, STREAMLINING APPROVAL PROCESSES, AND ESTABLISHING A NATIONAL SURFACE TRANSPORTATION AND INNOVATIVE FINANCE BUREAU. THE ACT AIMS TO IMPROVE ROADS, BRIDGES, TRANSIT SYSTEMS, AND RAIL TRANSPORTATION NETWORKS.3.1.10 INFRASTRUCTURE INVESTMENT AND JOBS ACT (IIJA)

The IIJA, was enacted in November 2021 and allocates approximately $550 billion in new federal funds for roads, bridges, water infrastructure, transit, and internet.

3.2 CALIFORNIA REGULATIONS

3.2.1 INTEGRATED ENERGY POLICY REPORT (IEPR)

Senate Bill 1389 (Bowen, Chapter 568, Statutes of 2002) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (Public Resources Code § 25301[a]). The CEC prepares these assessments and associated policy recommendations every two years, with updates in alternate years, as part of the Integrated Energy Policy Report.

The 2022 IEPR was adopted February 2023, and continues to work towards improving electricity, natural gas, and transportation fuel energy use in California. The 2022 IEPR introduces a new framework for embedding equity and environmental justice at the CEC and the California Energy Planning Library which allows for easier access to energy data and analytics for a wide range of users. Additionally, energy reliability, western electricity integration, gasoline cost factors and price spikes, the role of hydrogen in California's clean energy future, fossil gas transition and distributed energy resources are topics discussed within the 2022 IEPR (10).

3.2.2 STATE OF CALIFORNIA ENERGY PLAN

The CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The Plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies several strategies, including assistance to public agencies and fleet operators and encouragement of urban designs that reduce vehicle miles traveled (VMT) and accommodate pedestrian and bicycle access.

3.2.3 TITLE 24 ENERGY EFFICIENCY STANDARDS AND CALIFORNIA GREEN BUILDING STANDARDS

California Code of Regulations (CCR) Title 24 Part 6: The California Energy Code was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption.

The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. CCR, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on August 1, 2009, and is administered by the California Building Standards Commission.

CALGreen is updated on a regular basis, with the most recent approved update consisting of the 2022 California Green Building Code Standards that became effective on January 1, 2023. The CEC anticipates that the 2022 energy code will provide $1.5 billion in consumer benefits and reduce GHG emissions by 10 million metric tons (18). The Project would be required to comply with the applicable standards in place at the time plan check submittals are made. These require, among other items (19):

NONRESIDENTIAL MANDATORY MEASURES

- Short-term bicycle parking. If the new project or an additional alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5% of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility (5.106.4.1.2).
- EV charging stations. New construction shall facilitate the future installation of EV supply equipment. The compliance requires empty raceways for future conduit and documentation that the electrical system has adequate capacity for the future load. The number of spaces to be provided for is contained in Table 5.106. 5.3.3 (5.106.5.3). Additionally, Table 5.106.5.4.1 specifies requirements for the installation of raceway conduit and panel power requirements for medium- and heavy-duty EV supply equipment for warehouses, grocery stores, and retail stores.
- Outdoor light pollution reduction. Outdoor lighting systems shall be designed to meet the backlight, uplight and glare ratings per Table 5.106.8 (5.106.8).
- Construction waste management. Recycle and/or salvage for reuse a minimum of 65% of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1. 5.405.1.2, or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent (5.408.1).
- Excavated soil and land clearing debris. 100% of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed (5.408.3).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive (5.410.1).
- Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:
    - Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush (5.303.3.1)
    - Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush (5.303.3.2.1). The effective flush volume of floor- mounted or other urinals shall not exceed 0.5 gallons per flush (5.303.3.2.2).
    - Showerheads. Single showerheads shall have a minimum flow rate of not more than 1.8 gallons per minute and 80 psi (5.303.3.3.1). When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi (5.303.3.3.2).

  - Faucets and fountains. Nonresidential lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi (5.303.3.4.1). Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute of 60 psi (5.303.3.4.2). Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute (5.303.3.4.3). Metering faucets shall not deliver more than 0.20 gallons per cycle (5.303.3.4.4). Metering faucets for wash fountains shall have a maximum flow rate not more than 0.20 gallons per cycle (5.303.3.4.5).
- Outdoor potable water uses in landscaped areas. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent (5.304.1).
- Water meters. Separate submeters or metering devices shall be installed for new buildings or additions in excess of 50,000 sf or for excess consumption where any tenant within a new building or within an addition that is project to consume more than 1,000 gallons per day (GPD) (5.303.1.1 and 5.303.1.2).
- Outdoor water uses in rehabilitated landscape projects equal or greater than 2,500 sf. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 sf requiring a building or landscape permit (5.304.3).
- Commissioning. For new buildings 10,000 sf and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements (5.410.2).

3.2.4 AB 1493 PAVLEY REGULATIONS AND FUEL EFFICIENCY STANDARDS

California AB 1493, enacted on July 22, 2002, required California Air Resources Board (CARB) to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Under this legislation, CARB adopted regulations to reduce GHG emissions from non-commercial passenger vehicles (cars and light-duty trucks). Although aimed at reducing GHG emissions, specifically, a co-benefit of the Pavley standards is an improvement in fuel efficiency and consequently a reduction in fuel consumption.

3.2.5 CALIFORNIA'S RENEWABLE PORTFOLIO STANDARD

First established in 2002 under Senate Bill (SB) 1078, California's RPS requires retail sellers of electric services to increase procurement from eligible renewable resources to 44% of total retail sales by 2024 (20).

3.2.6 CLEAN ENERGY AND POLLUTION REDUCTION ACT OF 2015 (SB 350)

In October 2015, the legislature approved, and the Governor signed, SB 350 which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard (RPS), higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Specifically, SB 350 requires the following to reduce statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33% to 50% by 2030, with interim targets of 40% by 2024, and 45% by 2027.
- Double the energy efficiency in existing buildings by 2030. This target would be achieved through the California Public Utility Commission (CPUC), the California Energy Commission (CEC), and local publicly owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which would facilitate the growth of renewable energy markets in the western U.S. (California Leginfo 2015).

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4 PROJECT ENERGY DEMANDS AND ENERGY EFFICIENCY MEASURES

4.1 EVALUATION CRITERIA

Appendix F of the *State CEQA Guidelines* (21) states that the means of achieving the goal of energy conservation includes the following:

- Decreasing overall per capita energy consumption;
- Decreasing reliance on fossil fuels such as coal, natural gas and oil; and
- Increasing reliance on renewable energy sources.

In compliance with Appendix G of the *State CEQA Guidelines* (22), this report analyzes the Project's anticipated energy use during construction and operations to determine if the Project would:

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

4.2 METHODOLOGY

Information from the CalEEMod Version 2022.1 outputs for the *Airport Drive Warehouse Air Quality Impact Analysis* (AQIA) (23) was utilized in this analysis, detailing Project-related construction equipment, transportation energy demands, and facility energy demands.

4.2.1 CALEEMOD

In May 2022, the SJVAPCD, in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the CalEEMod Version 2022.1. The purpose of this model is to calculate construction-source and operational-source criteria pollutants and GHG emissions from direct and indirect sources as well as energy usage (24). Accordingly, the latest version of CalEEMod has been used to determine the proposed Project's anticipated transportation and facility energy demands. Outputs from the annual model runs are provided in Appendices 4.1 through 4.3.

4.2.2 EMISSION FACTORS MODEL

On May 2, 2022, the EPA approved the 2021 version of the EMissions FACtor model (EMFAC2021) web database for use in State Implementation Plan and transportation conformity analyses. EMFAC2021 is a mathematical model that was developed to calculate emission rates, fuel consumption, VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the CARB to project changes in future emissions from on-road mobile sources (25). This energy study utilizes the different fuel types for each vehicle class from the annual EMFAC2021 emission inventory in order to derive the average vehicle fuel economy which is then used to determine the estimated annual fuel consumption associated with vehicle usage during Project construction and operational activities. For purposes of analysis, the 2024 and 2025 analysis years were utilized to determine the average vehicle fuel economy used throughout the duration of the Project. Outputs from the EMFAC2021 model run are provided in Appendix 4.4.

4.3 CONSTRUCTION ENERGY DEMANDS

The focus within this section is the energy implications of the construction process, specifically the power cost from on-site electricity consumption during construction of the proposed Project.

4.3.1 CONSTRUCTION POWER COST

The total Project construction power costs is the summation of the products of the area (sf) by the construction duration and the typical power cost.

CONSTRUCTION DURATION

Construction is expected to commence in January 2024 and will last through December 2025 (23). The construction schedule utilized in the analysis, shown in Table 4-1, represents a "worst-case" analysis scenario. The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per *CEQA Guidelines* (26).

TABLE 4-1: CONSTRUCTION DURATION

Construction Activity	Start Date	End Date	Days
Site Preparation	1/1/2024	2/11/2024	30
Grading	2/12/2024	7/26/2024	120
Building Construction	7/27/2024	12/14/2025	360
Paving	9/20/2025	12/14/2025	60
Architectural Coating	9/20/2025	12/14/2025	60

PROJECT CONSTRUCTION POWER COST

The *2024 National Construction Estimator* identifies a typical power cost per 1,000 sf of construction per month of $2.66, which was used to calculate the Project's total construction power cost (27).

As shown in Table 4-2, the total power cost of the on-site electricity usage during the construction of the Project is estimated to be approximately $131,862.97.

TABLE 4-2: CONSTRUCTION POWER COST

Land Use	**Power Cost** (per 1,000 SF of construction per month)	**Size** (1,000 SF)	**Construction Duration** (months)	Project Construction Power Cost
High-Cube Transload Warehouse	$2.66	738.500	23	$45,181.43
High-Cube Cold Storage Warehouse	$2.66	184.600	23	$11,293.83
Parking Lot	$2.66	872.942	23	$53,406.59
Landscape	$2.66	359.286	23	$21,981.12
			CONSTRUCTION POWER COST	***$131,862.97***

4.3.2 CONSTRUCTION ELECTRICITY USAGE

The total Project construction electricity usage is the summation of the products of the power cost (estimated in Table 4-2) by the utility provider cost per kilowatt hour (kWh) of electricity.

PROJECT CONSTRUCTION ELECTRICITY USAGE

The PG&E's general service rate schedule was used to determine the Project's electrical usage. As of January 1, 2024, PG&E's general service rate is $0.28 per kilowatt hours (kWh) of electricity for industrial services (28). As shown in Table 4-3, the total electricity usage from on-site Project construction related activities is estimated to be approximately 470,939 kWh.

TABLE 4-3: CONSTRUCTION ELECTRICITY USAGE

Land Use	Cost per kWh	**Project Construction Electricity Usage** (kWh)
High-Cube Transload Warehouse	$0.28	161,362
High-Cube Cold Storage Warehouse	$0.28	40,335
Parking Lot	$0.28	190,738
Landscape	$0.28	78,504
	CONSTRUCTION ELECTRICITY USAGE	***470,939***

4.3.3 CONSTRUCTION EQUIPMENT FUEL ESTIMATES

Fuel consumed by construction equipment would be the primary energy resource expended over the course of Project construction.

CONSTRUCTION EQUIPMENT

Consistent with industry standards, typical construction practices, as well as information provided by the Project applicant, each piece of equipment listed in Table 4-4 would operate up to a total of eight (8) hours per day, or more than two-thirds of the period during which construction activities are allowed pursuant to the code. It should be noted that most pieces of equipment would likely operate for fewer hours per day. A summary of construction equipment assumptions, by phase, is provided at Table 4-4.

TABLE 4-4: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Construction Activity	Equipment[1]	Amount	Hours Per Day
Site Preparation	Rubber Tired Dozers	3	8
	Crawler Tractors	4	8
Grading	Excavators	2	8
	Graders	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Crawler Tractors	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Paving	Pavers	2	8
	Paving Equipment	2	8
	Rollers	2	8
Architectural Coating	Air Compressors	1	8

PROJECT CONSTRUCTION EQUIPMENT FUEL CONSUMPTION

Project construction activity timeline estimates, construction equipment schedules, equipment power ratings, load factors, and associated fuel consumption estimates are presented in Table 4-5. The aggregate fuel consumption rate for all equipment is estimated at 18.5 horsepower hour per gallon (hp-hr/gal.), obtained from CARB 2018 Emissions Factors Tables and cited fuel consumption rate factors presented in Table D-24 of the Moyer Guidelines (29). For the purposes of this analysis, the calculations are based on all construction equipment being diesel-powered which is consistent with industry standards[2].

Diesel fuel would be supplied by existing industrial fuel providers serving the Project area and region. As presented in Table 4-5, Project construction activities would consume an estimated 92,973 gallons of diesel fuel. Project construction would represent a “single-event” diesel fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

[2] Based on Appendix A of the CalEEMod User’s Guide, Construction consists of several types of off-road equipment. Since the majority of the off-road construction equipment used for construction projects are diesel fueled, CalEEMod assumes all of the equipment operates on diesel fuel.

TABLE 4-5: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Phase Name	Duration (Days)	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs./day	Total Fuel Consumption
Site Preparation	30	Rubber Tired Dozers	367	3	8	0.40	3,523	5,713
		Crawler Tractors	87	4	8	0.43	1,197	1,941
Grading	120	Excavators	36	2	8	0.38	219	1,420
		Graders	148	1	8	0.41	485	3,149
		Rubber Tired Dozers	367	1	8	0.40	1,174	7,618
		Scrapers	423	2	8	0.48	3,249	21,072
		Crawler Tractors	87	2	8	0.43	599	3,883
Building Construction	360	Cranes	367	1	8	0.29	851	16,569
		Forklifts	82	3	8	0.20	394	7,659
		Generator Sets	14	1	8	0.74	83	1,613
		Tractors/Loaders/Backhoes	84	3	8	0.37	746	14,515
		Welders	46	1	8	0.45	166	3,222
Paving	60	Pavers	81	2	8	0.42	544	1,765
		Paving Equipment	89	2	8	0.36	513	1,663
		Rollers	36	2	8	0.38	219	710
Architectural Coating	60	Air Compressors	37	1	8	0.48	142	461
CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)								***92,973***

4.3.4 CONSTRUCTION TRIPS AND VMT

Construction generates on-road vehicle emissions from vehicle usage for workers and vendors commuting to and from the site. The number of workers and vendor trips are presented below in Table 4-6. It should be noted that for vendor trips specifically, CalEEMod only assigns Vendor Trips to the Building Construction phase. Vendor trips would likely occur during all phases of construction. As such, the CalEEMod defaults for vendor trips have been adjusted based on a ratio of the total vendor trips to the number of days of each subphase of activity. Hauling trips are based on CalEEMod defaults.

TABLE 4-6: CONSTRUCTION TRIPS AND VMT

Construction Activity	Worker Trips Per Day	Vendor Trips Per Day	Hauling Trips Per Day
Site Preparation	18	8	0
Grading	20	32	0
Building Construction	388	95	0
Paving	15	16	0
Architectural Coating	78	0	0

4.3.5 CONSTRUCTION WORKER FUEL ESTIMATES

Based on CalEEMod methodology, it is assumed that 50% of all worker trips are from light-duty-auto vehicles (LDA), 25% are from light-duty-trucks (LDT1[3]), and 25% are from light-duty-trucks (LDT2[4]). Data regarding Project related construction worker trips were based on CalEEMod defaults utilized within the AQIA.

Vehicle fuel efficiencies for LDA, LDT1, and LDT2 were estimated using information generated within the 2021 version of the EMFAC developed by CARB. EMFAC2021 is a mathematical model that was developed to calculate emission rates, fuel consumption, and VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the CARB to project changes in future emissions from on-road mobile sources (25). EMFAC2021 was run for the LDA, LDT1, and LDT2 vehicle class within the Kern (SJV) area for the 2024 and 2025 calendar years. Data from EMFAC2021 is shown in Appendix 4.4.

As shown in Table 4-7, the estimated annual fuel consumption resulting from Project construction worker trips is 58,216 gallons during full construction of the Project. It should be noted that construction worker trips would represent a “single-event” gasoline fuel demand and would not require ongoing or permanent commitment of fuel resources for this purpose.

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[3] Vehicles under the LDT1 category have a gross vehicle weight rating (GVWR) of less than 6,000 lbs. and equivalent test weight (ETW) of less than or equal to 3,750 lbs.

[4] Vehicles under the LDT2 category have a GVWR of less than 6,000 lbs. and ETW between 3,751 lbs. and 5,750 lbs.

TABLE 4-7: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES

Year	Construction Activity	Duration (Days)	Worker Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2024	LDA						
	Site Preparation	30	9	11	2,970	31.46	94
	Grading	120	10	11	13,200	31.46	420
	Building Construction	112	194	11	239,008	31.46	7,596
	LDT1						
	Site Preparation	30	5	11	1,650	24.51	67
	Grading	120	5	11	6,600	24.51	269
	Building Construction	112	97	11	119,504	24.51	4,876
	LDT2						
	Site Preparation	30	5	11	1,650	24.29	68
	Grading	120	5	11	6,600	24.29	272
	Building Construction	112	97	11	119,504	24.29	4,920
2025	LDA						
	Building Construction	248	194	11	529,232	32.55	16,262
	Paving	60	8	11	5,280	32.55	162
	Architectural Coating	60	39	11	25,740	32.55	791
	LDT1						
	Building Construction	248	97	11	264,616	25.06	10,560
	Paving	60	4	11	2,640	25.06	105
	Architectural Coating	60	20	11	13,200	25.06	527
	LDT2						
	Building Construction	248	97	11	264,616	24.98	10,592
	Paving	60	4	11	2,640	24.98	106
	Architectural Coating	60	20	11	13,200	24.98	528
TOTAL CONSTRUCTION WORKER FUEL CONSUMPTION							***58,216***

4.3.6 CONSTRUCTION VENDOR/HAULING FUEL ESTIMATES

It is assumed that 50% of all vendor trips are from medium-heavy duty trucks (MHDT), 50% are from heavy-heavy duty trucks (HHDT), and 100% of all hauling trips are from HHDTs. These assumptions are consistent with the CalEEMod defaults utilized within the AQIA (23). Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within

EMFAC2021. EMFAC2021 was run for the MHDT and HHDT vehicle classes within the Kern (SJV) area for the 2024 and 2025 calendar years. Data from EMFAC2021 is shown in Appendix 4.4.

Based on Table 4-8, it is estimated that 42,288 gallons of fuel will be consumed related to construction vendor trips during full construction of the Project. It should be noted that Project construction vendor trips would represent a "single-event" diesel fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

TABLE 4-8: CONSTRUCTION VENDOR FUEL CONSUMPTION ESTIMATES

Year	Construction Activity	Duration (Days)	Vendor Trips/Day	Trip Length (miles)	VMT	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
2024	MHDT						
	Site Preparation	30	4	7.4	888	7.83	113
	Grading	120	16	7.4	14,208	7.83	1,815
	Building Construction	112	48	7.4	39,782	7.83	5,082
	HHDT (Vendor)						
	Site Preparation	30	4	7.4	888	6.09	146
	Grading	120	16	7.4	14,208	6.09	2,334
	Building Construction	112	48	7.4	39,782	6.09	6,535
2025	MHDT						
	Building Construction	248	48	7.4	88,090	7.98	11,044
	Paving	60	8	7.4	3,552	7.98	445
	HHDT (Vendor)						
	Building Construction	248	48	7.4	88,090	6.20	14,200
	Paving	60	8	7.4	3,552	6.20	573
TOTAL CONSTRUCTION VENDOR FUEL CONSUMPTION							***42,288***

4.3.7 Construction Energy Efficiency/Conservation Measures

Starting in 2014, CARB adopted the nation's first regulation aimed at cleaning up off-road construction equipment such as bulldozers, graders, and backhoes. These requirements ensure fleets gradually turnover the oldest and dirtiest equipment to newer, cleaner models and prevent fleets from adding older, dirtier equipment. As such, the equipment used for Project construction would conform to CARB regulations and California emissions standards. It should also be noted that there are no unusual Project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities; or equipment that would not conform to current emissions standards (and related fuel efficiencies). Equipment employed in the construction of the Project would therefore not result in inefficient wasteful, or unnecessary consumption of fuel.

Construction contractors would be required to comply with applicable CARB regulations regarding retrofitting, repowering, or replacement of diesel off-road construction equipment. Additionally, CARB has adopted the Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other Toxic Air Contaminants. Compliance with anti-idling and emissions regulations would result in a more efficient use of construction-related energy and the minimization or elimination of wasteful or unnecessary consumption of energy. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption.

Additional construction-source energy efficiencies would occur due to required California regulations and best available control measures. For example, CCR Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than five minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. Section 2449(d)(3) requires that "grading plans shall reference the requirement that a sign shall be posted on-site stating that construction workers need to shut off engines at or before five minutes of idling." In this manner, construction equipment operators are required to be informed that engines are to be turned off at, or prior to, five minutes of idling. Enforcement of idling limitations is realized through periodic site inspections conducted by County building officials, and/or in response to citizen complaints.

A full analysis related to the energy needed to form construction materials is not included in this analysis due to a lack of detailed Project-specific information on construction materials. At this time, an analysis of the energy needed to create Project-related construction materials would be extremely speculative and thus has not been prepared.

In general, the construction processes promote conservation and efficient use of energy by reducing raw materials demands, with related reduction in energy demands associated with raw materials extraction, transportation, processing, and refinement. Use of materials in bulk reduces energy demands associated with preparation and transport of construction materials as well as the transport and disposal of construction waste and solid waste in general, with corollary reduced demands on area landfill capacities and energy consumed by waste transport and landfill operations.

4.4 OPERATIONAL ENERGY DEMANDS

Energy consumption in support of, or related to, Project operations would include transportation fuel demands (fuel consumed by passenger car and truck vehicles accessing the Project site), fuel demands from operational equipment, and facilities energy demands (energy consumed by building operations and site maintenance activities).

4.4.1 TRANSPORTATION ENERGY DEMANDS

Energy that would be consumed by Project-generated traffic is a function of total VMT and estimated vehicle fuel economies of vehicles accessing the Project site. The VMT per vehicle class can be determined by evaluating the vehicle fleet mix and the total VMT. As with worker and vendors trips, operational vehicle fuel efficiencies were estimated using information generated within EMFAC2021 developed by CARB (25). EMFAC2021 was run for the Kern (SJV) area for the 2024 and 2025 calendar years. Data from EMFAC2021 is shown in Appendix 4.4.

In order to account for the possibility of refrigerated uses (cold storage), it is assumed that all trucks accessing this land use are presumed to also have transport refrigeration units (TRUs). Therefore, for modeling purposes, 51 trucks (resulting from 102 two-way truck trips) are assumed to be trucks with TRUs. TRUs are also accounted for during on-site and off-site travel. The TRU calculations are based on EMFAC2021.

The estimated transportation energy demands are summarized in Table 4-9. As summarized in Table 4-9, the Project would result in 8,792,827 annual VMT and an estimated annual fuel consumption of 1,045,808 gallons of fuel.

TABLE 4-9: TOTAL PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION

Vehicle Type	Average Vehicle Fuel Economy (mpg)	Annual VMT	Estimated Annual Fuel Consumption (gallons)
LDA	32.55	1,148,030	35,275
LDT1	25.06	99,635	3,976
LDT2	24.98	548,164	21,943
MDV	19.90	509,871	25,616
LHDT1	11.88	869,803	73,227
LHDT2	11.20	274,524	24,509
MHDT	7.98	1,057,635	132,604
HHDT	6.20	4,230,541	681,977
MCY	41.77	54,623	1,308
TRUs			17,724
PROJECT FUEL CONSUMPTION (ALL VEHICLES)		***8,792,827***	***1,045,808***

Annual VMT based on CalEEMod model outputs and vehicle fleet mix.

4.4.2 ON-SITE CARGO HANDLING EQUIPMENT FUEL DEMANDS

It is common for industrial buildings to require the operation of exterior cargo handling equipment in the building's truck court areas. For this particular Project, on-site modeled operational equipment includes up to two (2) 175 horsepower (hp), natural gas-powered cargo handling equipment – port tractor operating 4 hours a day[5] for 365 days of the year.

Project operational activity estimates and associated fuel consumption estimates are based on the annual EMFAC2021 offroad emissions for the 2025 operational year and were used to derive

[5] Based on Table II-3, Port and Rail Cargo Handling Equipment Demographics by Type, from CARB's Technology Assessment: Mobile Cargo Handling Equipment document, a single piece of equipment could operate up to 2 hours per day (Total Average Annual Activity divided by Total Number Pieces of Equipment). As such, the analysis conservatively assumes that the tractor/loader/backhoe would operate up to 4 hours per day.

the total annual fuel consumption associated on-site equipment. As presented in Table 4-10, Project on-site equipment would consume an estimated 9,284 gallons of natural gas.

TABLE 4-10: ON-SITE CARGO HANDLING EQUIPMENT FUEL CONSUMPTION ESTIMATES

Equipment	Quantity	Usage Hours	Days of Operation	EMFAC2021 Fuel Consumption (gal./yr.)	EMFAC2021 Activity (hrs./yr.)	Total Fuel Consumption
Cargo Handling Equipment	2	4	365	18,339	5,768	9,284
ON-SITE CARGO HANDLING EQUIPMENT FUEL DEMAND (GALLONS FUEL)						***9,284***

4.4.3 EMERGENCY ENGINE FUEL DEMANDS

It is anticipated that the Project would utilize two 300 horsepower diesel-powered emergency fire pumps. For analytical purposes, it is anticipated that the fire pumps would each operate for a maximum time of 1 hour per day and 50 hours per year for maintenance and testing purposes. As presented in Table 4-11, emergency engine operation for maintenance and testing purposes would consume an estimated 1,130 gallons of diesel fuel per year.

TABLE 4-11: EMERGENCY ENGINE FUEL CONSUMPTION ESTIMATES

Equipment	Horsepower	Fuel Consumption (gal./hour)	Activity (hrs./yr.)	Total Fuel Consumption (gal./year)
Emergency Fire Pump	300	11	50	565
Emergency Fire Pump	300	11	50	565
EMERGENCY ENGINE FUEL DEMAND (GALLONS FUEL)				***1,130***

4.4.4 TURBINE FUEL DEMANDS

It is anticipated that the Project would utilize two natural gas-powered turbines. For analytical purposes, it is anticipated that the turbines would each operate for a maximum time of 1 hour per day and 100 hours per year for maintenance and testing purposes. As presented in Table 4-12, microturbine operation for maintenance and testing purposes would consume an estimated 1,140,000 kBTU of natural gas per year.

TABLE 4-12: TURBINE FUEL CONSUMPTION ESTIMATES

Equipment	Fuel Consumption (kBTU/hour)	Activity (hrs./yr.)	Total Fuel Consumption (kBTU/year)
Microturbine	11,400	50	570,000
Microturbine	11,400	50	570,000
MICROTURBINE FUEL DEMAND (kBTU)			***1,140,000***

4.4.5 FACILITY ENERGY DEMANDS

Project building operations activities would result in the consumption of natural gas and electricity, which would be supplied to the Project by SoCal Gas and PG&E. Electricity usage associated with the Project was calculated based on CalEEMod defaults. As summarized in Table 4-13, the Project would result in 5,772,220 kBTU/year of natural gas and 13,229,854 kWh/year of electricity.

TABLE 4-13: PROJECT ANNUAL OPERATIONAL ENERGY DEMAND SUMMARY

Land Use	**Natural Gas Demand** (kBTU/year)	**Electricity Demand** (kWh/year)
High-Cube Transload Warehouse	3,939,270	7,931,354
High-Cube Cold Storage Warehouse	692,950	4,533,803
Parking Lot	0	764,698
Microturbines	1,140,000	0
PROJECT ENERGY DEMAND	***5,772,220***	***13,229,854***

4.4.6 OPERATIONAL ENERGY EFFICIENCY/CONSERVATION MEASURES

Energy efficiency/energy conservation attributes of the Project would be complemented by increasingly stringent state and federal regulatory actions addressing vehicle fuel economies and vehicle emissions standards; and enhanced building/utilities energy efficiencies mandated under California building codes (e.g., Title 24, California Green Building Standards Code).

ENHANCED VEHICLE FUEL EFFICIENCIES

Project annual fuel consumption estimates presented previously in Table 4-9 represent likely potential maximums that would occur for the Project. Under subsequent future conditions, average fuel economies of vehicles accessing the Project site can be expected to improve as older, less fuel-efficient vehicles are removed from circulation, and in response to fuel economy and emissions standards imposed on newer vehicles entering the circulation system.

Enhanced fuel economies realized pursuant to federal and state regulatory actions, and related transition of vehicles to alternative energy sources (e.g., electricity, natural gas, biofuels, hydrogen cells) would likely decrease future gasoline fuel demands per VMT. The location of the Project proximate to regional and local roadway systems tends to reduce VMT within the region, acting to reduce regional vehicle energy demands.

4.5 SUMMARY

4.5.1 CONSTRUCTION ENERGY DEMANDS

The estimated power cost of on-site electricity usage during the construction of the Project is assumed to be approximately $131,862.97. Additionally, based on the assumed power cost, it is estimated that the total electricity usage during construction, after full Project build-out, is calculated to be approximately 470,939 kWh.

Construction equipment used by the Project would result in single event consumption of approximately 92,973 gallons of diesel fuel. Construction equipment use of fuel would not be atypical for the type of construction proposed because there are no aspects of the Project's proposed construction process that are unusual or energy-intensive, and Project construction equipment would conform to the applicable CARB emissions standards, acting to promote equipment fuel efficiencies.

CCR Title 13, Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than 5 minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. Best Available Control Measures (BACMs) inform construction equipment operators of this requirement. Enforcement of idling limitations is realized through periodic site inspections conducted by County building officials, and/or in response to citizen complaints.

Construction worker trips for full construction of the Project would result in the estimated fuel consumption of 58,216 gallons of fuel. Additionally, fuel consumption from construction vendor and hauling trips (MHDTs and HHDTs) would total approximately 42,288 gallons. Diesel fuel would be supplied by County and regional industrial vendors. Indirectly, construction energy efficiency and energy conservation would be achieved using bulk purchases, transport and use of construction materials. The 2022 IEPR released by the CEC has shown that fuel efficiencies are getting better within on and off-road vehicle engines due to more stringent government requirements (30). As supported by the preceding discussions, Project construction energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

4.5.2 OPERATIONAL ENERGY DEMANDS

TRANSPORTATION ENERGY DEMANDS

Annual vehicular trips and related VMT generated by the operation of the Project would result in a fuel demand of 8,792,827 annual VMT and 1,045,808 gallons of fuel per year during operations.

Fuel would be provided by current and future industrial vendors. Trip generation and VMT generated by the Project are consistent with other industrial uses of similar scale and configuration. As such, Project operations would not result in excessive and wasteful vehicle trips and VMT, nor excess and wasteful vehicle energy consumption compared to other industrial uses.

It should be noted that the state strategy for the transportation sector for medium and heavy-duty trucks is focused on making trucks more efficient and expediting truck turnover rather than reducing VMT from trucks. This is in contrast to the passenger vehicle component of the transportation sector where both per-capita VMT reductions and an increase in vehicle efficiency are forecasted to be needed to achieve the overall state emissions reductions goals.

Heavy duty trucks involved in goods movements are generally controlled on the technology side and through fleet turnover of older trucks and engines to newer and cleaner trucks and engines.

The first battery-electric heavy-heavy duty trucks are being tested this year and SJVAPCD is looking to integrate this new technology into large-scale truck operations. The following state strategies reduce GHG emissions from the medium and heavy-duty trucks:

- CARB's Mobile Source Strategy focuses on reducing GHGs through the transition to zero and low emission vehicles and from medium-duty and heavy-duty trucks.
- CARB's Sustainable Freight Action Plan establishes a goal to improve freight efficiency by 25 percent by 2030, deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize both zero and near-zero emission freight vehicles and equipment powered by renewable energy by 2030.
- CARB's Emissions Reduction Plan for Ports and Goods Movement (Goods Movement Plan) in California focuses on reducing heavy-duty truck-related emissions focus on establishment of emissions standards for trucks, fleet turnover, truck retrofits, and restriction on truck idling (CARB 2006). While the focus of Goods Movement Plan is to reduce criteria air pollutant and air toxic emissions, the strategies to reduce these pollutants would also generally have a beneficial effect in reducing GHG emissions.
- CARB's On-Road Truck and Bus Regulation (2010) requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet particulate matter filter requirements beginning January 1, 2012. Lighter and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses would need to have 2010 model year engines or equivalent (31).
- CARB's Heavy-Duty (Tractor-Trailer) GHG Regulation requires SmartWay tractor trailers that include idle-reduction technologies, aerodynamic technologies, and low-rolling resistant tires that would reduce fuel consumption and associated GHG emissions.

Enhanced fuel economies realized pursuant to federal and state regulatory actions, and related transition of vehicles to alternative energy sources (e.g., electricity, natural gas, biofuels, hydrogen cells) would likely decrease future gasoline fuel demands per VMT. The location of the Project proximate to regional and local roadway systems tends to reduce VMT within the region, acting to reduce regional vehicle energy demands. The Project would implement sidewalks, facilitating and encouraging pedestrian access. Facilitating pedestrian and bicycle access would reduce VMT and associated energy consumption. In compliance with the California Green Building Standards Code and County requirements, the Project would promote the use of bicycles as an alternative means of transportation by providing short-term and/or long-term bicycle parking accommodations. As supported by the preceding discussions, Project transportation energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

ON-SITE CARGO HANDLING EQUIPMENT FUEL DEMANDS

As previously stated, it is common for industrial buildings to require the operation of exterior cargo handling equipment in the building's truck court areas. On-site cargo handling equipment used by the Project would result in approximately 9,284 gallons of natural gas. On-site equipment use of fuel would not be atypical for the type of construction proposed because there are no aspects of the Project's proposed operations that are unusual or energy-intensive, and Project on-site equipment would conform to the applicable CARB emissions standards, acting to promote equipment fuel efficiencies.

EMERGENCY ENGINE FUEL DEMANDS

The proposed Project is expected to include the installation of two diesel-powered emergency fire pumps. Operation of these engines for maintenance and testing purposes is estimated to result in annual fuel demand of approximately 1,130 gallons.

TURBINE FUEL DEMANDS

The proposed Project is expected to include the installation of two natural gas-powered turbines. Operation of these turbines for maintenance and testing purposes is estimated to result in annual fuel demand of approximately 1,140,000 kBTU of natural gas per year.

FACILITY ENERGY DEMANDS

Project facility operational energy demands are estimated at: 5,772,220 kBTU/year of natural gas and 13,229,854 kWh/year of electricity. Natural gas would be supplied to the Project by SoCalGas; electricity would be supplied by PG&E. The Project proposes conventional industrial uses reflecting contemporary energy efficient/energy conserving designs and operational programs. The Project does not propose uses that are inherently energy intensive and the energy demands in total would be comparable to other industrial uses of similar scale and configuration.

Implementation of the Project would increase the demand for electricity at the Project site and petroleum consumption in the region during operation. However, the electrical consumption demands of the Project during operation would conform to the state's Title 24 and to CALGreen standards, which implement conservation measures. Further, the proposed Project would not directly require the construction of new energy generation or supply facilities and providers of electricity are in compliance with regulatory requirements that assist in conservation, including requirements that electrical providers achieve state-mandated renewal energy production requirements. With compliance with Title 24 conservation standards and other regulatory requirements, the Project would not be wasteful or inefficient or unnecessarily consume energy resources during construction or operation.

Lastly, the Project will comply with the applicable Title 24 standards. Compliance itself with applicable Title 24 standards will ensure that the Project energy demands would not be inefficient, wasteful, or otherwise unnecessary.

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5 ENERGY FINDINGS AND RECOMMENDATIONS

5.1 ENERGY IMPACT 1

Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Impact Analysis

A significant impact would occur if the proposed Project would result in the inefficient, wasteful, or unnecessary use of energy.

Construction

Based on CalEEMod estimations within the modeling output files used to estimate GHG emissions associated with future development projects, construction-related vehicle trips would consume an estimated 100,504 gallons of gasoline and diesel combined during future development projects construction phases. Limitations on idling of vehicles and equipment and requirements that equipment be properly maintained would result in fuel savings. California Code of Regulations, Title 13, Sections 2449 and 2485, limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. Additionally, given the cost of fuel, contractors and owners have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy during construction.

Due to the temporary nature of construction and the financial incentives for developers and contractors to use energy-consuming resources in an efficient manner, the construction phase of the proposed Project would not result in wasteful, inefficient, and unnecessary consumption of energy.

Operation

Electricity and Natural Gas

Operation of the proposed Project would consume energy as part of building operations and transportation activities. Building operations would involve energy consumption for multiple purposes including, but not limited to, building heating and cooling, refrigeration, lighting, and electronics. Based on client-provided energy use estimations, operations for the Project would result in approximately 5,772,220 kBTU/year of natural gas and 13,229,854 kWh/year of electricity.

Future development projects would be designed and constructed in accordance with the County's latest adopted energy efficiency standards, which are based on the California Title 24 energy efficiency standards. Title 24 standards include a broad set of energy conservation requirements that apply to the structural, mechanical, electrical, and plumbing systems in a building. For example, the Title 24 Lighting Power Density requirements define the maximum wattage of lighting that can be used in a building based on its square footage. Title 24 standards are widely regarded as the most advanced energy efficiency standards, would help reduce the amount of energy required for lighting, water heating, and heating and air conditioning in buildings and promote energy conservation.

Fuel

Operational energy would also be consumed during vehicle trips associated with future development projects envisioned under the proposed Project. Fuel consumption would be primarily related to vehicle use by residents, visitors, and employees associated with future development projects. Based on CalEEMod energy use estimations, project-related vehicle trips would result in approximately 8,792,827 VMT and consume an estimated 1,045,808 gallons of gasoline and diesel combined, annually (see Appendix 4.3).

The Project is located on an infill site that is surrounded by existing urban uses, the existing transportation facilities and infrastructure would provide future residents, visitors, and employees associated with the Project access to a mix of land uses in close proximity to the Project, thus further reducing fuel consumption demand. Additionally, the Project will also provide parking and EV infrastructure that would further promote fuel efficient vehicles.

5.2 ENERGY IMPACT 2

Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Impact Analysis

A significant impact would occur if the proposed Project would conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

Construction

As discussed in Section 5.1, above, the proposed Project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment, and the use of electricity for temporary buildings, lighting, and other sources. California Code of Regulations Title 13, Sections 2449 and 2485, limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. The proposed Project would comply with these regulations. There are no policies at the local level applicable to energy conservation specific to the construction phase. Thus, it is anticipated that construction of the proposed Project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy.

Operation

California's Renewable Portfolio Standard (RPS) establishes a goal of renewable energy for local providers to be 44 percent by 2040. Similarly, the State is promoting renewable energy targets to meet the 2022 Scoping Plan greenhouse gas emissions reductions. As discussed in Section 5.1 above, the Project would result in approximately 5,772,220 kBTU/year of natural gas and 13,229,854 kWh/year of electricity.

Future development projects would be designed and constructed in accordance with the County's latest adopted energy efficiency standards, which are based on the California Title 24 energy efficiency standards. Title 24 standards include a broad set of energy conservation requirements that apply to the structural, mechanical, electrical, and plumbing systems in a building. For example, the Title 24 Lighting Power Density requirements define the maximum wattage of lighting that can be used in a building based on its square footage. Title 24 standards, widely regarded as the most advanced energy efficiency standards, would help reduce the amount of energy required for lighting, water heating, and heating and air conditioning in buildings and promote energy conservation.

Compliance with the aforementioned mandatory measures would ensure that future development projects would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy.

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6 REFERENCES

1. **Administration, U.S. Energy Information.** California State Profile and Energy Estimates. [Online] https://www.eia.gov/state/data.php?sid=CA#ConsumptionExpenditures.
2. **U.S. Energy Information Administration.** Use of Energy in the United States Explained Energy Use for Transportation. [Online] https://www.eia.gov/energyexplained/use-of-energy/transportation.php.
3. —. Use of Energy in the United States Explained Energy Use for Transportation. [Online] https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTPUPUS1&f=A.
4. —. Prime Supplier Sales Volume, California, Annual. [Online] 2020. https://www.eia.gov/dnav/pet/pet_cons_prim_dcu_SCA_a.htm.
5. —. California Energy Consumption by End-Use Sector. *California State Profile and Energy Estimates.* [Online] https://www.eia.gov/state/?sid=CA#tabs-2.
6. —. California State Profile and Energy Estimates. [Online] https://www.eia.gov/state/seds/sep_fuel/html/pdf/fuel_use_es.pdf.
7. —. California State Profile and Energy Estimates. [Online] https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm.
8. **California Energy Commission.** 2022 Total System Electric Generation. *CA.gov.* [Online] https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2022-total-system-electric-generation.
9. **U.S. Energy Information Administration.** California State Profile and Energy Estimates. [Online] https://www.eia.gov/state/?sid=CA.
10. **California Energy Commission Staff.** 2022 Integrated Energy Policy Report Update. [Online] 2022. https://www.energy.ca.gov/sites/default/files/2023-02/Adopted_2022_IEPR_Update_with_errata_ada.pdf.
11. **California ISO.** Understanding the ISO. [Online] http://www.caiso.com/about/Pages/OurBusiness/UnderstandingtheISO/default.aspx.
12. **Pacific Gas & Electric.** *Pacific Gas & Electric's Service Area.* [Online] https://www.pge.com/en/about/company-information/company-profile.html#:~:text=Fast%20facts%20about%20PG%26E&text=The%20company%20provides%20natural%20gas,in%20northern%20and%20central%20California..
13. —. 2022 Power Content Label. [Online] https://www.pge.com/content/dam/pge/docs/account/billing-and-assistance/bill-inserts/1023-Power-Content-Label.pdf.
14. **California Public Utilities Commission.** Natural Gas and California. [Online] https://www.cpuc.ca.gov/industries-and-topics/natural-gas/natural-gas-and-california.
15. **United States Energy Information Administration.** California Analysis. *Energy Information Administration.* [Online] https://www.eia.gov/beta/states/states/ca/analysis.
16. **Department of Motor Vehicles.** *State of California Department of Motor Vehicles Statistics For Publication January Through December 2021.* 2021.
17. **U.S. Energy Information Administration.** California Analysis. *Energy Information Administration.* [Online] https://www.eia.gov/beta/states/states/ca/analysis.

18. **California Energy Commission.** Energy Commission Adopts Updated Building Standards to Improve Efficiency, Reduce Emissions from Homes and Businesses. [Online] August 11, 2021. https://www.energy.ca.gov/news/2021-08/energy-commission-adopts-updated-building-standards-improve-efficiency-reduce-0.

19. **California Department of General Services.** 2022 CALGreen Code. *CALGreen.* [Online] https://codes.iccsafe.org/content/CAGBC2022P1.

20. **California Energy Commission.** Renewables Portfolio Standard (RPS). [Online] 2002. http://www.energy.ca.gov/portfolio/.

21. **State of California.** *California Environmental Quality Act Guideline, California Public Resources Code, Title 14, Division 6, Chapter 3.*

22. **Association of Environmental Professionals.** *2019 CEQA California Environmental Quality Act.* 2019.

23. **Urban Crossroads, Inc.** *Airport Drive Warehouse Air Quality Impact Analysis.* 2024.

24. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] May 2022. www.caleemod.com.

25. **California Department of Transportation.** EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.

26. **State of California.** *2024 CEQA California Environmental Quality Act.* 2024.

27. **Pray, Richard.** *2024 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2024.

28. **Pacific Gas & Electric.** Electric Rates. [Online] https://www.pge.com/tariffs/electric.shtml.

29. **California Air Resources Board.** *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects For Evaluating Motor Vehicle Registration Fee Projects And Congestion Mitigation and Air Quality Improvement (CMAQ) Projects, Emission Factor Tables.* 2018.

30. **California Energy Commission Staff.** 2019 Integrated Energy Policy Report Update. [Online] 2019. [Cited: March 26, 2020.] https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2019-integrated-energy-policy-report.

31. **California Air Resources Board.** Truck and Bus Regulation. [Online] https://ww2.arb.ca.gov/our-work/programs/truck-and-bus-regulation.

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7 CERTIFICATIONS

The contents of this energy report represent an accurate depiction of the environmental impacts associated with the proposed Airport Drive Warehouse. The information contained in this energy report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at hqureshi@urbanxroads.com.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Professionals
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June, 2013
Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – CARB • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 4.1:

CALEEMOD CONSTRUCTION EMISSIONS MODEL OUTPUTS - UNMITIGATED

15369 Airport Drive Warehouse Construction Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	15369 Airport Drive Warehouse Construction
Construction Start Date	1/1/2024
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	18.0
Location	35.43251328711992, -119.04161199950366
County	Kern-San Joaquin
City	Unincorporated
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2899
EDFZ	5
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Southern California Gas
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Unrefrigerated Warehouse-No Rail	739	1000sqft	17.0	738,500	359,286	—	—	—

Refrigerated Warehouse-No Rail	185	1000sqft	4.24	184,600	0.00	—	—	—
Parking Lot	20.0	Acre	20.0	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.00	80.6	38.6	51.4	0.07	1.78	4.43	5.32	1.64	1.07	2.71	—	11,054	11,054	0.41	0.57	21.8	11,258
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.44	80.3	42.8	44.8	0.07	2.25	5.85	8.10	2.07	2.73	4.81	—	10,550	10,550	0.33	0.57	0.57	10,730
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.08	14.7	21.4	23.6	0.04	0.95	2.58	3.52	0.87	0.84	1.72	—	5,837	5,837	0.21	0.34	5.55	5,948
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.56	2.67	3.90	4.30	0.01	0.17	0.47	0.64	0.16	0.15	0.31	—	966	966	0.03	0.06	0.92	985

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	4.84	4.07	38.6	37.0	0.07	1.78	3.61	4.81	1.64	1.07	2.71	—	8,309	8,309	0.30	0.48	19.2	8,478
2025	5.00	80.6	24.6	51.4	0.06	0.89	4.43	5.32	0.82	1.07	1.89	—	11,054	11,054	0.41	0.57	21.8	11,258
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	5.44	4.57	42.8	36.1	0.07	2.25	5.85	8.10	2.07	2.73	4.81	—	7,892	7,892	0.33	0.48	0.50	8,042
2025	4.72	80.3	25.1	44.8	0.06	0.89	4.43	5.32	0.82	1.07	1.89	—	10,550	10,550	0.32	0.57	0.57	10,730
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.08	2.62	21.4	23.6	0.04	0.95	2.58	3.52	0.87	0.84	1.72	—	5,466	5,466	0.21	0.21	2.99	5,537
2025	2.43	14.7	12.1	23.3	0.03	0.40	2.57	2.97	0.37	0.62	0.99	—	5,837	5,837	0.16	0.34	5.55	5,948
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.56	0.48	3.90	4.30	0.01	0.17	0.47	0.64	0.16	0.15	0.31	—	905	905	0.03	0.03	0.49	917
2025	0.44	2.67	2.20	4.25	0.01	0.07	0.47	0.54	0.07	0.11	0.18	—	966	966	0.03	0.06	0.92	985

3. Construction Emissions Details

3.1. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	5.35	4.49	42.5	35.3	0.05	2.25	—	2.25	2.07	—	2.07	—	5,529	5,529	0.22	0.04	—	5,548
Dust From Material Movement	—	—	—	—	—	—	5.66	5.66	—	2.69	2.69	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	0.37	3.49	2.90	< 0.005	0.19	—	0.19	0.17	—	0.17	—	454	454	0.02	< 0.005	—	456
Dust From Material Movement	—	—	—	—	—	—	0.47	0.47	—	0.22	0.22	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	0.64	0.53	< 0.005	0.03	—	0.03	0.03	—	0.03	—	75.2	75.2	< 0.005	< 0.005	—	75.5
Dust From Material Movement	—	—	—	—	—	—	0.08	0.08	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.07	0.71	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	136	136	0.01	0.01	0.02	138
Vendor	0.01	0.01	0.26	0.09	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.02	—	189	189	< 0.005	0.03	0.01	197
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.02	11.8
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.5	15.5	< 0.005	< 0.005	0.02	16.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	1.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.68
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.69	3.94	37.6	31.4	0.06	1.77	—	1.77	1.63	—	1.63	—	6,715	6,715	0.27	0.05	—	6,738
Dust From Material Movement	—	—	—	—	—	—	2.67	2.67	—	0.98	0.98	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	4.69	3.94	37.6	31.4	0.06	1.77	—	1.77	1.63	—	1.63	—	6,715	6,715	0.27	0.05	—	6,738
Dust From Material Movement	—	—	—	—	—	—	2.67	2.67	—	0.98	0.98	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.54	1.30	12.4	10.3	0.02	0.58	—	0.58	0.54	—	0.54	—	2,208	2,208	0.09	0.02	—	2,215
Dust From Material Movement	—	—	—	—	—	—	0.88	0.88	—	0.32	0.32	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	0.24	2.25	1.88	< 0.005	0.11	—	0.11	0.10	—	0.10	—	366	366	0.01	< 0.005	—	367
Dust From Material Movement	—	—	—	—	—	—	0.16	0.16	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	0.06	1.12	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	177	177	0.01	0.01	0.68	180

Vendor	0.04	0.03	0.97	0.37	0.01	0.01	0.20	0.21	0.01	0.05	0.07	—	755	755	0.01	0.11	2.02	790
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.08	0.82	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	156	156	0.01	0.01	0.02	158
Vendor	0.04	0.03	1.04	0.37	0.01	0.01	0.20	0.21	0.01	0.05	0.07	—	756	756	0.01	0.11	0.05	789
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.28	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	53.1	53.1	< 0.005	< 0.005	0.10	54.0
Vendor	0.01	0.01	0.33	0.12	< 0.005	< 0.005	0.06	0.07	< 0.005	0.02	0.02	—	248	248	< 0.005	0.04	0.29	259
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.80	8.80	< 0.005	< 0.005	0.02	8.93
Vendor	< 0.005	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	41.1	41.1	< 0.005	0.01	0.05	43.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.55	1.30	12.2	14.2	0.03	0.54	—	0.54	0.49	—	0.49	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.55	1.30	12.2	14.2	0.03	0.54	—	0.54	0.49	—	0.49	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	0.40	3.76	4.40	0.01	0.17	—	0.17	0.15	—	0.15	—	813	813	0.03	0.01	—	816
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.07	0.69	0.80	< 0.005	0.03	—	0.03	0.03	—	0.03	—	135	135	0.01	< 0.005	—	135
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	2.03	1.90	1.24	21.6	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,437	3,437	0.16	0.13	13.2	3,493
Vendor	0.13	0.08	2.88	1.08	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,242	2,242	0.03	0.33	6.00	2,345
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.70	1.56	1.58	15.8	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,017	3,017	0.20	0.13	0.34	3,061
Vendor	0.12	0.08	3.08	1.11	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,244	2,244	0.03	0.33	0.16	2,342
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.53	0.49	0.45	5.15	0.00	0.00	0.92	0.92	0.00	0.22	0.22	—	969	969	0.06	0.04	1.76	984
Vendor	0.04	0.02	0.93	0.34	< 0.005	0.01	0.18	0.19	0.01	0.05	0.06	—	693	693	0.01	0.10	0.80	724
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.08	0.94	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	160	160	0.01	0.01	0.29	163
Vendor	0.01	< 0.005	0.17	0.06	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	115	115	< 0.005	0.02	0.13	120
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.45	1.21	11.3	14.1	0.03	0.47	—	0.47	0.43	—	0.43	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.45	1.21	11.3	14.1	0.03	0.47	—	0.47	0.43	—	0.43	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.99	0.83	7.71	9.63	0.02	0.32	—	0.32	0.29	—	0.29	—	1,791	1,791	0.07	0.01	—	1,797

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	0.15	1.41	1.76	< 0.005	0.06	—	0.06	0.05	—	0.05	—	297	297	0.01	< 0.005	—	298
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.82	1.70	1.13	19.8	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,361	3,361	0.16	0.13	12.0	3,416
Vendor	0.11	0.08	2.77	1.03	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,200	2,200	0.03	0.33	5.96	2,304
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.61	1.47	1.37	14.5	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	2,952	2,952	0.09	0.13	0.31	2,993
Vendor	0.10	0.08	2.96	1.06	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,203	2,203	0.03	0.33	0.15	2,301
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.11	1.02	0.85	10.4	0.00	0.00	2.04	2.04	0.00	0.48	0.48	—	2,088	2,088	0.05	0.09	3.52	2,118
Vendor	0.07	0.05	1.97	0.71	0.01	0.02	0.40	0.42	0.02	0.11	0.13	—	1,499	1,499	0.02	0.22	1.76	1,567
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.20	0.19	0.15	1.90	0.00	0.00	0.37	0.37	0.00	0.09	0.09	—	346	346	0.01	0.01	0.58	351
Vendor	0.01	0.01	0.36	0.13	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	248	248	< 0.005	0.04	0.29	259
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.95	0.80	7.45	9.98	0.01	0.35	—	0.35	0.32	—	0.32	—	1,511	1,511	0.06	0.01	—	1,517
Paving	—	0.88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.95	0.80	7.45	9.98	0.01	0.35	—	0.35	0.32	—	0.32	—	1,511	1,511	0.06	0.01	—	1,517
Paving	—	0.88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.13	1.23	1.64	< 0.005	0.06	—	0.06	0.05	—	0.05	—	248	248	0.01	< 0.005	—	249
Paving	—	0.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.22	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	41.1	41.1	< 0.005	< 0.005	—	41.3
Paving	—	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.04	0.77	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	130	130	0.01	< 0.005	0.46	132
Vendor	0.02	0.01	0.47	0.17	< 0.005	0.01	0.10	0.10	0.01	0.03	0.03	—	371	371	< 0.005	0.05	1.00	388
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.56	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	114	114	< 0.005	< 0.005	0.01	116
Vendor	0.02	0.01	0.50	0.18	< 0.005	0.01	0.10	0.10	0.01	0.03	0.03	—	371	371	< 0.005	0.05	0.03	387
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	19.5	19.5	< 0.005	< 0.005	0.03	19.8
Vendor	< 0.005	< 0.005	0.08	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	60.9	60.9	< 0.005	0.01	0.07	63.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.23	3.23	< 0.005	< 0.005	0.01	3.28
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.1	10.1	< 0.005	< 0.005	0.01	10.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	75.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	75.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.19	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	29.3	29.3	< 0.005	< 0.005	—	29.4
Architectural Coatings	—	12.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.85	4.85	< 0.005	< 0.005	—	4.86
Architectural Coatings	—	2.26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.36	0.34	0.23	3.96	0.00	0.00	0.60	0.60	0.00	0.14	0.14	—	672	672	0.03	0.03	2.39	683
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.27	2.90	0.00	0.00	0.60	0.60	0.00	0.14	0.14	—	590	590	0.02	0.03	0.06	599
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.50	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	101	101	< 0.005	< 0.005	0.17	102
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	16.7	16.7	< 0.005	< 0.005	0.03	16.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/1/2024	2/11/2024	5.00	30.0	—
Grading	Grading	2/12/2024	7/26/2024	5.00	120	—
Building Construction	Building Construction	7/27/2024	12/14/2025	5.00	360	—
Paving	Paving	9/20/2025	12/14/2025	5.00	60.0	—
Architectural Coating	Architectural Coating	9/20/2025	12/14/2025	5.00	60.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Crawler Tractors	Diesel	Average	4.00	8.00	87.0	0.43
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Grading	Crawler Tractors	Diesel	Average	2.00	8.00	87.0	0.43
Building Construction	Cranes	Diesel	Average	1.00	8.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20

Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	11.0	LDA,LDT1,LDT2
Site Preparation	Vendor	8.00	7.37	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	11.0	LDA,LDT1,LDT2
Grading	Vendor	32.0	7.37	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	388	11.0	LDA,LDT1,LDT2
Building Construction	Vendor	95.0	7.37	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT

Paving	—	—	—	—
Paving	Worker	15.0	11.0	LDA,LDT1,LDT2
Paving	Vendor	16.0	7.37	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	77.5	11.0	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	7.37	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	1,384,650	461,550	52,377

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	105	0.00	—
Grading	—	—	480	0.00	—
Paving	0.00	0.00	0.00	0.00	20.0

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	3	74%	74%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Unrefrigerated Warehouse-No Rail	0.00	0%
Refrigerated Warehouse-No Rail	0.00	0%
Parking Lot	20.0	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	204	0.03	< 0.005
2025	0.00	204	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	20.5	annual days of extreme heat
Extreme Precipitation	0.10	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score

Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	0	0	0	N/A
Drought	0	0	0	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	1	1	1	2
Drought	1	1	1	2
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	91.1
AQ-PM	99.0
AQ-DPM	38.0
Drinking Water	96.2
Lead Risk Housing	33.6
Pesticides	75.3
Toxic Releases	19.3
Traffic	37.5
Effect Indicators	—
CleanUp Sites	88.9
Groundwater	82.6
Haz Waste Facilities/Generators	95.3
Impaired Water Bodies	0.00
Solid Waste	59.2
Sensitive Population	—
Asthma	82.4
Cardio-vascular	89.0
Low Birth Weights	48.0
Socioeconomic Factor Indicators	—

Education	41.2
Housing	45.0
Linguistic	17.3
Poverty	73.2
Unemployment	85.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	54.39496984
Employed	40.16424997
Median HI	43.94969845
Education	—
Bachelor's or higher	29.56499423
High school enrollment	100
Preschool enrollment	17.59271141
Transportation	—
Auto Access	42.71782369
Active commuting	5.607596561
Social	—
2-parent households	42.25587065
Voting	35.2239189
Neighborhood	—
Alcohol availability	52.64981394
Park access	44.96342872
Retail density	27.46054151

Supermarket access	55.46002823
Tree canopy	33.86372385
Housing	—
Homeownership	36.39163352
Housing habitability	49.90375978
Low-inc homeowner severe housing cost burden	68.61285769
Low-inc renter severe housing cost burden	45.06608495
Uncrowded housing	68.66418581
Health Outcomes	—
Insured adults	38.07262928
Arthritis	0.0
Asthma ER Admissions	14.3
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	2.4
Cognitively Disabled	33.5
Physically Disabled	16.6
Heart Attack ER Admissions	12.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	44.9
Physical Health Not Good	0.0

Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	9.0
Elderly	73.1
English Speaking	87.1
Foreign-born	2.9
Outdoor Workers	28.2
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.7
Traffic Density	31.8
Traffic Access	0.0
Other Indices	—
Hardship	49.2
Other Decision Support	—
2016 Voting	31.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	88.0
Healthy Places Index Score for Project Location (b)	36.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes

Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Construction schedule adjusted based on info provided by the applicant.
Construction: Off-Road Equipment	All equipment is assumed to operate 8 hours per day
Construction: Trips and VMT	Vendor trips assigned to site prep, grading, and paving phases based on phase length

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APPENDIX 4.2:

CALEEMOD CONSTRUCTION EMISSIONS MODEL OUTPUTS - MITIGATED

15369 Airport Drive Warehouse Construction Mitigated Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	15369 Airport Drive Warehouse Construction Mitigated
Construction Start Date	1/1/2024
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	18.0
Location	35.43251328711992, -119.04161199950366
County	Kern-San Joaquin
City	Unincorporated
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2899
EDFZ	5
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Southern California Gas
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Unrefrigerated Warehouse-No Rail	739	1000sqft	17.0	738,500	359,286	—	—	—

Refrigerated Warehouse-No Rail	185	1000sqft	4.24	184,600	0.00	—	—	—
Parking Lot	20.0	Acre	20.0	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.76	79.7	22.6	54.2	0.07	0.29	4.43	4.73	0.28	1.07	1.35	—	11,054	11,054	0.41	0.57	21.8	11,258
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.49	79.4	23.1	47.7	0.07	0.29	5.85	5.95	0.28	2.73	2.84	—	10,550	10,550	0.33	0.57	0.57	10,730
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.82	14.2	12.5	25.4	0.04	0.12	2.58	2.70	0.12	0.84	0.96	—	5,837	5,837	0.21	0.34	5.55	5,948
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.33	2.59	2.29	4.63	0.01	0.02	0.47	0.49	0.02	0.15	0.17	—	966	966	0.03	0.06	0.92	985

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	2.83	2.59	20.4	39.1	0.07	0.19	3.61	3.77	0.18	1.07	1.26	—	8,309	8,309	0.30	0.48	19.2	8,478
2025	3.76	79.7	22.6	54.2	0.06	0.29	4.43	4.73	0.28	1.07	1.35	—	11,054	11,054	0.41	0.57	21.8	11,258
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	2.49	2.25	20.5	37.4	0.07	0.19	5.85	5.95	0.18	2.73	2.84	—	7,892	7,892	0.33	0.48	0.50	8,042
2025	3.49	79.4	23.1	47.7	0.06	0.29	4.43	4.73	0.28	1.07	1.35	—	10,550	10,550	0.32	0.57	0.57	10,730
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	1.22	1.12	12.5	25.4	0.04	0.12	2.58	2.70	0.12	0.84	0.96	—	5,466	5,466	0.21	0.21	2.99	5,537
2025	1.82	14.2	11.0	24.9	0.03	0.12	2.57	2.69	0.12	0.62	0.74	—	5,837	5,837	0.16	0.34	5.55	5,948
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.22	0.20	2.29	4.63	0.01	0.02	0.47	0.49	0.02	0.15	0.17	—	905	905	0.03	0.03	0.49	917
2025	0.33	2.59	2.01	4.54	0.01	0.02	0.47	0.49	0.02	0.11	0.13	—	966	966	0.03	0.06	0.92	985

3. Construction Emissions Details

3.1. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.68	0.68	15.7	30.0	0.05	0.10	—	0.10	0.10	—	0.10	—	5,529	5,529	0.22	0.04	—	5,548
Dust From Material Movement	—	—	—	—	—	—	5.66	5.66	—	2.69	2.69	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.06	1.29	2.46	< 0.005	0.01	—	0.01	0.01	—	0.01	—	454	454	0.02	< 0.005	—	456
Dust From Material Movement	—	—	—	—	—	—	0.47	0.47	—	0.22	0.22	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.24	0.45	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	75.2	75.2	< 0.005	< 0.005	—	75.5
Dust From Material Movement	—	—	—	—	—	—	0.08	0.08	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.07	0.71	0.00	0.00	0.14	0.14	0.00	0.03	0.03	—	136	136	0.01	0.01	0.02	138
Vendor	0.01	0.01	0.26	0.09	< 0.005	< 0.005	0.05	0.05	< 0.005	0.01	0.02	—	189	189	< 0.005	0.03	0.01	197
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.02	11.8
Vendor	< 0.005	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	15.5	15.5	< 0.005	< 0.005	0.02	16.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.92	1.92	< 0.005	< 0.005	< 0.005	1.95
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.57	2.57	< 0.005	< 0.005	< 0.005	2.68
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.98	19.4	36.2	0.06	0.18	—	0.18	0.17	—	0.17	—	6,715	6,715	0.27	0.05	—	6,738
Dust From Material Movement	—	—	—	—	—	—	2.67	2.67	—	0.98	0.98	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.01	0.98	19.4	36.2	0.06	0.18	—	0.18	0.17	—	0.17	—	6,715	6,715	0.27	0.05	—	6,738
Dust From Material Movement	—	—	—	—	—	—	2.67	2.67	—	0.98	0.98	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	0.32	6.38	11.9	0.02	0.06	—	0.06	0.06	—	0.06	—	2,208	2,208	0.09	0.02	—	2,215
Dust From Material Movement	—	—	—	—	—	—	0.88	0.88	—	0.32	0.32	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.06	1.16	2.17	< 0.005	0.01	—	0.01	0.01	—	0.01	—	366	366	0.01	< 0.005	—	367
Dust From Material Movement	—	—	—	—	—	—	0.16	0.16	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	0.06	1.12	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	177	177	0.01	0.01	0.68	180

Vendor	0.04	0.03	0.97	0.37	0.01	0.01	0.20	0.21	0.01	0.05	0.07	—	755	755	0.01	0.11	2.02	790
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.08	0.08	0.82	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	156	156	0.01	0.01	0.02	158
Vendor	0.04	0.03	1.04	0.37	0.01	0.01	0.20	0.21	0.01	0.05	0.07	—	756	756	0.01	0.11	0.05	789
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.02	0.28	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	53.1	53.1	< 0.005	< 0.005	0.10	54.0
Vendor	0.01	0.01	0.33	0.12	< 0.005	< 0.005	0.06	0.07	< 0.005	0.02	0.02	—	248	248	< 0.005	0.04	0.29	259
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.80	8.80	< 0.005	< 0.005	0.02	8.93
Vendor	< 0.005	< 0.005	0.06	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	41.1	41.1	< 0.005	0.01	0.05	43.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	0.61	10.0	16.4	0.03	0.12	—	0.12	0.12	—	0.12	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	0.61	10.0	16.4	0.03	0.12	—	0.12	0.12	—	0.12	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.19	3.09	5.06	0.01	0.04	—	0.04	0.04	—	0.04	—	813	813	0.03	0.01	—	816
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.56	0.92	< 0.005	0.01	—	0.01	0.01	—	0.01	—	135	135	0.01	< 0.005	—	135
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	2.03	1.90	1.24	21.6	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,437	3,437	0.16	0.13	13.2	3,493
Vendor	0.13	0.08	2.88	1.08	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,242	2,242	0.03	0.33	6.00	2,345
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.70	1.56	1.58	15.8	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,017	3,017	0.20	0.13	0.34	3,061
Vendor	0.12	0.08	3.08	1.11	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,244	2,244	0.03	0.33	0.16	2,342
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.53	0.49	0.45	5.15	0.00	0.00	0.92	0.92	0.00	0.22	0.22	—	969	969	0.06	0.04	1.76	984
Vendor	0.04	0.02	0.93	0.34	< 0.005	0.01	0.18	0.19	0.01	0.05	0.06	—	693	693	0.01	0.10	0.80	724
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	0.08	0.94	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	160	160	0.01	0.01	0.29	163
Vendor	0.01	< 0.005	0.17	0.06	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	115	115	< 0.005	0.02	0.13	120
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.65	0.59	9.96	16.4	0.03	0.12	—	0.12	0.11	—	0.11	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.65	0.59	9.96	16.4	0.03	0.12	—	0.12	0.11	—	0.11	—	2,630	2,630	0.11	0.02	—	2,639
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	0.40	6.78	11.1	0.02	0.08	—	0.08	0.08	—	0.08	—	1,791	1,791	0.07	0.01	—	1,797

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.07	1.24	2.03	< 0.005	0.01	—	0.01	0.01	—	0.01	—	297	297	0.01	< 0.005	—	298
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.82	1.70	1.13	19.8	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	3,361	3,361	0.16	0.13	12.0	3,416
Vendor	0.11	0.08	2.77	1.03	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,200	2,200	0.03	0.33	5.96	2,304
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.61	1.47	1.37	14.5	0.00	0.00	3.02	3.02	0.00	0.71	0.71	—	2,952	2,952	0.09	0.13	0.31	2,993
Vendor	0.10	0.08	2.96	1.06	0.02	0.03	0.59	0.62	0.03	0.16	0.19	—	2,203	2,203	0.03	0.33	0.15	2,301
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	1.11	1.02	0.85	10.4	0.00	0.00	2.04	2.04	0.00	0.48	0.48	—	2,088	2,088	0.05	0.09	3.52	2,118
Vendor	0.07	0.05	1.97	0.71	0.01	0.02	0.40	0.42	0.02	0.11	0.13	—	1,499	1,499	0.02	0.22	1.76	1,567
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.20	0.19	0.15	1.90	0.00	0.00	0.37	0.37	0.00	0.09	0.09	—	346	346	0.01	0.01	0.58	351
Vendor	0.01	0.01	0.36	0.13	< 0.005	< 0.005	0.07	0.08	< 0.005	0.02	0.02	—	248	248	< 0.005	0.04	0.29	259
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.46	6.78	10.6	0.01	0.10	—	0.10	0.10	—	0.10	—	1,511	1,511	0.06	0.01	—	1,517
Paving	—	0.88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.46	6.78	10.6	0.01	0.10	—	0.10	0.10	—	0.10	—	1,511	1,511	0.06	0.01	—	1,517
Paving	—	0.88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.08	1.12	1.74	< 0.005	0.02	—	0.02	0.02	—	0.02	—	248	248	0.01	< 0.005	—	249
Paving	—	0.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.01	0.20	0.32	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	41.1	41.1	< 0.005	< 0.005	—	41.3
Paving	—	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.04	0.77	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	130	130	0.01	< 0.005	0.46	132
Vendor	0.02	0.01	0.47	0.17	< 0.005	0.01	0.10	0.10	0.01	0.03	0.03	—	371	371	< 0.005	0.05	1.00	388
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.05	0.56	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	114	114	< 0.005	< 0.005	0.01	116
Vendor	0.02	0.01	0.50	0.18	< 0.005	0.01	0.10	0.10	0.01	0.03	0.03	—	371	371	< 0.005	0.05	0.03	387
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.10	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	19.5	19.5	< 0.005	< 0.005	0.03	19.8
Vendor	< 0.005	< 0.005	0.08	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	60.9	60.9	< 0.005	0.01	0.07	63.7
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.23	3.23	< 0.005	< 0.005	0.01	3.28
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.1	10.1	< 0.005	< 0.005	0.01	10.5
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	75.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	0.17	1.18	1.52	< 0.005	0.04	—	0.04	0.03	—	0.03	—	178	178	0.01	< 0.005	—	179
Architectural Coatings	—	75.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.03	0.19	0.25	< 0.005	0.01	—	0.01	0.01	—	0.01	—	29.3	29.3	< 0.005	< 0.005	—	29.4
Architectural Coatings	—	12.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.85	4.85	< 0.005	< 0.005	—	4.86
Architectural Coatings	—	2.26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.36	0.34	0.23	3.96	0.00	0.00	0.60	0.60	0.00	0.14	0.14	—	672	672	0.03	0.03	2.39	683
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.32	0.29	0.27	2.90	0.00	0.00	0.60	0.60	0.00	0.14	0.14	—	590	590	0.02	0.03	0.06	599
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.04	0.50	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	101	101	< 0.005	< 0.005	0.17	102
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	< 0.005	< 0.005	—	16.7	16.7	< 0.005	< 0.005	0.03	16.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequest ered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Remove d	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequest ered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Remove d	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequest ered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/1/2024	2/11/2024	5.00	30.0	—
Grading	Grading	2/12/2024	7/26/2024	5.00	120	—
Building Construction	Building Construction	7/27/2024	12/14/2025	5.00	360	—
Paving	Paving	9/20/2025	12/14/2025	5.00	60.0	—
Architectural Coating	Architectural Coating	9/20/2025	12/14/2025	5.00	60.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Tier 4 Interim	3.00	8.00	367	0.40
Site Preparation	Crawler Tractors	Diesel	Tier 4 Interim	4.00	8.00	87.0	0.43
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Tier 4 Interim	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Tier 4 Interim	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Tier 4 Interim	2.00	8.00	423	0.48
Grading	Crawler Tractors	Diesel	Tier 4 Interim	2.00	8.00	87.0	0.43
Building Construction	Cranes	Diesel	Tier 4 Interim	1.00	8.00	367	0.29
Building Construction	Forklifts	Diesel	Tier 4 Interim	3.00	8.00	82.0	0.20

Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Tier 4 Interim	3.00	8.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Tier 4 Interim	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Tier 4 Interim	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	11.0	LDA,LDT1,LDT2
Site Preparation	Vendor	8.00	7.37	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	11.0	LDA,LDT1,LDT2
Grading	Vendor	32.0	7.37	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	388	11.0	LDA,LDT1,LDT2
Building Construction	Vendor	95.0	7.37	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT

Paving	—	—	—	—
Paving	Worker	15.0	11.0	LDA,LDT1,LDT2
Paving	Vendor	16.0	7.37	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	77.5	11.0	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	7.37	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	1,384,650	461,550	52,377

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	105	0.00	—
Grading	—	—	480	0.00	—
Paving	0.00	0.00	0.00	0.00	20.0

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	3	74%	74%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Unrefrigerated Warehouse-No Rail	0.00	0%
Refrigerated Warehouse-No Rail	0.00	0%
Parking Lot	20.0	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	204	0.03	< 0.005
2025	0.00	204	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	20.5	annual days of extreme heat
Extreme Precipitation	0.10	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score

Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	0	0	0	N/A
Drought	0	0	0	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	1	1	1	2
Drought	1	1	1	2
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	91.1
AQ-PM	99.0
AQ-DPM	38.0
Drinking Water	96.2
Lead Risk Housing	33.6
Pesticides	75.3
Toxic Releases	19.3
Traffic	37.5
Effect Indicators	—
CleanUp Sites	88.9
Groundwater	82.6
Haz Waste Facilities/Generators	95.3
Impaired Water Bodies	0.00
Solid Waste	59.2
Sensitive Population	—
Asthma	82.4
Cardio-vascular	89.0
Low Birth Weights	48.0
Socioeconomic Factor Indicators	—

Education	41.2
Housing	45.0
Linguistic	17.3
Poverty	73.2
Unemployment	85.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	54.39496984
Employed	40.16424997
Median HI	43.94969845
Education	—
Bachelor's or higher	29.56499423
High school enrollment	100
Preschool enrollment	17.59271141
Transportation	—
Auto Access	42.71782369
Active commuting	5.607596561
Social	—
2-parent households	42.25587065
Voting	35.2239189
Neighborhood	—
Alcohol availability	52.64981394
Park access	44.96342872
Retail density	27.46054151

Supermarket access	55.46002823
Tree canopy	33.86372385
Housing	—
Homeownership	36.39163352
Housing habitability	49.90375978
Low-inc homeowner severe housing cost burden	68.61285769
Low-inc renter severe housing cost burden	45.06608495
Uncrowded housing	68.66418581
Health Outcomes	—
Insured adults	38.07262928
Arthritis	0.0
Asthma ER Admissions	14.3
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	2.4
Cognitively Disabled	33.5
Physically Disabled	16.6
Heart Attack ER Admissions	12.8
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	44.9
Physical Health Not Good	0.0

Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	9.0
Elderly	73.1
English Speaking	87.1
Foreign-born	2.9
Outdoor Workers	28.2
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.7
Traffic Density	31.8
Traffic Access	0.0
Other Indices	—
Hardship	49.2
Other Decision Support	—
2016 Voting	31.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	88.0
Healthy Places Index Score for Project Location (b)	36.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes

Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Construction schedule adjusted based on info provided by the applicant.
Construction: Off-Road Equipment	All equipment is assumed to operate 8 hours per day
Construction: Trips and VMT	Vendor trips assigned to site prep, grading, and paving phases based on phase length

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APPENDIX 4.3:

CALEEMOD OPERATIONAL EMISSIONS MODEL OUTPUTS

15369 Airport Drive Warehouse Ops Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	15369 Airport Drive Warehouse Ops
Operational Year	2025
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	18.0
Location	35.4326087395694, -119.04131635196151
County	Kern-San Joaquin
City	Unincorporated
Air District	San Joaquin Valley APCD
Air Basin	San Joaquin Valley
TAZ	2899
EDFZ	5
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Southern California Gas
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Unrefrigerated Warehouse-No Rail	739	1000sqft	17.0	738,500	359,286	—	—	—

Refrigerated Warehouse-No Rail	185	1000sqft	4.24	184,600	0.00	—	—	—
User Defined Industrial	923	User Defined Unit	0.00	0.00	0.00	—	—	—
Parking Lot	20.0	Acre	20.0	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	15.6	34.8	77.8	97.2	0.76	1.63	27.3	29.0	1.55	7.23	8.79	877	88,455	89,332	91.1	11.8	432	95,543
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	8.01	27.7	83.3	50.4	0.75	1.56	27.3	28.9	1.50	7.23	8.73	877	87,523	88,400	91.1	11.8	194	94,386
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	8.82	28.7	58.4	55.9	0.55	1.11	19.8	20.9	1.06	5.24	6.31	877	66,438	67,315	90.8	8.91	265	72,505
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.61	5.23	10.7	10.2	0.10	0.20	3.62	3.82	0.19	0.96	1.15	145	11,000	11,145	15.0	1.48	43.9	12,004

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	7.25	6.09	73.5	53.5	0.74	1.32	27.3	28.7	1.26	7.23	8.49	—	78,430	78,430	0.95	10.6	244	81,855
Area	7.14	27.6	0.34	40.1	< 0.005	0.07	—	0.07	0.05	—	0.05	—	165	165	0.01	< 0.005	—	166
Energy	0.14	0.07	1.24	1.05	0.01	0.09	—	0.09	0.09	—	0.09	—	8,878	8,878	1.33	0.15	—	8,955
Water	—	—	—	—	—	—	—	—	—	—	—	409	478	887	42.0	1.01	—	2,237
Waste	—	—	—	—	—	—	—	—	—	—	—	468	0.00	468	46.7	0.00	—	1,636
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Stationary	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Total	15.6	34.8	77.8	97.2	0.76	1.63	27.3	29.0	1.55	7.23	8.79	877	88,455	89,332	91.1	11.8	432	95,543
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	6.80	5.63	79.3	46.8	0.74	1.32	27.3	28.7	1.26	7.23	8.49	—	77,664	77,664	1.00	10.6	6.33	80,864
Area	—	21.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.14	0.07	1.24	1.05	0.01	0.09	—	0.09	0.09	—	0.09	—	8,878	8,878	1.33	0.15	—	8,955
Water	—	—	—	—	—	—	—	—	—	—	—	409	478	887	42.0	1.01	—	2,237
Waste	—	—	—	—	—	—	—	—	—	—	—	468	0.00	468	46.7	0.00	—	1,636
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Stationary	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Total	8.01	27.7	83.3	50.4	0.75	1.56	27.3	28.9	1.50	7.23	8.73	877	87,523	88,400	91.1	11.8	194	94,386
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	5.01	4.16	56.6	34.7	0.54	0.96	19.8	20.8	0.92	5.24	6.16	—	56,931	56,931	0.71	7.76	77.1	59,338
Area	3.52	24.3	0.17	19.8	< 0.005	0.04	—	0.04	0.03	—	0.03	—	81.4	81.4	< 0.005	< 0.005	—	81.7

Energy	0.14	0.07	1.24	1.05	0.01	0.09	—	0.09	0.09	—	0.09	—	8,878	8,878	1.33	0.15	—	8,955
Water	—	—	—	—	—	—	—	—	—	—	—	409	478	887	42.0	1.01	—	2,237
Waste	—	—	—	—	—	—	—	—	—	—	—	468	0.00	468	46.7	0.00	—	1,636
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Stationary	0.15	0.13	0.38	0.34	< 0.005	0.02	0.00	0.02	0.02	0.00	0.02	0.00	69.0	69.0	< 0.005	< 0.005	0.00	69.2
Total	8.82	28.7	58.4	55.9	0.55	1.11	19.8	20.9	1.06	5.24	6.31	877	66,438	67,315	90.8	8.91	265	72,505
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.92	0.76	10.3	6.34	0.10	0.18	3.62	3.79	0.17	0.96	1.12	—	9,426	9,426	0.12	1.28	12.8	9,824
Area	0.64	4.44	0.03	3.61	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.5	13.5	< 0.005	< 0.005	—	13.5
Energy	0.02	0.01	0.23	0.19	< 0.005	0.02	—	0.02	0.02	—	0.02	—	1,470	1,470	0.22	0.02	—	1,483
Water	—	—	—	—	—	—	—	—	—	—	—	67.7	79.1	147	6.96	0.17	—	370
Waste	—	—	—	—	—	—	—	—	—	—	—	77.4	0.00	77.4	7.74	0.00	—	271
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	31.2	31.2
Stationary	0.03	0.02	0.07	0.06	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	0.00	11.4	11.4	< 0.005	< 0.005	0.00	11.5
Total	1.61	5.23	10.7	10.2	0.10	0.20	3.62	3.82	0.19	0.96	1.15	145	11,000	11,145	15.0	1.48	43.9	12,004

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unrefrigerated Warehouse-No Rail	3.09	2.90	1.37	25.5	0.05	0.02	4.42	4.44	0.02	1.12	1.13	—	4,976	4,976	0.21	0.14	17.2	5,039
Refrigerated Warehouse-No Rail	1.17	1.10	0.52	9.67	0.02	0.01	1.68	1.68	0.01	0.42	0.43	—	1,885	1,885	0.08	0.05	6.50	1,909
User Defined Industrial	2.99	2.09	71.6	18.3	0.68	1.29	21.2	22.5	1.23	5.69	6.93	—	71,569	71,569	0.67	10.4	220	74,907
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.25	6.09	73.5	53.5	0.74	1.32	27.3	28.7	1.26	7.23	8.49	—	78,430	78,430	0.95	10.6	244	81,855
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	2.81	2.61	1.68	20.9	0.04	0.02	4.42	4.44	0.02	1.12	1.13	—	4,411	4,411	0.24	0.16	0.44	4,465
Refrigerated Warehouse-No Rail	1.07	0.99	0.64	7.91	0.02	0.01	1.68	1.68	0.01	0.42	0.43	—	1,671	1,671	0.09	0.06	0.17	1,691
User Defined Industrial	2.92	2.03	77.0	18.0	0.68	1.29	21.2	22.5	1.23	5.69	6.93	—	71,582	71,582	0.66	10.4	5.72	74,708
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	6.80	5.63	79.3	46.8	0.74	1.32	27.3	28.7	1.26	7.23	8.49	—	77,664	77,664	1.00	10.6	6.33	80,864
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unrefrigerated Warehou Rail	0.38	0.35	0.20	2.85	0.01	< 0.005	0.59	0.59	< 0.005	0.15	0.15	—	558	558	0.03	0.02	0.91	565
Refrigerated Warehouse-No Rail	0.14	0.13	0.08	1.07	< 0.005	< 0.005	0.22	0.22	< 0.005	0.06	0.06	—	209	209	0.01	0.01	0.34	212
User Defined Industrial	0.39	0.27	10.1	2.42	0.09	0.17	2.81	2.98	0.16	0.75	0.92	—	8,658	8,658	0.08	1.26	11.5	9,047
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.92	0.76	10.3	6.34	0.10	0.18	3.62	3.79	0.17	0.96	1.12	—	9,426	9,426	0.12	1.28	12.8	9,824

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	4,432	4,432	0.72	0.09	—	4,476
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	2,534	2,534	0.41	0.05	—	2,559

User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	427	427	0.07	0.01	—	432
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,394	7,394	1.20	0.14	—	7,467
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	4,432	4,432	0.72	0.09	—	4,476
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	2,534	2,534	0.41	0.05	—	2,559
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	427	427	0.07	0.01	—	432
Total	—	—	—	—	—	—	—	—	—	—	—	—	7,394	7,394	1.20	0.14	—	7,467
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	734	734	0.12	0.01	—	741
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	419	419	0.07	0.01	—	424

User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	70.8	70.8	0.01	< 0.005	—	71.5
Total	—	—	—	—	—	—	—	—	—	—	—	—	1,224	1,224	0.20	0.02	—	1,236

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	0.12	0.06	1.06	0.89	0.01	0.08	—	0.08	0.08	—	0.08	—	1,262	1,262	0.11	< 0.005	—	1,266
Refrigerated Warehouse-No Rail	0.02	0.01	0.19	0.16	< 0.005	0.01	—	0.01	0.01	—	0.01	—	222	222	0.02	< 0.005	—	223
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.14	0.07	1.24	1.05	0.01	0.09	—	0.09	0.09	—	0.09	—	1,485	1,485	0.13	< 0.005	—	1,489
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unrefrigerated Warehou Rail	0.12	0.06	1.06	0.89	0.01	0.08	—	0.08	0.08	—	0.08	—	1,262	1,262	0.11	< 0.005	—	1,266
Refrigerated Warehouse-No Rail	0.02	0.01	0.19	0.16	< 0.005	0.01	—	0.01	0.01	—	0.01	—	222	222	0.02	< 0.005	—	223
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.14	0.07	1.24	1.05	0.01	0.09	—	0.09	0.09	—	0.09	—	1,485	1,485	0.13	< 0.005	—	1,489
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	0.02	0.01	0.19	0.16	< 0.005	0.01	—	0.01	0.01	—	0.01	—	209	209	0.02	< 0.005	—	210
Refrigerated Warehouse-No Rail	< 0.005	< 0.005	0.03	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.8	36.8	< 0.005	< 0.005	—	36.9
User Defined Industrial	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.02	0.01	0.23	0.19	< 0.005	0.02	—	0.02	0.02	—	0.02	—	246	246	0.02	< 0.005	—	246

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	19.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	1.24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	7.14	6.59	0.34	40.1	< 0.005	0.07	—	0.07	0.05	—	0.05	—	165	165	0.01	< 0.005	—	166
Total	7.14	27.6	0.34	40.1	< 0.005	0.07	—	0.07	0.05	—	0.05	—	165	165	0.01	< 0.005	—	166
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	19.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	1.24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	21.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	3.62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landsca Equipment	0.64	0.59	0.03	3.61	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.5	13.5	< 0.005	< 0.005	—	13.5
Total	0.64	4.44	0.03	3.61	< 0.005	0.01	—	0.01	< 0.005	—	< 0.005	—	13.5	13.5	< 0.005	< 0.005	—	13.5

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	327	384	711	33.6	0.80	—	1,791
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	81.8	94.0	176	8.40	0.20	—	446
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	409	478	887	42.0	1.01	—	2,237
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unrefrigerated Warehouse-No	—	—	—	—	—	—	—	—	—	—	—	327	384	711	33.6	0.80	—	1,791
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	81.8	94.0	176	8.40	0.20	—	446
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	409	478	887	42.0	1.01	—	2,237
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	54.2	63.6	118	5.57	0.13	—	297
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	13.5	15.6	29.1	1.39	0.03	—	73.8
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	67.7	79.1	147	6.96	0.17	—	370

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	374	0.00	374	37.4	0.00	—	1,309
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	93.5	0.00	93.5	9.35	0.00	—	327
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	468	0.00	468	46.7	0.00	—	1,636
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	374	0.00	374	37.4	0.00	—	1,309
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	93.5	0.00	93.5	9.35	0.00	—	327

User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	468	0.00	468	46.7	0.00	—	1,636
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unrefrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	61.9	0.00	61.9	6.19	0.00	—	217
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	15.5	0.00	15.5	1.55	0.00	—	54.2
User Defined Industrial	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	77.4	0.00	77.4	7.74	0.00	—	271

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Refrigerated	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	188	188
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Refrigerated Warehouse-No Rail	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	31.2	31.2
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	31.2	31.2

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fire Pump	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Total	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fire Pump	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Total	1.08	0.98	2.75	2.51	< 0.005	0.14	0.00	0.14	0.14	0.00	0.14	0.00	504	504	0.02	< 0.005	0.00	505
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fire Pump	0.03	0.02	0.07	0.06	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	0.00	11.4	11.4	< 0.005	< 0.005	0.00	11.5
Total	0.03	0.02	0.07	0.06	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	0.00	11.4	11.4	< 0.005	< 0.005	0.00	11.5

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year

Unrefrigerated Warehouse-No Rail	768	93.8	36.9	207,055	6,370	778	306	1,717,156
Refrigerated Warehouse-No Rail	291	23.4	9.23	77,553	2,413	194	76.5	643,168
User Defined Industrial	371	40.6	1.85	98,962	24,121	2,640	120	6,432,504
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	1,384,650	461,550	52,377

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)

Unrefrigerated Warehouse-No Rail	7,931,354	204	0.0330	0.0040	3,939,270
Refrigerated Warehouse-No Rail	4,533,803	204	0.0330	0.0040	692,950
User Defined Industrial	0.00	204	0.0330	0.0040	0.00
Parking Lot	764,698	204	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Unrefrigerated Warehouse-No Rail	170,778,125	5,859,834
Refrigerated Warehouse-No Rail	42,688,750	0.00
User Defined Industrial	0.00	0.00
Parking Lot	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Unrefrigerated Warehouse-No Rail	694	—
Refrigerated Warehouse-No Rail	174	—
User Defined Industrial	0.00	—
Parking Lot	0.00	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Refrigerated Warehouse-No Rail	Cold storage	User Defined	150	7.50	7.50	7.50	25.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
Fire Pump	Diesel	1.00	1.00	50.0	300	0.73
Fire Pump	Diesel	1.00	1.00	50.0	300	0.73

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	20.5	annual days of extreme heat
Extreme Precipitation	0.10	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	0.00	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	0	0	0	N/A
Drought	0	0	0	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	1	1	1	2
Drought	1	1	1	2
Snowpack Reduction	N/A	N/A	N/A	N/A

Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	91.1
AQ-PM	99.0
AQ-DPM	38.0
Drinking Water	96.2
Lead Risk Housing	33.6
Pesticides	75.3
Toxic Releases	19.3
Traffic	37.5
Effect Indicators	—
CleanUp Sites	88.9
Groundwater	82.6
Haz Waste Facilities/Generators	95.3
Impaired Water Bodies	0.00
Solid Waste	59.2

Sensitive Population	—
Asthma	82.4
Cardio-vascular	89.0
Low Birth Weights	48.0
Socioeconomic Factor Indicators	—
Education	41.2
Housing	45.0
Linguistic	17.3
Poverty	73.2
Unemployment	85.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	54.39496984
Employed	40.16424997
Median HI	43.94969845
Education	—
Bachelor's or higher	29.56499423
High school enrollment	100
Preschool enrollment	17.59271141
Transportation	—
Auto Access	42.71782369
Active commuting	5.607596561
Social	—
2-parent households	42.25587065

Voting	35.2239189
Neighborhood	—
Alcohol availability	52.64981394
Park access	44.96342872
Retail density	27.46054151
Supermarket access	55.46002823
Tree canopy	33.86372385
Housing	—
Homeownership	36.39163352
Housing habitability	49.90375978
Low-inc homeowner severe housing cost burden	68.61285769
Low-inc renter severe housing cost burden	45.06608495
Uncrowded housing	68.66418581
Health Outcomes	—
Insured adults	38.07262928
Arthritis	0.0
Asthma ER Admissions	14.3
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	2.4
Cognitively Disabled	33.5
Physically Disabled	16.6
Heart Attack ER Admissions	12.8

Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	44.9
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	9.0
Elderly	73.1
English Speaking	87.1
Foreign-born	2.9
Outdoor Workers	28.2
Climate Change Adaptive Capacity	—
Impervious Surface Cover	46.7
Traffic Density	31.8
Traffic Access	0.0
Other Indices	—
Hardship	49.2
Other Decision Support	—
2016 Voting	31.0

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	88.0
Healthy Places Index Score for Project Location (b)	36.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Operations: Vehicle Data	Trip rates adjusted based on Project traffic study
Operations: Fleet Mix	Fleet mix adjusted to separate passenger vehicles and trucks
Operations: Refrigerants	As of 1 January 2022, new commercial refrigeration equipment may not use refrigerants with a GWP of 150 or greater.
Operations: Off-Road Equipment	Cargo handling equipment is assumed to operate 4 hours per day, 365 days per year.
Operations: Emergency Generators and Fire Pumps	—

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APPENDIX 4.4:

EMFAC2021 MODEL OUTPUTS

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: Sub-Area
Region: Kern (SJV)
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/year for CVMT and EVMT, trips/year for Trips, kWh/year for Energy Consumption, tons/year for Emissions, 1000 gallons/year for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel_Consumption	Fuel_Consumption	Total Fuel	VMT	Total VMT	Miles per Gallon	Vehicle Class
Kern (SJV)	2024	HHDT	Aggregate	Aggregate	Gasoline	3.768519108	182.3589808	0.053410041	53.41004134	611952.9901	182.3589808	3725242.696	6.09	HHDT
Kern (SJV)	2024	HHDT	Aggregate	Aggregate	Diesel	24180.77433	3690018.825	606.6181396	606618.1396		3690018.825			
Kern (SJV)	2024	HHDT	Aggregate	Aggregate	Electricity	66.08173901	8362.456863	0	0		8362.456863			
Kern (SJV)	2024	HHDT	Aggregate	Aggregate	Natural Gas	392.9132658	26679.05485	5.281440412	5281.440412		26679.05485			
Kern (SJV)	2024	LDA	Aggregate	Aggregate	Gasoline	280741.7509	10662337.27	363.0933063	363093.3063	369203.9224	10662337.27	11616277.46	31.46	LDA
Kern (SJV)	2024	LDA	Aggregate	Aggregate	Diesel	753.517769	23656.26364	0.542194795	542.1947954		23656.26364			
Kern (SJV)	2024	LDA	Aggregate	Aggregate	Electricity	12327.18007	585285.0785	0	0		585285.0785			
Kern (SJV)	2024	LDA	Aggregate	Aggregate	Plug-in Hybrid	7698.330017	344998.8499	5.568421313	5568.421313		344998.8499			
Kern (SJV)	2024	LDT1	Aggregate	Aggregate	Gasoline	26833.01507	879519.7715	36.00295695	36002.95695	36035.11194	879519.7715	883200.2397	24.51	LDT1
Kern (SJV)	2024	LDT1	Aggregate	Aggregate	Diesel	11.95090856	167.0524153	0.006935838	6.935838265		167.0524153			
Kern (SJV)	2024	LDT1	Aggregate	Aggregate	Electricity	39.07140082	1794.676136	0	0		1794.676136			
Kern (SJV)	2024	LDT1	Aggregate	Aggregate	Plug-in Hybrid	33.46368199	1718.739668	0.025219153	25.21915262		1718.739668			
Kern (SJV)	2024	LDT2	Aggregate	Aggregate	Gasoline	138273.3514	5419002.973	225.7697079	225769.7079	227097.6928	5419002.973	5516391.466	24.29	LDT2
Kern (SJV)	2024	LDT2	Aggregate	Aggregate	Diesel	416.0598841	17534.97496	0.520890592	520.8905923		17534.97496			
Kern (SJV)	2024	LDT2	Aggregate	Aggregate	Electricity	767.2678469	27462.75517	0	0		27462.75517			
Kern (SJV)	2024	LDT2	Aggregate	Aggregate	Plug-in Hybrid	1066.10965	52390.76292	0.807094381	807.0943814		52390.76292			
Kern (SJV)	2024	LHDT1	Aggregate	Aggregate	Gasoline	13847.80966	499047.7422	52.28998337	52289.98337	79855.27153	499047.7422	935221.5849	11.71	LHDT1
Kern (SJV)	2024	LHDT1	Aggregate	Aggregate	Diesel	11980.96598	433729.6116	27.56528816	27565.28816		433729.6116			
Kern (SJV)	2024	LHDT1	Aggregate	Aggregate	Electricity	33.08231588	2444.23116	0	0		2444.23116			
Kern (SJV)	2024	LHDT2	Aggregate	Aggregate	Gasoline	2715.766035	92501.8873	11.0438315	11043.8315	26250.78923	92501.8873	290413.9391	11.06	LHDT2
Kern (SJV)	2024	LHDT2	Aggregate	Aggregate	Diesel	5456.201341	197312.6399	15.20695773	15206.95773		197312.6399			
Kern (SJV)	2024	LHDT2	Aggregate	Aggregate	Electricity	8.562737865	599.4119592	0	0		599.4119592			
Kern (SJV)	2024	MCY	Aggregate	Aggregate	Gasoline	14432.52931	82430.63987	1.983844421	1983.844421	1983.844421	82430.63987	82430.63987	41.55	MCY
Kern (SJV)	2024	MDV	Aggregate	Aggregate	Gasoline	132610.1343	4736954.171	247.3237684	247323.7684	250951.5958	4736954.171	4877472.578	19.44	MDV
Kern (SJV)	2024	MDV	Aggregate	Aggregate	Diesel	1976.52561	73463.81026	3.030664647	3030.664647		73463.81026			
Kern (SJV)	2024	MDV	Aggregate	Aggregate	Electricity	850.6814996	30400.99568	0	0		30400.99568			
Kern (SJV)	2024	MDV	Aggregate	Aggregate	Plug-in Hybrid	792.0827425	36653.60101	0.597162771	597.1627712		36653.60101			
Kern (SJV)	2024	MH	Aggregate	Aggregate	Gasoline	1926.94204	16727.9634	3.79135361	3791.35361	4662.648309	16727.9634	24937.10413	5.35	MH
Kern (SJV)	2024	MH	Aggregate	Aggregate	Diesel	954.478878	8209.140737	0.871294699	871.2946985		8209.140737			
Kern (SJV)	2024	MHDT	Aggregate	Aggregate	Gasoline	1118.60401	68920.73563	14.69155645	14691.55645	65141.27041	68920.73563	509968.7846	7.83	MHDT
Kern (SJV)	2024	MHDT	Aggregate	Aggregate	Diesel	9064.704369	435271.0732	49.87908207	49879.08207		435271.0732			
Kern (SJV)	2024	MHDT	Aggregate	Aggregate	Electricity	30.15539963	1726.6959	0	0		1726.6959			
Kern (SJV)	2024	MHDT	Aggregate	Aggregate	Natural Gas	77.25630867	4050.279821	0.570631898	570.6318985		4050.279821			
Kern (SJV)	2024	OBUS	Aggregate	Aggregate	Gasoline	331.5062874	18372.04341	3.847897705	3847.897705	5112.044794	18372.04341	27075.2685	5.30	OBUS
Kern (SJV)	2024	OBUS	Aggregate	Aggregate	Diesel	114.5833219	8536.494212	1.248988953	1248.988953		8536.494212			
Kern (SJV)	2024	OBUS	Aggregate	Aggregate	Electricity	0.507937847	54.42823007	0	0		54.42823007			
Kern (SJV)	2024	OBUS	Aggregate	Aggregate	Natural Gas	2.0969703	112.302645	0.015158136	15.15813617		112.302645			
Kern (SJV)	2024	SBUS	Aggregate	Aggregate	Gasoline	160.5323981	10261.61039	1.047627161	1047.627161	4323.160122	10261.61039	35121.53723	8.12	SBUS
Kern (SJV)	2024	SBUS	Aggregate	Aggregate	Diesel	919.9496443	20507.8017	2.531777822	2531.777822		20507.8017			
Kern (SJV)	2024	SBUS	Aggregate	Aggregate	Electricity	2.883447896	72.62237793	0	0		72.62237793			
Kern (SJV)	2024	SBUS	Aggregate	Aggregate	Natural Gas	168.9440011	4279.502771	0.743755139	743.7551389		4279.502771			
Kern (SJV)	2024	UBUS	Aggregate	Aggregate	Gasoline	43.55834392	3288.36205	0.55735714	557.3571395	3866.945481	3288.36205	23921.37267	6.19	UBUS
Kern (SJV)	2024	UBUS	Aggregate	Aggregate	Diesel	24.86958548	2265.758475	0.213850708	213.8507084		2265.758475			
Kern (SJV)	2024	UBUS	Aggregate	Aggregate	Electricity	1.378086695	160.4538073	0	0		160.4538073			
Kern (SJV)	2024	UBUS	Aggregate	Aggregate	Natural Gas	162.1423166	18206.79834	3.095737633	3095.737633		18206.79834			

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: Sub-Area
Region: Kern (SJV)
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel_Consumption	Fuel_Consumption	Total Fuel	VMT	Total VMT	Miles per Gallon	Vehicle Class
Kern (SJV)	2025	HHDT	Aggregate	Aggregate	Gasoline	3.103004382	164.7667149	0.046682665	46.6826648	614567.7965	164.7667149	3812380.13	6.20	HHDT
Kern (SJV)	2025	HHDT	Aggregate	Aggregate	Diesel	25033.33393	3765669.014	609.1308566	609130.8566		3765669.014			
Kern (SJV)	2025	HHDT	Aggregate	Aggregate	Electricity	141.9423905	19065.4236	0	0		19065.4236			
Kern (SJV)	2025	HHDT	Aggregate	Aggregate	Natural Gas	413.3525799	27480.92562	5.390257253	5390.257253		27480.92562			
Kern (SJV)	2025	LDA	Aggregate	Aggregate	Gasoline	280759.1826	10653048.7	355.1160239	355116.0239	361533.5981	10653048.7	11766112.86	32.55	LDA
Kern (SJV)	2025	LDA	Aggregate	Aggregate	Diesel	706.8988026	21773.81815	0.494531314	494.5313135		21773.81815			
Kern (SJV)	2025	LDA	Aggregate	Aggregate	Electricity	14738.34209	715121.1782	0	0		715121.1782			
Kern (SJV)	2025	LDA	Aggregate	Aggregate	Plug-in Hybrid	8468.15683	376169.1704	5.923042917	5923.042917		376169.1704			
Kern (SJV)	2025	LDT1	Aggregate	Aggregate	Gasoline	26327.71196	868524.7674	34.82967387	34829.67387	34871.23891	868524.7674	873790.7697	25.06	LDT1
Kern (SJV)	2025	LDT1	Aggregate	Aggregate	Diesel	10.77908043	146.8573218	0.006089018	6.089018208		146.8573218			
Kern (SJV)	2025	LDT1	Aggregate	Aggregate	Electricity	54.41459633	2631.325635	0	0		2631.325635			
Kern (SJV)	2025	LDT1	Aggregate	Aggregate	Plug-in Hybrid	49.04029051	2487.819301	0.03547602	35.47602044		2487.819301			
Kern (SJV)	2025	LDT2	Aggregate	Aggregate	Gasoline	142667.3593	5588959.245	226.9991298	226999.1298	228484.5281	5588959.245	5707951.229	24.98	LDT2
Kern (SJV)	2025	LDT2	Aggregate	Aggregate	Diesel	441.2402658	18530.04075	0.53791672	537.9167195		18530.04075			
Kern (SJV)	2025	LDT2	Aggregate	Aggregate	Electricity	1061.627816	37425.59189	0	0		37425.59189			
Kern (SJV)	2025	LDT2	Aggregate	Aggregate	Plug-in Hybrid	1305.684292	63036.35152	0.947481583	947.4815828		63036.35152			
Kern (SJV)	2025	LHDT1	Aggregate	Aggregate	Gasoline	13608.71284	491032.6199	50.61634831	50616.34831	77237.70161	491032.6199	917441.9474	11.88	LHDT1
Kern (SJV)	2025	LHDT1	Aggregate	Aggregate	Diesel	11760.7819	420068.0068	26.6213533	26621.3533		420068.0068			
Kern (SJV)	2025	LHDT1	Aggregate	Aggregate	Electricity	92.65781907	6341.320673	0	0		6341.320673			
Kern (SJV)	2025	LHDT2	Aggregate	Aggregate	Gasoline	2626.061243	88394.85236	10.44665516	10446.65516	25145.25262	88394.85236	281651.4293	11.20	LHDT2
Kern (SJV)	2025	LHDT2	Aggregate	Aggregate	Diesel	5386.637571	191721.7187	14.69859746	14698.59746		191721.7187			
Kern (SJV)	2025	LHDT2	Aggregate	Aggregate	Electricity	23.58335596	1534.858197	0	0		1534.858197			
Kern (SJV)	2025	MCY	Aggregate	Aggregate	Gasoline	14496.36065	82482.98734	1.974903747	1974.903747	1974.903747	82482.98734	82482.98734	41.77	MCY
Kern (SJV)	2025	MDV	Aggregate	Aggregate	Gasoline	131239.3863	4669141.427	238.8185245	238818.5245	242408.8563	4669141.427	4824932.359	19.90	MDV
Kern (SJV)	2025	MDV	Aggregate	Aggregate	Diesel	1960.190701	71351.34698	2.905472155	2905.472155		71351.34698			
Kern (SJV)	2025	MDV	Aggregate	Aggregate	Electricity	1166.941261	41053.32526	0	0		41053.32526			
Kern (SJV)	2025	MDV	Aggregate	Aggregate	Plug-in Hybrid	946.8497026	43386.26029	0.684859636	684.8596357		43386.26029			
Kern (SJV)	2025	MH	Aggregate	Aggregate	Gasoline	1830.461916	15901.58076	3.603485921	3603.485921	4457.406256	15901.58076	23943.94568	5.37	MH
Kern (SJV)	2025	MH	Aggregate	Aggregate	Diesel	944.7085365	8042.364918	0.853920335	853.9203347		8042.364918			
Kern (SJV)	2025	MHDT	Aggregate	Aggregate	Gasoline	1084.423131	66812.38601	14.09877167	14098.77167	65379.29446	66812.38601	521459.7601	7.98	MHDT
Kern (SJV)	2025	MHDT	Aggregate	Aggregate	Diesel	9387.771311	445266.1533	50.6872679	50687.2679		445266.1533			
Kern (SJV)	2025	MHDT	Aggregate	Aggregate	Electricity	90.14419364	5159.843142	0	0		5159.843142			
Kern (SJV)	2025	MHDT	Aggregate	Aggregate	Natural Gas	82.2937218	4221.377721	0.593254887	593.2548867		4221.377721			
Kern (SJV)	2025	OBUS	Aggregate	Aggregate	Gasoline	315.0446672	17083.94302	3.549114807	3549.114807	4812.228531	17083.94302	25928.30567	5.39	OBUS
Kern (SJV)	2025	OBUS	Aggregate	Aggregate	Diesel	119.5781784	8579.543713	1.245446428	1245.446428		8579.543713			
Kern (SJV)	2025	OBUS	Aggregate	Aggregate	Electricity	1.248753867	131.1561465	0	0		131.1561465			
Kern (SJV)	2025	OBUS	Aggregate	Aggregate	Natural Gas	2.638481639	133.6627952	0.017667295	17.66729518		133.6627952			
Kern (SJV)	2025	SBUS	Aggregate	Aggregate	Gasoline	155.811072	9921.532916	1.00722187	1007.22187	4266.265517	9921.532916	34802.07288	8.16	SBUS
Kern (SJV)	2025	SBUS	Aggregate	Aggregate	Diesel	917.6261473	20321.80833	2.499177804	2499.177804		20321.80833			
Kern (SJV)	2025	SBUS	Aggregate	Aggregate	Electricity	6.161393571	171.2010244	0	0		171.2010244			
Kern (SJV)	2025	SBUS	Aggregate	Aggregate	Natural Gas	175.0161798	4387.530607	0.759865843	759.8658432		4387.530607			
Kern (SJV)	2025	UBUS	Aggregate	Aggregate	Gasoline	44.73792787	3377.412707	0.572040664	572.0406635	3378.211936	3377.412707	24569.17663	7.27	UBUS
Kern (SJV)	2025	UBUS	Aggregate	Aggregate	Diesel	30.36235849	3238.507284	0.336178325	336.1783254		3238.507284			
Kern (SJV)	2025	UBUS	Aggregate	Aggregate	Electricity	13.65692126	1972.982059	0	0		1972.982059			
Kern (SJV)	2025	UBUS	Aggregate	Aggregate	Natural Gas	149.4724137	15980.27458	2.469992947	2469.992947		15980.27458			

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Appendix F
Geology and Soils

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LGC Geotechnical, Inc.

December 7, 2022 Project No. 22203-01

Mr. Craig Wilde
Industrial Property Group, Inc.
10515 20th Street Southeast
Lake Stevens, Washington 98258

Subject: ***Preliminary Geotechnical Evaluation, Proposed Industrial Development, Southwest of the Intersection of Boughton Drive and Airport Drive, Kern County, California***

In accordance with your request, LGC Geotechnical, Inc. has performed a preliminary geotechnical evaluation for the proposed industrial development to be located southwest of the intersection of Boughton Drive and Airport Drive in Kern County, California. The purpose of our study was to evaluate the existing onsite geotechnical conditions and to provide preliminary geotechnical recommendations relative to the proposed development.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Respectfully,

LGC Geotechnical, Inc.

Brad Zellmer, GE 2618
Project Engineer

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1.0 INTRODUCTION

LGC Geotechnical has performed a geotechnical evaluation for the proposed industrial development to be located southwest of the intersection of Boughton Drive and Airport Drive, Kern County, California. (Figure 1). This report summarizes our findings, conclusions, and preliminary geotechnical recommendations relative to the proposed development.

1.1 Project Description and Background

The approximately 52-acre, L-shaped site is bound on the north by Boughton Drive, on the east by Airport Drive, on the south by Skyway Drive, on the west by Hangar Way and on the southwest by vacant land and a car rental return facility along Hangar Way. At the time of our field visit the site consisted of vacant land with a few man-made dirt trails. Vegetation generally consisted of a moderate growth of weeds across the site. The majority of the site is relatively flat with topographic relief on the order of approximately 50 feet. Drainage is toward the southwest generally via sheet flow. Some dilapidated fence posts were observed on the eastern side of the site, near the northeastern corner, an no other structures were observed at the site. Extensive areas of stockpiles and earthen berms were observed at the site, covering areas hundreds of feet long by hundreds of feet wide. Refuse was observe scattered among the stockpiles, including concrete, wood, and other rubbish.

We understand that the proposed development will include two large at-grade industrial buildings, one on each the northern and southern portions of the site, along with associated parking, driveways, and basin areas. Preliminary grading plans indicate that the northern building will be at a finish floor elevation of 524 feet, requiring design cuts up to about 9 feet in the northeastern corner and fills up to about 14 feet in the southwest corner (Kier+Wright, 2022). The southern building will be at a finish floor elevation of 507.5 feet. The southern building pad currently has numerous stockpiles. Design cuts are up to about 3 feet in the northwestern corner and design fills up to about 10 feet in the southwest corner. Preliminary building (dead plus live) loads were not provided at the time of this report. The assumed maximum column and wall structural (dead plus live) loads are 125 kips and 10 kips per lineal foot, respectively.

The recommendations given in this report are based on the assumptions and preliminary information as indicated above. LGC Geotechnical should be provided with any updated project information, plans and/or any structural loads when they become available, in order to either confirm or modify the recommendations provided herein.

1.2 Subsurface Exploration

On October 24 through 25 of 2022, LGC Geotechnical performed a subsurface geotechnical evaluation of the subject site consisting of the excavation of 12 hollow-stem auger borings in order to evaluate onsite geotechnical conditions.

Twelve borings (HS-1 through HS-8 and I-1 through I-4) were excavated using a truck-mounted drill rig equipped with 6-inch and 8-inch-diameter hollow-stem augers to depths ranging from approximately 10 to 50 feet below existing grade. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. Driven soil samples were collected by means of the Standard Penetration Test (SPT) and Modified California Drive (MCD) sampler. The SPT sampler (1.4-inch ID) and MCD sampler (2.4-inch ID, 3.0-inch OD) were driven using a 140-pound hammer falling 30 inches to advance the sampler a total depth of 18 inches or until refusal. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. Bulk samples were also collected and logged for laboratory testing at select depths. In select borings, after removal of the augers the depth of the boring due to caving was measured and is noted on the boring logs. The borings were backfilled with cuttings. The approximate locations of our subsurface explorations are provided on our Geotechnical Map (Sheet 1). The boring logs are provided in Appendix B.

At the completion of excavation of Infiltration Borings, I-1 through I-4, an infiltration well was constructed within each boring for testing as outlined in the "Preliminary Field Percolation Testing" Section below. At the completion of infiltration testing, the installed pipe was removed, and the resulting void backfilled with native soils.

Please note that some settlement of the backfill may occur over time and the excavations should be topped off as needed.

1.3 <u>Preliminary Field Percolation Testing</u>

Four falling-head field percolation tests (I-1 through I-4) were performed in the approximate locations indicated on the Geotechnical Map (Sheet 1). A 3-inch diameter perforated PVC pipe was placed in the borehole, and the annulus was backfilled with gravel, including placement of approximately 2 inches of gravel at the bottom of the borehole. The infiltration wells were pre-soaked the day prior to testing. During the pre-test, if the water level drops more than 6 inches in 25 minutes for two consecutive readings, the test procedure for coarse-grained soils should be followed. If the water level does not meet that criterion, the procedure for fine-grained soils should be followed. The procedure for coarse-grained soils requires performing the test for one hour and taking one reading every 10 minutes from a fixed reference point. The procedure for fine-grained soils requires performing the test for six hours and taking one reading every 30 minutes from a fixed reference point. The pre-tests indicated the procedure for fine-grained soils should be followed. The calculated (observed) infiltration is normalized relative to the three-dimensional flow that occurs within the field test to a one-dimensional flow out of the bottom of the boring only (i.e., "Porchet Method"). The observed infiltration rates are provided in Table 1 below and do not include any factors of safety.

TABLE 1

Summary of Field Infiltration Testing

Infiltration Test Location	Infiltration Test Approximate Depth (ft)	Observed Infiltration Rate (inch/hr.) *
I-1	10	0.1
I-2	10	0.3
I-3	10	0.1
I-4	10	0.8

*Does not include a factor of safety

It should also be emphasized that infiltration test results are only representative of the location and depth where they are performed. Varying subsurface conditions may exist outside of the test locations which could alter the calculated infiltration rates indicated above. The percolation tests were performed using relatively clean water free of particulates, silt, etc. Field percolation test data is presented in Appendix B. Refer to further discussion in Section 4.9.

1.4 Laboratory Testing

Representative bulk and driven samples were obtained for laboratory testing during our field evaluation. Laboratory testing included in-situ moisture content and dry density, Atterberg Limits, fines content, consolidation, expansion index, laboratory compaction, R-Value, and corrosion characteristics (sulfate, chloride, pH and minimum resistivity).

- Dry density of the samples collected ranged from approximately 110 pounds per cubic foot (pcf) to 130 pcf, with an average of approximately 120 pcf. Field moisture contents ranged from approximately 1 percent to 14 percent, with an average of approximately 6 percent.
- Eight fines content tests indicated a fines content (passing No. 200 sieve) ranging from approximately 13 to 64 percent. Based on the Unified Soils Classification System (USCS), six of the tested samples are classified as "coarse-grained" and the remaining two samples are classified as "fine-grained."
- One Atterberg Limit (liquid limit and plastic limit) test was performed. Results indicated a Plasticity Index of 14.
- Two Expansion Index (EI) tests indicated EI values of 3 and 7, corresponding to "Very Low" expansion potential.
- Five Consolidation tests were performed. The deformation versus vertical stress plots is provided in Appendix C.
- A laboratory compaction curve resulted in a maximum dry density value of 131.0 pcf with an optimum moisture content value of 8.5 percent.
- An R-Value test indicated a result of 23.
- Corrosion testing indicated soluble sulfate contents less than approximately 0.02 percent, a chloride content of 21 parts per million (ppm), pH of 7.9, and a minimum resistivity of 2,120 ohm-centimeters.

A summary of the results is presented in Appendix C. The moisture and dry density test results are presented on the boring logs in Appendix B.

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional and Local Geology

Regionally the site is located in the southwestern portion of the Great Valley Geomorphic Province of California. The following discussion regarding the Geomorphic Province is from the California Geological Survey Note 36 (CGS, 2002). The Great Valley is an alluvial plain about 50 miles wide and 400 miles long in the central part of California. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic (about 160 million years ago). The Sierra Nevada Mountains lie along the eastern side of the trough while the Coastal Ranges lie along the western side of the trough. The northern part of the Great Valley is the Sacramento Valley, while the southern part is the San Joaquin Valley. The site is located near the southern end of the San Joaquin Valley. Great oil fields have been found in the southernmost San Joaquin Valley and along anticlinal uplifts on its southwestern margin.

Locally, the site is situated on a broad, nearly flat alluvial plain that descends to the southwest. The southwest-flowing Kern River is located approximately 2 miles southeast of the site. Foothills of the Sierra Nevada Mountains rise approximately 1 to 2 miles northeast of the site, and an approximately 3 mile wide by 11-mile-long oil field is located in these foothills.

2.2 Site-Specific Geology & Generalized Subsurface Conditions

Based on our review of regional geologic mapping in the vicinity of the site and our site visit, the project area is underlain by Quaternary old alluvial deposits. The regional mapping from 1964 (Smith, 1964) identifies the deposits at the site as Pleistocene (Quaternary) Non-Marine (continental) deposits – using map symbol Qc. Using more current nomenclature we identify the deposits as Quaternary old alluvium – using map symbol Qoa. A brief description of the geologic unit encountered is presented below.

It should be noted that our excavations are only representative of the location and time where/when they are performed, and varying subsurface conditions may exist outside of the performed location. In addition, subsurface conditions can change over time. The soil descriptions provided above should not be construed to mean that the subsurface profile is uniform, and that soil is homogeneous within the project area. For details on the stratigraphy at the exploration locations, refer to Appendix B.

2.2.1 Artificial Fill – Undocumented (Map Symbol - afu)

Undocumented fills consisting of berms and stockpiles were observed across large portions of the site. An estimated 6- to 7-foot tall by 600 feet long by 50 feet wide earthen berm was observed in the southern half of the site along its eastern side, parallel to Airport Drive, along the side of the proposed Building 2. Numerous stockpiles, estimated at approximately 4-feet tall and covering an area of approximately 800 feet long by 350 feet wide, were observed in the southern half of the site, adjacent to the western side of the earthen berm, which cover most of the area of the proposed Building 2. What appeared to be a ditch and berm, estimated at approximately 3 to 4 feet tall and covering an area of approximately 25 feet wide by 200 feet long was observed near the southwestern concave corner of the site, south of the proposed Building 1 and northwest of Building 2. Based on a review of aerial images and a grid-like pattern of weed growth, it appears that stockpiles had once existed near the northeastern corner of the site, covering an area of approximately 250 feet long by 500 feet wide, in the northeastern portion of the proposed Building 1, however, that area appeared flat during our site visit, and it is unclear if the stockpiles had been completely removed. The undocumented fill is interpreted to be dry and loose.

2.2.2 Quaternary Old Alluvium (Map Symbol - Qoa)

Quaternary-aged old alluvium was exposed at the surface of most of the site and was encountered to the maximum depth explored, approximately 50 feet below the ground surface. The old alluvium was found to consist mostly of silty sand and sandy silt with scattered discontinuous beds of sandy clay and clayey sand. The upper 5 feet of the alluvium was generally found to be dry and loose to medium dense, however, at depth it was generally found to be dense to very dense or very stiff to hard and slightly moist to moist in-place.

2.3 Geologic Structure

Geologic structure was not identified in the subject site geotechnical evaluation. The alluvial materials encountered are generally massive, and bedding (if present) is assumed to dip very gently to the southwest.

2.4 Landslides

The topography of the site and surrounding area is generally flat. Our research and field observations do not indicate the presence of landslides on the site or in the immediate vicinity. Review of regional geologic maps of the area do not indicate the presence of known or suspected landslides in the vicinity of the site. Therefore, the possibility of landslides at the site is considered nil.

2.5 Groundwater

Groundwater was not encountered during our subsurface field evaluation to the maximum explored depth of approximately 50 feet below existing ground surface. Historical high groundwater is anticipated to be deeper than 50 feet below the existing ground surface. The California Department of Water Resources Water Data Library (CDWR, 2022) indicates several wells existed within approximately 2.5-miles to the northwest and southwest of the site; however, the wells were not frequently monitored. Based on the data, it appears that groundwater between approximately 1969 and 2011 ranged from approximately 130 to 500 feet below the ground surface. The Kern River is located approximately 2 miles southeast of the site, at an elevation that is approximately 100 feet lower than the lowest point on the site.

Seasonal fluctuations of groundwater elevations should be expected over time. In general, groundwater levels fluctuate with the seasons and local zones of perched groundwater may be present within the near-surface deposits due to local seepage or during rainy seasons. Groundwater conditions below the site may be variable, depending on numerous factors including seasonal rainfall, local irrigation and groundwater pumping, among others.

2.6 __Faulting__

California is located on the boundary between the Pacific and North American Lithospheric Plates. The average motion along this boundary is on the order of 50-mm/yr. in a right-lateral sense. The majority of the motion is expressed at the surface along the northwest trending San Andreas Fault Zone with lesser amounts of motion accommodated by sub-parallel faults located predominantly west of the San Andreas including the San Jacinto, Elsinore, Newport-Inglewood, Rose Canyon, and Coronado Bank Faults. Within Southern California, a large bend in the San Andreas Fault north of the San Gabriel Mountains has resulted in a transfer of a portion of the right-lateral motion between the plates into left-lateral displacement and vertical uplift. Compression south and west of the bend has resulted in folding, left-lateral, reverse thrust faulting, and regional uplift creating the east-west trending Transverse Ranges and several east-west trending faults including the Garlock Fault.

Prompted by damaging earthquakes in Northern and Southern California, State legislation and policies concerning the classification and land-use criteria associated with faults have been developed. The Alquist-Priolo Earthquake Fault Zoning Act was implemented in 1972 to prevent the construction of urban developments across the trace of active faults. California Geologic Survey Special Publication 42 was created to provide guidance for following and implementing the law requirements. Special Publication 42 was most recently revised in 2018 (CGS, 2018). According to the State Geologist, a "Holocene-active" fault is defined as one which has had surface displacement within Holocene time (roughly the last 11,700 years). Regulatory Earthquake Fault Zones have been delineated to encompass traces of known, Holocene-active faults to address hazards associated with surface fault rupture within California. Where developments for human occupation are proposed within these zones, the state requires detailed fault evaluations be performed so that engineering-geologists can identify the locations of active faults and recommend setbacks from locations of possible surface fault rupture.

The subject site is not located within a State of California Fault Rupture Hazard Zone (CGS, 2018 and 2022). The major faults of the San Andreas Fault and Garlock Fault are approximately 40 miles southwest and 40 miles southeast of the site, respectively. The nearest Holocene-active faults identified by CGS are the Kern Front Fault located approximately 1 mile northeast of the site and the Premier Fault located approximately 3 miles to the northwest of the site. No Holocene-active faults are known to cross the site, therefore, the possibility of damage due to ground rupture is considered low.

Secondary effects of seismic shaking resulting from large earthquakes on the major faults in the Southern California region, which may affect the site, include ground lurching and shallow ground rupture, soil liquefaction, dynamic settlement, seiches and tsunamis. These secondary effects of seismic shaking are a possibility throughout the Southern California region and are dependent on the distance between the site and causative fault, and the onsite geology. A discussion of these secondary effects is provided in the following sections.

2.6.1 Lurching and Shallow Ground Rupture

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are not likely to be significant where the thickness of soft sediments do not vary appreciably under structures. Ground rupture due to active faulting is not likely to occur onsite due to the absence of known active fault traces. Ground cracking due to shaking from distant seismic events is not considered a significant hazard, although it is a possibility at any site.

2.6.2 Liquefaction and Dynamic Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Studies indicate that saturated, loose near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction, depending on their plasticity and moisture content. Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry loose sands can occur as the sand particles tend to settle and densify as a result of a seismic event.

Due to the depth of groundwater greater than 50 feet, and the generally dense/hard nature of underlying native soils, the potential for liquefaction and liquefaction-induced settlement is considered very low.

2.6.3 Lateral Spreading

Lateral spreading is a type of liquefaction-induced ground failure associated with the lateral displacement of surficial blocks of sediment resulting from liquefaction in a subsurface layer. Once liquefaction transforms the subsurface layer into a fluid mass, gravity plus the earthquake inertial forces may cause the mass to move down-slope towards a free face (such as a river channel or an embankment). Lateral spreading may cause large horizontal displacements and such movement typically damages pipelines, utilities, bridges, and structures.

Due to the very low potential for liquefaction, the potential for lateral spreading is also considered very low.

2.6.4 Tsunamis and Seiches

Based on the elevation of the site, with respect to sea level, the possibility of damage to the site during a large tsunami event is considered nil. There are no nearby large, enclosed bodies of water, therefore the possibility of damage due to a seiche is nil.

2.7 *Seismic Design Parameters*

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2019/2022 California Building Code (CBC) and applicable portions of ASCE 7-16 which has been adopted by the CBC. Please note that the following seismic parameters are only applicable for code-based acceleration response spectra and are not applicable for where site-specific ground motion procedures are required by ASCE 7-16. Representative site coordinates of latitude 35.4283 degrees north and longitude -119.0396 degrees west were utilized in our analyses. The maximum considered earthquake (MCE) spectral response accelerations (S_{MS} and S_{M1}) and adjusted design spectral response acceleration parameters (S_{DS} and S_{D1}) for Site Class D are provided in Table 2 below. The structural designer should contact the geotechnical consultant if structural conditions (e.g., number of stories, seismically isolated structures, etc.) require site-specific ground motions.

TABLE 2

Seismic Design Parameters

Selected Parameters from 2019/2022 CBC, Section 1613 - Earthquake Loads	Seismic Design Values	Notes/Exceptions
Distance to applicable faults classifies the site as a "Near-Fault" site.		Section 11.4.1 of ASCE 7
Site Class	D	Chapter 20 of ASCE 7
Ss (Risk-Targeted Spectral Acceleration for Short Periods)	0.882g	From SEAOC, 2022
S_1 (Risk-Targeted Spectral Accelerations for 1-Second Periods)	0.320g	From SEAOC, 2022
F_a (per Table 1613.2.3(1))	1.147	For Simplified Design Procedure of Section 12.14 of ASCE 7, F_a shall be taken as 1.4 (Section 12.14.8.1)
F_v (per Table 1613.2.3(2))	1.980	-
S_{MS} for Site Class D [Note: $S_{MS} = F_aS_S$]	1.012g	-
S_{M1} for Site Class D [Note: $S_{M1} = F_vS_1$]	0.634g	-
S_{DS} for Site Class D [Note: $S_{DS} = (^2/_3)\ S_{MS}$]	0.675g	-
S_{D1} for Site Class D [Note: $S_{D1} = (^2/_3)\ S_{M1}$]	0.423g	-
C_{RS} (Mapped Risk Coefficient at 0.2 sec)	0.924	ASCE 7 Chapter 22
C_{R1}(Mapped Risk Coefficient at 1 sec)	0.922	ASCE 7 Chapter 22

A deaggregation of the PGA based on a 2,475-year average return period (MCE) indicates that an earthquake magnitude of 6.34 at a distance of approximately 19.73 km from the site would contribute the most to this ground motion. A deaggregation of the PGA based on a 475-year average return period (Design Earthquake) indicates that an earthquake magnitude of 6.51 at a distance of approximately 29.11 km from the site would contribute the most to this ground motion (USGS, 2014).

Section 1803.5.12 of the 2019/2022 CBC (per Section 11.8.3 of ASCE 7) states that the maximum considered earthquake geometric mean (MCE_G) Peak Ground Acceleration (PGA) should be used for liquefaction potential. The PGA_M for the site is equal to 0.466g (SEAOC, 2022). The design PGA is equal to 0.311g (2/3 of PGA_M).

2.8 ***Subsidence***

Subsidence is the settlement of the ground surface over large areas (typically on the order of square miles) typically due to the lowering of the groundwater table. Mitigation against such a large-scale groundwater drawdown cannot be performed on a site-specific level, but instead "requires regional cooperation among numerous agencies" and therefore is not a site-specific geotechnical consideration. The soils encountered in our field evaluation did not generally indicate the presence of soils susceptible to collapse or excessive settlement. Based on the local site geologic conditions, the potential for subsidence in the site development area is considered low.

2.9 ***Rippability***

In general, excavation for foundations and underground improvements should be achievable with the appropriate earthwork equipment.

2.10 ***Oversized Material***

Encountering significant quantities of oversized material (material larger than 8 inches in maximum dimension) is not anticipated during grading. Recommendations are provided for appropriate handling of oversized materials, if encountered, in Appendix D. If feasible, crushing oversized materials or exporting to an offsite location may be considered.

2.11 ***Expansion Potential***

Based on the results of laboratory testing, site soils are anticipated to have a "Very Low" expansion potential. Final expansion potential of site soils should be determined at the completion of grading. Results of expansion testing at finish grades will be utilized to confirm final foundation design.

3.0 FINDINGS AND CONCLUSIONS

Based on the results of our geotechnical evaluation, it is our opinion that the proposed site development is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are incorporated into the site design, grading, and construction.

The following is a summary of the primary geotechnical factors, which may affect future development of the site.

- In general, our subsurface evaluation primarily indicates that the site contains medium dense to very dense silty sands and stiff to very stiff and sandy silts with occasional clay layers to the maximum explored depth of approximately 50 feet below existing grade. Undocumented fills consisting of stockpiles and earthen berms up to approximately 6 to 7 feet in height are located on large portions of the site. The undocumented fill and near-surface compressible native soils are not suitable for the planned improvements in their present condition (refer to Section 4.1).
- From a geotechnical perspective, onsite soils are anticipated to be suitable for use as general compacted fill, provided they are screened of construction debris and any oversized material (8 inches in greatest dimension). Significant moisture conditioning of site soils should be anticipated to achieve adequate compaction.
- Groundwater was not encountered to the maximum explored depth of approximately 50 feet below existing ground surface. Historical high groundwater is anticipated to be greater than 50 feet below existing ground surface (CDWR, 2022).
- The subject site is not located within an Alquist-Priolo Earthquake Fault Zone. No active faults are mapped on the site. No faults were identified on the site during our site evaluation. The proposed development will likely be subjected to strong seismic ground shaking during its design life from one of the regional faults.
- Due to a lack of groundwater in the upper 50 feet and the generally dense/hard on underlying native soils, the potential for liquefaction and liquefaction-induced settlement is considered very low.
- Based on laboratory testing, soils exposed at the proposed foundation level are anticipated to have a "Very Low" expansion potential (EI not exceeding 20). This shall be confirmed at the completion of site earthwork.
- Excavation for foundations and underground improvements should be achievable with the appropriate earthwork equipment.
- The field infiltration tests indicated observed infiltration rates of 0.1 inch/hour to 0.8 inch/hour for I-1 through I-4. These values do not include any factor of safety. The site contains significant amounts of soils with high fines content (i.e., typically silts), and these soils typically have very low infiltration rates.
- The site contains soils with high fines content (i.e., typically silts) that are not suitable for backfill of retaining walls. Therefore, select grading and stockpiling of native suitable sandy soils and/or import of select sandy soils meeting project recommendations will be required for retaining wall backfill.

4.0 RECOMMENDATIONS

The following recommendations are to be considered preliminary and should be confirmed upon completion of earthwork operations. In addition, they should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the County. It is the responsibility of the builder to ensure these recommendations are provided to the appropriate parties.

It should be noted that the following geotechnical recommendations are intended to provide sufficient information to develop the site in general accordance with the 2019/2022 California Building Code (CBC) requirements. With regard to the potential occurrence of potentially catastrophic geotechnical hazards such as fault rupture, earthquake-induced landslides, liquefaction, etc. the following geotechnical recommendations should provide adequate protection for the proposed development to the extent required to reduce seismic risk to an "acceptable level." The "acceptable level" of risk is defined by the California Code of Regulations as "the level that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project" [Section 3721(a)]. Therefore, repair and remedial work of the proposed improvement may be required after a significant seismic event. With regards to the potential for less significant geologic hazards to the proposed development, the recommendations contained herein are intended as a reasonable protection against the potential damaging effects of geotechnical phenomena such as expansive soils, fill settlement, groundwater seepage, etc. It should be understood, however, that although our recommendations are intended to maintain the structural integrity of the proposed development and structures given the site geotechnical conditions, they cannot preclude the potential for some cosmetic distress or nuisance issues to develop as a result of the site geotechnical conditions.

The geotechnical recommendations contained herein must be confirmed to be suitable or modified based on the actual exposed conditions.

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of required earthwork removals, foundation construction and utility line construction and backfill. We recommend that earthwork onsite be performed in accordance with the following recommendations, Kern County, 2019/2022 CBC and the General Earthwork and Grading Specifications included in Appendix D. In case of conflict, the following recommendations shall supersede previous recommendations and those included as part of Appendix D.

4.1.1 Site Preparation

Prior to grading of areas to receive structural fill, engineered structures or improvements should be demolished and the area should be cleared of existing vegetation (shrubs, trees, grass, etc.), surface obstructions, existing debris and potentially compressible or otherwise unsuitable material. Debris should be removed and properly disposed of off-site. Holes resulting from the removal of buried obstructions, which extend below proposed removal bottoms, should be replaced with suitable compacted fill material. Any abandoned utility lines should be completely removed and replaced with properly compacted fill.

If cesspools or septic systems are encountered, they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, cesspools can be backfilled with lean sand-cement slurry. Any encountered wells should be properly abandoned in accordance with regulatory requirements. At the conclusion of the clearing operations, a representative of LGC Geotechnical should observe and accept the site prior to further grading.

4.1.2 Removal Depths and Limits

In order to provide a relatively uniform bearing condition for the planned improvements, undocumented fill and the upper loose/compressible native soils are to be removed and replaced as properly compacted fills. The undocumented fill includes stockpiles estimated at approximately 4 feet in heigh and earthen berms estimated at approximately 6 to 7 feet in height. Undocumented fills must be removed, cleared of debris, and may then be stockpiled and utilized as fill material. After the undocumented fill has been removed, the removals of the loose/compressible native soils should then be performed. For preliminary planning purposes, the depth of required removals may be estimated as indicated below.

Building Structures: Removals should extend a minimum depth of footings, whichever is greater. In general, the envelope for removals should extend laterally a minimum horizontal distance equal to the fill thickness so that a 1:1 (horizontal to vertical) plane may be projected from the footing to the edge of the removal, with a minimum lateral extent of 5 feet beyond the edges of the proposed building footprint. The removals for loading dock areas, which typically act as retaining walls, should extend a minimum of 2 feet below the bottom of the proposed footings, which is likely deeper than 5 feet below existing grade, depending upon the design of the loading docks.

Retaining/Free-Standing Wall Structures: Removals should extend a minimum of 3 feet below existing grade (not including overlying stockpiles), or 1-foot below proposed footings, whichever is greater.

Pavement and Hardscape Areas: Removals should extend to a depth of at least 2 feet below existing grade (not including overlying stockpiles). In general, the envelope for removals should extend laterally a minimum lateral distance of 2 feet beyond the edges of the proposed improvements.

Local conditions may be encountered during excavation that could require additional over-excavation beyond the above-noted minimum in order to obtain an acceptable subgrade including localized areas of undocumented fill. The actual depths and lateral extents of grading will be determined by the geotechnical consultant, based on subsurface conditions encountered during grading. Removal areas should be accurately staked in the field by the Project Surveyor.

4.1.3 Temporary Excavations

Temporary excavations should be performed in accordance with project plans, specifications, and applicable Occupational Safety and Health Administration (OSHA) requirements. Excavations should be laid back or shored in accordance with OSHA requirements before personnel or equipment are allowed to enter. Based on our field investigation, the majority of site soils are anticipated to be OSHA Type "C" soils (refer to the attached boring logs). Sandy soils are present and should be considered susceptible to caving. Soil conditions should be regularly evaluated during construction to verify conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination with the geotechnical consultant should be maintained to facilitate construction while providing safe excavations. Excavation safety is the sole responsibility of the contractor.

Vehicular traffic, stockpiles, and equipment storage should be set back from the perimeter of excavations a minimum distance equivalent to a 1:1 projection from the bottom of the excavation or 5 feet, whichever is greater. Once an excavation has been initiated, it should be backfilled as soon as practical. Prolonged exposure of temporary excavations may result in some localized instability. Excavations should be planned so that they are not initiated without sufficient time to shore/fill them prior to weekends, holidays, or forecasted rain.

It should be noted that any excavation that extends below a 1:1 (horizontal to vertical) projection of an existing foundation will remove existing support of the structure foundation. If requested, temporary shoring parameters can be provided.

4.1.4 Removal Bottoms and Subgrade Preparation

In general, removal bottom areas and any areas to receive compacted fill should be scarified to a minimum depth of 6 inches, brought to a near-optimum moisture condition, and re-compacted per project recommendations.

Removal bottoms and areas to receive fill should be observed and accepted by the geotechnical consultant prior to subsequent fill placement.

4.1.5 Material for Fill

From a geotechnical perspective, the onsite soils are generally considered suitable for use as general compacted fill (i.e., non-retaining wall backfill), provided they are screened of organic materials, construction debris and any oversized material (8 inches in greatest dimension). Significant moisture conditioning of site soils should be anticipated as outlined in the section below.

From a geotechnical viewpoint, any required import soils should consist of clean, relatively granular soils of Very Low expansion potential (expansion index 20 or less based on ASTM D4829) and no particles larger than 3 inches in greatest dimension.

Source samples of planned importation should be provided to the geotechnical consultant for laboratory testing a minimum of 3 working days prior to any planned importation for required laboratory testing.

Any required retaining wall backfill should consist of sandy soils with a maximum of 35 percent fines (passing the No. 200 sieve) per American Society for Testing and Materials (ASTM) Test Method D1140 (or ASTM D6913/D422) and a Very Low expansion potential (EI of 20 or less per ASTM D4829). Soils should also be screened of organic materials, construction debris and any material greater than 3 inches in maximum dimension. The site contains soils that are not suitable for retaining wall backfill due to their fines content; therefore, select grading and stockpiling and/or import of select sandy soils will be required by the contractor to obtain suitable retaining wall backfill soil.

Aggregate base (crushed aggregate base or crushed miscellaneous base) should conform to the requirements of Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook") for untreated base materials (except processed miscellaneous base) or Caltrans Class 2 aggregate base.

4.1.6 Fill Placement and Compaction

Material to be placed as fill should be brought to near-optimum moisture content (generally at about 2 percent above optimum moisture content) and recompacted to at least 90 percent relative compaction (per ASTM D1557). Significant moisture conditioning of site soils should be anticipated in order to achieve the required degree of compaction. In general, soils will require additional moisture conditioning in order to achieve the required compaction are present. Soils may also be present that will require drying and/or mixing the very moist soils prior to reusing the materials in compacted fills. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in loose thickness. Each lift should be thoroughly compacted and accepted prior to subsequent lifts. Generally, placement and compaction of fill should be performed in accordance with local grading ordinances and with observation and testing by the geotechnical consultant. Oversized material as previously defined should be removed from site fills.

Fill placed on any slopes greater than 5:1 (horizontal to vertical) should be properly keyed and benched into firm and competent soils as it is placed in lifts. During backfill of excavations, the fill should be properly benched into firm and competent soils of temporary backcut slopes as it is placed in lifts.

Aggregate base material should be compacted to a minimum of 95 percent relative compaction at or slightly above-optimum moisture content per ASTM D1557. Subgrade below aggregate base should be compacted to a minimum of 90 percent relative compaction per ASTM D1557 at or slightly above-optimum moisture content.

If gap-graded ¾-inch rock is used for backfill (around storm drain storage chambers, retaining wall backfill, etc.) it will require compaction. Rock shall be placed in thin lifts (typically not exceeding 6 inches) and mechanically compacted with observation by the geotechnical consultant. Backfill rock shall meet the requirements of ASTM D2321. Gap-graded rock is required to be wrapped in filter fabric to prevent the migration of fines into the rock backfill.

4.1.7 <u>Trench and Retaining Wall Backfill and Compaction</u>

Bedding material used within the pipe zone should conform to the requirements of the current Greenbook and the pipe manufacturer. Where applicable, sand having a sand equivalent (SE) of 20 or greater (per Caltrans Test Method [CTM] 217) may be used to bed and shade the pipes within the bedding zone. Sand backfill should be densified by jetting or flooding and then tamped to ensure adequate compaction. Bedding sand should be from a natural source, manufactured sand from recycled material is not suitable for jetting. The onsite soils may generally be considered suitable as trench backfill (zone defined as 12 inches above the pipe to subgrade), provided the soils are screened of rocks greater than 6 inches in maximum dimension, construction debris and organic material. Trench backfill should be compacted in uniform lifts (as outlined in Section 4.1.5 "Material for Fill") by mechanical means to at least 90 percent relative compaction (per ASTM D1557). If gap-graded rock is used for trench backfill, refer to Section 4.1.6.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, flowable fill such as sand-cement slurry may be substituted for compacted backfill. The slurry should contain about one sack of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil. Sand cement slurry placed near the surface within landscape areas should be evaluated for potential impacts on planned improvements.

Any required retaining wall backfill should consist of predominately granular, sandy soils outlined in Section 4.1.5. The limits of select sandy backfill should extend at minimum ½ the height of the retaining wall or the width of the heel (if applicable), whichever is greater (Refer to Figure 2). Retaining wall backfill soils should be compacted in relatively uniform thin lifts to a minimum of 90 percent relative compaction (per ASTM D1557). Jetting or flooding of retaining wall backfill materials should not be permitted. If gap-graded rock is used for retaining wall backfill, refer to Section 4.1.6.

A representative from LGC Geotechnical should observe, probe, and test the backfill to verify compliance with the project recommendations.

4.1.8 <u>Shrinkage and Subsidence</u>

Allowance in the earthwork volumes budget should be made for an estimated ±5 percent reduction in volume of the (non-stockpile) near-surface soils. Stockpiled soils may be estimated to shrink when recompacted on the order of 15 percent or more. It should be stressed that these values are only estimates and that an actual shrinkage factor would be extremely difficult to predetermine. Subsidence, due to earthwork operations, is expected to be on the order of 0.1-foot. These values are estimates only and exclude losses due to removal of any vegetation or debris. The above shrinkage estimate is intended as an aid for others in determining preliminary earthwork quantities.

However, these estimates should be used with some caution since they are not absolute values. The effective shrinkage of onsite soils will depend primarily on the type of compaction equipment and method of compaction used onsite by the contractor and accuracy of the topographic survey.

4.2 Preliminary Foundation Recommendations

The following foundation recommendations are preliminary and must be confirmed by LGC Geotechnical at the completion of project plans (i.e., foundation, grading, etc.) as well as completion of earthwork. Please note that foundation recommendations are based on estimated structural loads. Increase of structural loads may require revision of the provided foundation recommendations and parameters and/or revised remedial recommendations.

Based on preliminary laboratory testing, site soils are anticipated to be of Very Low expansion potential (EI of 20 or less per ASTM D4829). However, this must be verified based on as-graded conditions. Recommended soil bearing and estimated static settlement are provided in Section 4.3. Since site soils are anticipated to be of "Very Low" expansion potential special design considerations from a geotechnical perspective are not anticipated to be required.

4.2.1 Slab Design and Construction

From a geotechnical perspective, minimum slab thicknesses of 6 inches and 4 inches are recommended for new slabs in the warehouse areas and office areas, respectively. Slabs are to be supported on compacted fill soils properly prepared in accordance with the recommendations provided in this report. Actual slab reinforcement and thickness should be determined by the structural engineer based on the imposed loading. Additional slab-on-grade recommendations can be provided for alternative building types upon request.

The foundation designer may use a modulus of vertical subgrade reaction (k) of 150 pounds per cubic inch (pounds per square inch per inch of deflection). This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed footing using the following formula:

$k = 150 \times [(B+1)/2B]^2$
k = modulus of vertical subgrade reaction, pounds per cubic inch (pci)
B = foundation width (feet)

It is recommended that subgrade soils below slabs be moisture conditioned in order to maintain the recommended moisture content up to the time of concrete placement. The recommended moisture content of the slab subgrade soils should be between optimum moisture content and approximately 2 percent above optimum moisture content to a minimum depth of 12 inches. The moisture content of the slab subgrade should be verified by the geotechnical consultant within 1 to 2 days prior to concrete placement. In addition, this moisture content should be maintained around the immediate perimeter of the slab during construction and up to occupancy of the building structures.

The following recommendations are for informational purposes only, as they are unrelated to the geotechnical performance of the foundation. The following recommendations may be superseded by the foundation engineer and/or owner. Some post-construction moisture migration should be expected below the foundation. In general, interior floor slabs with moisture sensitive floor coverings should be underlain by a minimum 10 mil thick polyolefin material vapor retarder, which has a water vapor transmission rate (permeance) of less than 0.03 perms. The need for sand and/or the sand thickness (above and/or below the vapor retarder) should be specified by the structural engineer, architect or concrete contactor. The selection and thickness of sand is not a geotechnical engineering issue and is therefore outside our purview.

4.2.2 Shallow Foundation Maintenance

The geotechnical parameters provided herein assume that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage and adequately maintained so that ponding, which causes significant moisture changes below the foundation, does not occur. Our recommendations do not account for excessive irrigation and/or incorrect landscape design. Plants should only be provided with sufficient irrigation for life and not overwatered to saturate subgrade soils. Sunken planters placed adjacent to the foundation, should either be designed with an efficient drainage system or liners to prevent moisture infiltration below the foundation. Some lifting of the perimeter foundation beam should be expected even with properly constructed planters.

In addition to the factors mentioned above, future owners/property management personnel should be made aware of the potential negative influences of trees and/or other large vegetation. Roots that extend near the vicinity of foundations can cause distress to foundations. Future owners (and the owner's landscape architect) should not plant trees/large shrubs closer to the foundations than a distance equal to half the mature height of the tree or 20 feet, whichever is more conservative unless specifically provided with root barriers to prevent root growth below the building foundation.

It is the owner's responsibility to perform periodic maintenance during hot and dry periods to ensure that adequate watering has been provided to keep soil from separating or pulling back from the foundation. Future owners and property management personnel should be informed and educated regarding the importance of maintaining a constant level of soil-moisture. The owners should be made aware of the potential negative consequences of both excessive watering, as well as allowing potentially expansive soils to become too dry. Expansive soils can undergo shrinkage during drying, and swelling during the rainy winter season, or when irrigation is resumed. This can result in distress to building structures and hardscape improvements. These recommendations should be provided to future owners and property management personnel.

4.3 Soil Bearing and Lateral Resistance

Provided our earthwork recommendations are implemented, the following minimum footing widths and embedments for isolated spread and continuous wall footings are recommended for the corresponding allowable bearing pressures.

TABLE 3

Allowable Soil Bearing Pressures

Allowable Static Bearing Pressure (psf)	Minimum Footing Width (feet)	Minimum Footing Embedment* (feet)
3,000	4	2
2,500	3	2
2,000	2	1.5
1,500	1.5	1

*Refers to minimum depth to the bottom of the footing below lowest adjacent finish grade.

These allowable bearing pressures are applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Bearing values indicated above are for total dead loads and live loads. The above vertical bearing may be increased by one-third for short durations of loading which will include the effect of wind or seismic loading. The increase is based on a reduced factor of safety (seismic factor of safety equal to three-fourths of the static factor of safety) for short duration loading.

Soil settlement is a function of footing dimensions and applied soil bearing pressure. In utilizing the above-mentioned allowable bearing capacity and provided our earthwork recommendations are implemented, foundation settlement due to structural loads is anticipated to be on the order of 1-inch or less. Differential static settlement may be taken as half of the static settlement (i.e., ½-inch over a horizontal span of 40 feet). Additionally, differential settlement should be anticipated between nearby columns or walls where a large differential loading condition exists. Settlement estimates should be updated by LGC Geotechnical when the final foundation plans are available.

Resistance to lateral loads can be provided by friction acting at the base of foundations and by passive earth pressure. For concrete/soil frictional resistance, an allowable coefficient of friction of 0.30 may be assumed with dead-load forces. An allowable passive lateral earth pressure of 250 psf per foot of depth (or pcf) to a maximum of 2,500 psf may be used for lateral resistance. Allowable passive pressure may be increased to 340 pcf (maximum of 3,400 psf) for short duration seismic loading. This passive pressure is applicable for level (ground slope equal to or flatter than 5 horizontal feet to 1-foot vertical) conditions only. Frictional resistance and passive pressure may be used in combination without reduction. We recommend that the upper foot of passive resistance be neglected if finished grade will not be covered with concrete or asphalt concrete. The provided allowable passive pressures are based on a factor of safety of 1.5 and 1.1 for static and seismic loading conditions, respectively.

4.4 Lateral Earth Pressures for Retaining Walls

Lateral earth pressures are provided as equivalent fluid unit weights, in pound per square foot (psf) per foot of depth or pcf. These values do not contain an appreciable factor of safety, so the retaining wall designer should apply the applicable factors of safety and/or load factors during design.

The following lateral earth pressures are presented on Table 4 below for approved select granular soils with a maximum of 35 percent fines (passing the No. 200 sieve per ASTM D-421/422) and Very Low expansion potential (EI of 20 or less per ASTM D4829). The wall designer should clearly indicate on the retaining wall plans the required sandy soil backfill criteria.

TABLE 4

Lateral Earth Pressures – Select Sandy Backfill

Conditions	Equivalent Fluid Unit Weight (pcf)
	Level Backfill
	Approved Soils
Active	35
At-Rest	55

If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the earth pressure will be higher. This would include 90-degree corners of retaining walls. Such walls should be designed for "at-rest." The equivalent fluid pressure values assume free-draining conditions. Retaining wall structures should be provided with appropriate drainage and appropriately waterproofed (Figure 2). Please note that waterproofing and outlet systems are not the purview of the geotechnical consultant. If conditions other than those assumed above are anticipated, the equivalent fluid pressure values should be provided on an individual-case basis by the geotechnical consultant.

Surcharge loading effects from any adjacent structures should be evaluated by the basement/retaining wall designer. The amount of surcharge loading on a proposed retaining wall structure is primarily a function of the distance, magnitude and lateral extents of the surcharge loading and should be evaluated on a case-by-case basis. In addition to the recommended lateral earth pressure, basement/retaining walls adjacent to streets should be designed to resist vehicular traffic if applicable. Uniform surcharges may be estimated using the applicable coefficient of lateral earth pressure using a rectangular distribution. A factor of 0.5 and 0.3 may be used for at-rest and active conditions, respectively for a level backfill. The vertical traffic surcharge may be determined by the structural designer. The structural designer should contact the geotechnical consultant for any required geotechnical input in estimating any applicable surcharge loads.

If required, the retaining wall designer may use a seismic lateral earth pressure increment of 5 pcf for a level backfill condition. This increment should be applied in addition to the provided static lateral earth pressure using a triangular distribution with the resultant acting at H/3 in relation to the base of the retaining structure (where H is the retained height). For the restrained, at-rest condition, the seismic increment may be added to the applicable active lateral earth pressure (in lieu of the at-rest lateral earth pressure) when analyzing short duration seismic loading. Per Section 1803.5.12 of the 2019/2022 CBC, the seismic lateral earth pressure is applicable to structures assigned to Seismic Design Category D through F for retaining wall structures supporting more than 6 feet of backfill height. The provided seismic lateral earth pressure should not be used for retaining walls exceeding 10 feet in height. If a retaining wall greater than 10 feet in height is proposed or a retaining wall with a sloping backfill condition, the retaining wall designer should contact the geotechnical consultant for specific seismic lateral earth pressure increments based on the configuration of the planned retaining wall structures. Seismic lateral earth pressures are estimated using the procedure outlined by the Structural Engineers Association of California (Lew, et al, 2010).

Soil bearing and lateral resistance (friction coefficient and passive resistance) are provided in Section 4.3. Earthwork considerations (temporary backcuts, backfill, compaction, etc.) for retaining walls are provided in Section 4.1 (Site Earthwork) and the subsequent earthwork related sub-sections.

4.5 Preliminary Pavement Sections

The following provisional minimum asphalt concrete (AC) pavement sections are provided in Table 5 based on an R-value of 20 and assumed Traffic Indices (TI) of 5.0, 6.0 and 7.0. These recommendations should be confirmed with R-value testing of representative near-surface soils at the completion of earthwork. Final pavement sections should be confirmed by the project civil engineer based upon the final design Traffic Index. Determination of the TI is not the purview of the geotechnical consultant. If requested, LGC Geotechnical will provide sections for alternate TI values.

TABLE 5

Paving Section Options

Assumed Traffic Index	5.0	6.0	7.0
R -Value Subgrade	20	20	20
AC Thickness	4.0 inches	4.0 inches	4.0 inches
Aggregate Base Thickness	5.0 inches	9.5 inches	12.0 inches

The provided preliminary Portland Cement concrete pavement section is based on the guidelines of the American Concrete Institute (ACI 330R-08). For the final design section, we recommend a traffic study be performed as LGC Geotechnical does not perform traffic engineering. Traffic study should include the design vehicle (number of axles and load per axle) and estimated number of daily repetitions/trips. Based on an assumed Traffic Category C with an assumed Average Daily Truck Traffic (ADTT) of 100, we recommend a preliminary section of a minimum of 6.5 inches of concrete over 4 inches of compacted aggregate base over compacted subgrade. The concrete should have a minimum compressive strength of 4,000 psi and a minimum flexural strength of 550 psi at the time the pavement is subjected to traffic. Steel reinforcement is not required (ACI, 2013). This pavement section assumes that edge restraints like a curb and gutter will be provided. To reduce the potential (but not eliminate) for cracking, paving should provide control joints at regular intervals not exceeding 10 feet in each direction. Decreasing the spacing of these joints will further reduce, but not eliminate the potential for unsightly cracking. Preliminary pavement section is based on a 30-year design. Truck loading is defined one 16-kip axle and two 32-kip tandem axles (80 kips). Alternate section(s) may be provided based on anticipated specific traffic loadings and repetitions provided by others. LGC Geotechnical does not perform traffic engineering and determination of traffic loading is not the purview of the geotechnical consultant.

The thicknesses shown are for minimum thicknesses. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Earthwork recommendations regarding aggregate base and subgrade are provided in the previous section "Site Earthwork" and the related sub-sections of this report.

4.6 <u>Soil Corrosivity</u>

Although not corrosion engineers (LGC Geotechnical is not a corrosion consultant), several governing agencies in Southern California require the geotechnical consultant to determine the corrosion potential of soils to buried concrete and metal facilities. We therefore present the results of our testing with regard to corrosion for the use of the client and other consultants, as they determine necessary.

Corrosion testing indicated soluble sulfate contents less than approximately 0.02 percent, a chloride content of 21 parts per million (ppm), pH of 7.9, and a minimum resistivity of 2,120 ohm-centimeters. Based on Caltrans Corrosion Guidelines (2021), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 1,500 ppm (0.15 percent) or greater.

Based on laboratory sulfate test results, the near surface soils are designated to a class "S0" per ACI 318, Table 19.3.1.1 with respect to sulfates. This must be verified based on as-graded conditions.

4.7 <u>Nonstructural Concrete Flatwork</u>

Nonstructural concrete (such as flatwork, sidewalks, etc.) has a potential for cracking due to changes in soil volume related to soil-moisture fluctuations. To reduce the potential for excessive cracking and lifting, concrete should be designed in accordance with the minimum guidelines outlined in Table 6 on the following page. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

TABLE 6

Nonstructural Concrete Flatwork for Very Low/Low Expansion Potential

	Flatwork	City Sidewalk Curb and Gutters
Minimum Thickness (in.)	4 (full)	City/Agency Standard
Presoaking	Wet down prior to placing	City/Agency Standard
Reinforcement	No. 3 at 24 inches on centers	City/Agency Standard
Crack Control Joints	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	City/Agency Standard
Maximum Joint Spacing	6 feet	City/Agency Standard
Aggregate Base Thickness (in.)	—	City/Agency Standard

To reduce the potential for nonstructural concrete flatwork to separate from entryways and doorways, the owner may elect to install dowels to tie these two elements together.

4.8 Surface Drainage and Landscaping

Landscape design should limit the potential for surface water to penetrate the soils adjacent to the proposed structures and improvements.

4.8.1 General

Surface drainage should be carefully taken into consideration during precise grading, building construction, future landscaping, and throughout the design life of the industrial structure. Positive drainage should be provided to direct surface water away from improvements and towards either the street or other suitable drainage devices. Ponding of water, adjacent to any structural improvement foundation, must be avoided. The performance of structural foundations is dependent upon maintaining adequate surface drainage away from them, thereby reducing excessive moisture fluctuations.

From a geotechnical perspective, area drains, drainage swales, and finished grade soils should be aligned so as to transport surface water to a minimum distance of 5 feet away from the proposed foundations. Roof gutters and downspout systems should be discharged directly to a pipe or to a paved surface with a positive gradient away from the building and should not outlet directly into unpaved landscape areas.

Decorative gravel tends to act as a reservoir trapping surface water; therefore, we do not recommend it be used adjacent to buildings unless the system is designed with a subsurface drainage system and is properly lined.

4.8.2 *Precise Grading*

From a geotechnical perspective, we recommend that compacted finished grade soils adjacent to the proposed industrial structures be sloped away from the proposed structures and towards an approved drainage device or unobstructed swale. Drainage swales, wherever feasible, should not be constructed within 5 feet of buildings. Where lot and building geometry necessitates that the drainage swales be routed closer than 5 feet to structural foundations, we recommend the use of area drains together with drainage swales. Drainage swales used in conjunction with area drains should be designed by the project civil engineer so that a properly constructed and maintained system will prevent ponding within 5 feet of the foundation. Code compliance of grades is not the purview of the geotechnical consultant. We do not recommend that area drains be connected to basement/retaining subdrains.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made. Overwatering must be avoided.

4.8.3 *Landscaping*

Planters adjacent to a building or structure should be avoided wherever possible or be properly designed (e.g., lined with a membrane and properly outlet), to reduce the penetration of water into the adjacent footing subgrades and thereby reduce moisture related damage to the foundation. Planting areas at grade should be provided with appropriate positive drainage. Wherever possible, exposed soil areas should be above adjacent paved grades to facilitate drainage. Planters should not be depressed below adjacent paved grades unless provisions for drainage, such as multiple depressed area drains, are constructed. Adequate drainage gradients, devices, and curbing should be provided to prevent runoff from adjacent pavement or walks into the planting areas. Irrigation methods should promote uniformity of moisture in planters and beneath adjacent concrete flatwork. Overwatering and underwatering of landscape areas must be avoided. Irrigation levels should be kept to the absolute minimum level necessary to maintain healthy plant life.

Area drain inlets should be maintained and kept clear of debris in order to properly function. The building owner should also be made aware that excessive irrigation of neighboring properties can cause seepage and moisture conditions on adjacent lots.

The impact of heavy irrigation or inadequate runoff gradients can create perched water conditions. This may result in seepage or shallow groundwater conditions where previously none existed. Maintaining adequate surface drainage and controlled irrigation will significantly reduce the potential for nuisance-type moisture problems. To reduce differential earth movements such as heaving and shrinkage due to the change in moisture content of foundation soils, which may cause distress to a structure and associated improvements, moisture content of the soils surrounding the structure should be kept as relatively constant as possible.

4.9 <u>Subsurface Water Infiltration</u>

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. It should be noted that collecting and concentrating surface water for the purpose of intentionally infiltrating it below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, we do not recommend that surface water be intentionally infiltrated into the subsurface soils.

If it is determined that water must be infiltrated due to regulatory requirements, we recommend the absolute minimum amount of water be infiltrated and that the infiltration areas not be located near slopes or near settlement sensitive existing/proposed improvements. Contamination and environmental suitability of the site for infiltration is not the purview of the geotechnical consultant and should be evaluated by others. LGC Geotechnical only addressed the geotechnical issues associated with stormwater infiltration.

As with all systems that are designed to concentrate surface flow and direct the water into the subsurface soils, some minor settlement, nuisance type localized saturation and/or other water related issues should be expected. Due to variability in geologic and hydraulic conductivity characteristics, these effects may be experienced at the onsite location and/or potentially at other locations well beyond the physical limits of the subject site. Infiltrated water may enter underground utility pipe zones or flow along heterogeneous soil layers or geologic structure and migrate laterally impacting other improvements which may be located far away or at an elevation much different than the infiltration source.

Based on the results of our field infiltration testing the observed (no factor of safety) infiltration rates ranged from 0.1 to 0.8 inches per hour (refer to Table 1). The design infiltration rate is typically determined by dividing the observed infiltration rate by a factor of safety.

Please note that the infiltration values reported herein are for native materials only and are not for compacted fill. Water discharge from any infiltration systems should not occur within the zone of influence of foundation footings (column and load bearing wall locations). For preliminary purposes we recommend a minimum setback of 15 feet from the structural improvements. Infiltration shall not be permitted directly on or into compacted fill soils. The infiltration values provided are based on clean water and this requires the removal of trash, debris, soil particles, etc., and on-going maintenance. Over time, siltation, plugging and clogging of the system may reduce the infiltration rate and subsequently reduce the effectiveness of the infiltration system. Any designed infiltration system will require routine periodic maintenance. It should be noted that methods to prevent this shall be the sole responsibility of the infiltration designer and are not the purview of the geotechnical consultant. If adequate measures cannot be incorporated into the design and maintenance of the system, then the infiltration rates may need to be further reduced. These and other factors should be considered in selecting a design infiltration rate.

We recommend the design of any infiltration system include at least one redundancy or overflow system. It may be prudent to provide an overflow system connected directly to a storm drain system in order to prevent failure of the infiltration system, either as a result of lower than anticipated infiltration with time and/or very high flow volumes.

LGC Geotechnical should be provided with the details early in the design process for geotechnical input.

4.10 Pre-Construction Documentation and Construction Monitoring

A program of documentation and monitoring should be devised and put into practice before the onset of any groundwork. LGC Geotechnical can perform these services at your request. This should include, but not necessarily be limited to, detailed documentation of the existing improvements, buildings, and utilities around the area of proposed excavation, with particular attention to any distress that is already present prior to the start of work. At the completion of construction, we recommend that the adjacent properties be re-documented to confirm their condition after potentially damaging activities are completed. In the event of future claims, any post-construction damage may be attributed to other causes.

4.11 Geotechnical Plan Review

Project plans (e.g., grading, foundation, retaining wall, etc.) and any other improvement plans, and final project drawings should be reviewed by this office prior to construction to verify that our geotechnical recommendations, provided herein, have been appropriately incorporated. Additional or modified geotechnical recommendations may be required based on the proposed design.

4.12 Geotechnical Observation and Testing During Construction

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction by a representative of LGC Geotechnical. Geotechnical observation and testing is required per Section 1705 of the 2019/2022 California Building Code (CBC).

Geotechnical observation and/or testing should be performed by LGC Geotechnical at the following stages:

- During grading (removal bottoms, fill placement, etc.);
- During retaining wall backfill and compaction;

- During utility trench backfill and compaction;
- During precise grading;
- Preparation of building pads and other concrete-flatwork subgrades, and prior to placement of aggregate base or concrete;
- After building and wall footing excavation and prior to placement of steel reinforcement and/or concrete;
- Preparation of pavement subgrade and placement of aggregate base; and
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

5.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The samples taken and submitted for laboratory testing, the observations made, and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if LGC Geotechnical has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

In addition, changes in applicable or appropriate standards may 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 our control. Therefore, this report is subject to review and modification, and should not be relied upon after a period of 3 years.

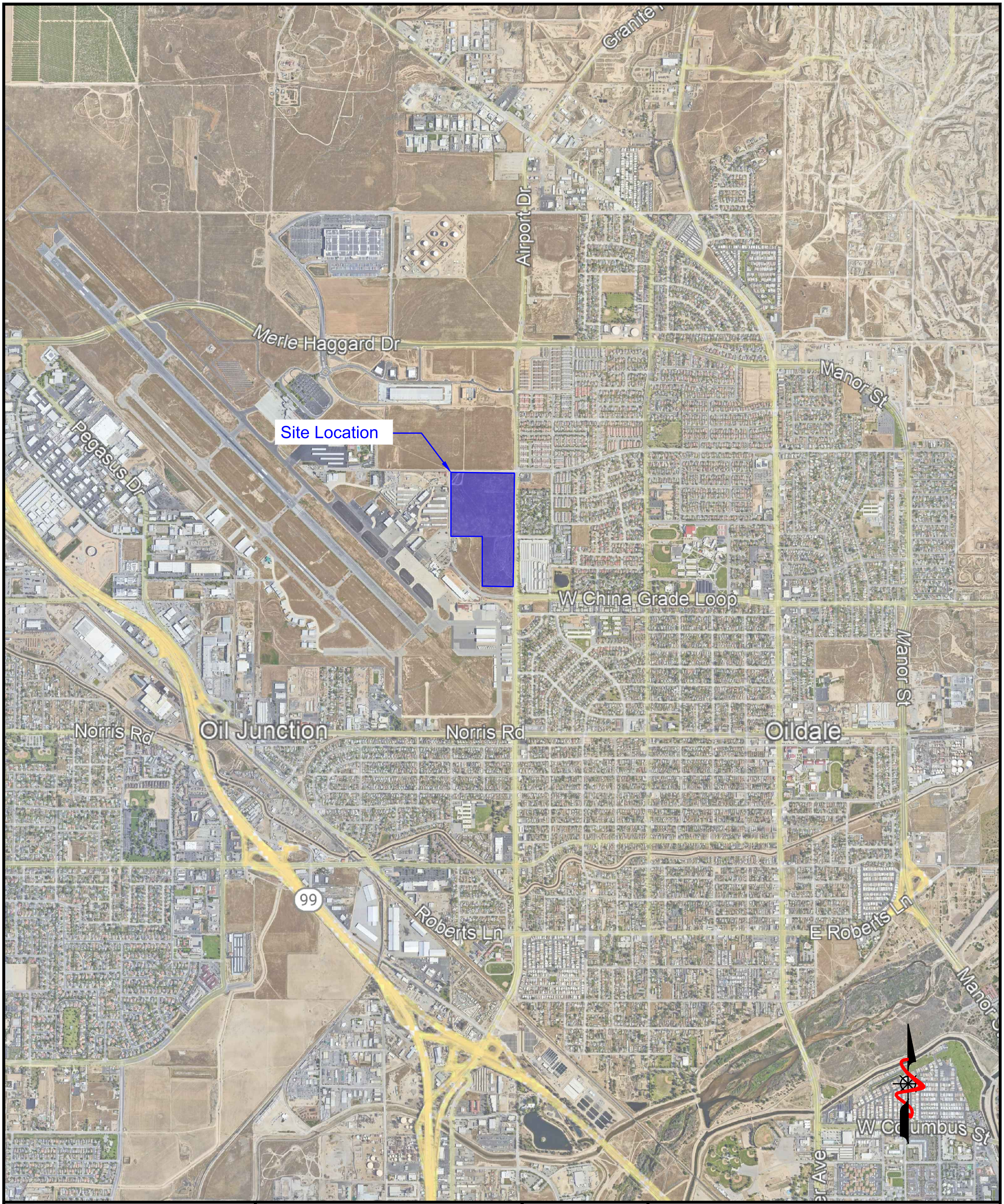

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FIGURE 1
Site Location Map

PROJECT NAME	IPG - ARB 52
PROJECT NO.	22203-01
ENG. / GEOL.	BTZ / KBC
SCALE	Not to Scale
DATE	November 2022

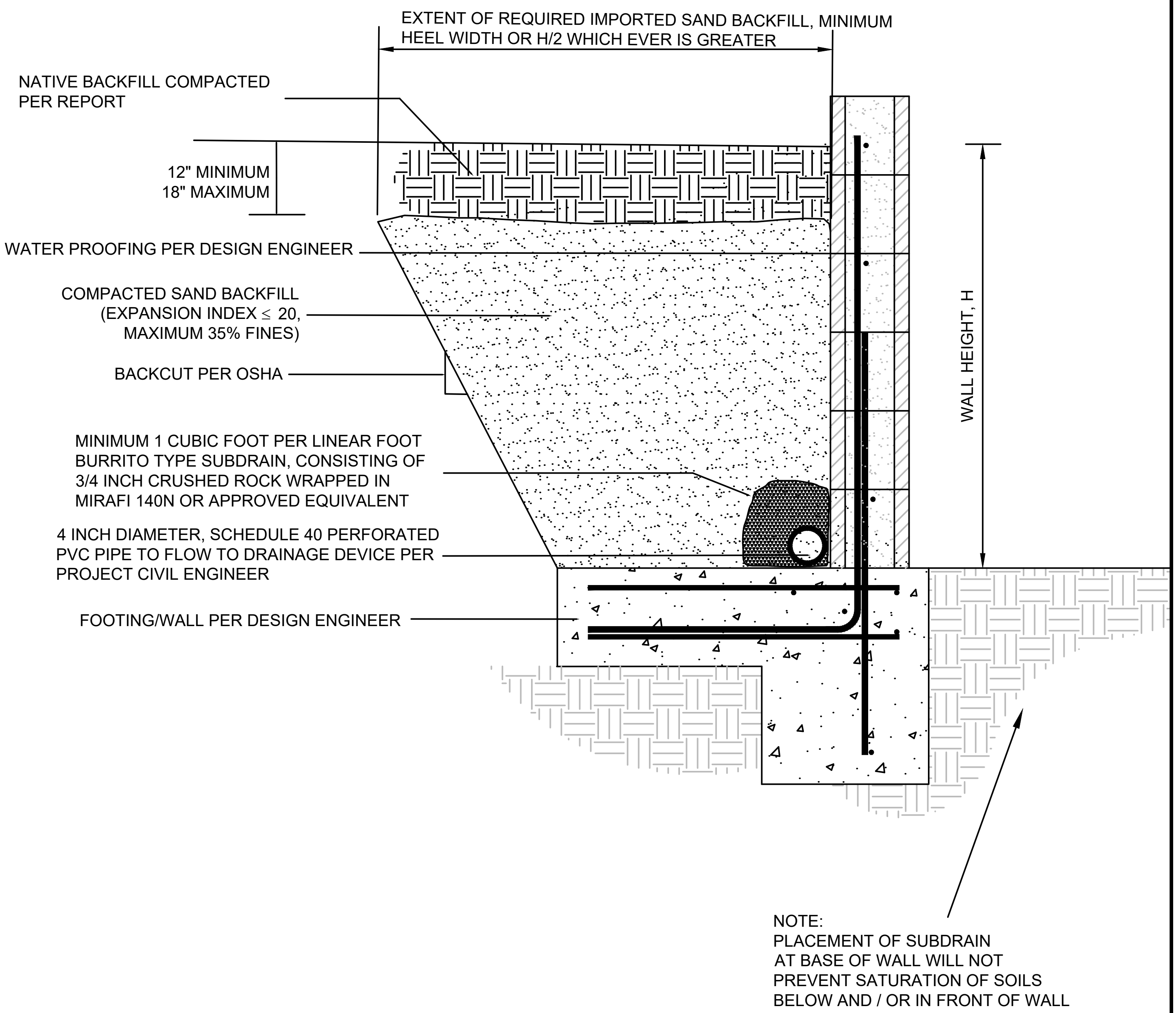

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FIGURE 2
Retaining Wall Backfill Detail

PROJECT NAME	IPG - ARB 52
PROJECT NO.	22203-01
ENG. / GEOL.	BTZ/KBC
SCALE	Not to Scale
DATE	December 2022

Appendix A
References

APPENDIX A

References

American Concrete Institute, 2013, Guide for the Design and Construction of Concrete Parking Lots (ACI 330R-08), fifteenth printing, November 2013.

________, 2017, Guide for the Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities (ACI 3302R-17), May 2017.

________, 2019, Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19), June 2019.

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16, 2017.

________, 2018, Standard 7-16, Minimum Design Loads for Buildings and Associated Criteria for Buildings and Other Structures, Supplement 1, effective: December 12, 2018.

American Society for Testing and Materials (ASTM), Volume 04.08 Soil and Rock (I):D420 – D5876.

California Building Standards Commission, 2019, California Building Code (CBC), California Code of Regulations Title 24, Volumes 1 and 2, dated July 2019.

________, 2022, California Building Code (CBC), California Code of Regulations Title 24, Volumes 1 and 2, dated July 2022.

California Department of Transportation (Caltrans), 2021, Corrosion Guidelines, Version 3.2, dated May 2021.

California Department of Water Resources (CDWR), 2022, Water Data Library, retrieved October 27, 2022, from https://wdl.water.ca.gov/waterdatalibrary/

California Geological Survey (CGS), (Previously California Division of Mines and Geology [CDMG]), 2002, California Geomorphic Provinces, CGS Note 36, dated 2002.

________, 2008, California Geological Survey Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California.

_________, 2018, Earthquake Fault Zones, Special Publication 42, Revised 2018.

________, 2022, Earthquake Zones of Required Investigation, web application, retrieved October 27, 2022, from https://maps.conservation.ca.gov/cgs/EQZApp/

Kier+Wright, 2022, Preliminary Grading & Drainage Plan of Airport & Boughton Drive for Industrial Property Group, Inc., Kern County, California, dated November, 2022, received November 28, 2022.

Lew, et al, 2010, Seismic Earth Pressures on Deep Basements, Structural Engineers Association of California (SEAOC) Convention Proceedings.

Smith, A.R. (Compiled by), 1964, Geologic Map of California, Bakersfield Sheet, Olaf. P. Jenkins Edition, California Division of Mines and Geology, map dated 1964, Third Printing dated 1975.

Structural Engineers Association of California (SEAOC), 2022, Seismic Design Maps, Retrieved November 29, 2022, from https://seismicmaps.org/

United States Geological Survey (USGS), 2014, Unified Hazard Tool, Dynamic: Conterminous U.S. 2014 (update) (v4.2.0), Retrieved December 2, 2022, from: https://earthquake.usgs.gov/hazards/interactive/

Appendix B
Boring Logs & Infiltration Data

Geotechnical Boring Log Borehole HS-1

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~530' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to 1' Undocumented Fill (afu):** @ 0' - Dry tall grass with Silty SAND: light brown, dry	
			R-1	13 14 22	119.3	2.9	SM	**@ 1' to 20' Quaternary Old Alluvium (Qoa):** @ 2.5' - Silty SAND: light brown, slightly moist, medium dense	
525	5	B-1	SPT-1	10 9 10		5.7		@ 5' - Silty SAND: light reddish brown, slightly moist, medium dense	
			R-2	45 46 50	124.4	3.4	SP-SM	@ 7.5' - SAND with Silt: reddish brown, slightly moist, very dense	
520	10		SPT-2	12 14 14		4.8	SM	@ 10' - Silty SAND: reddish brown, slightly moist, dense	
515	15		R-3	16 23 25	119.7	10.8	CL	@ 15' - CLAY: yellowish brown, slightly moist, hard	CN
510	20		SPT-3	5 5 5		5.2	SM	@ 20' - Silty SAND: reddish brown, slightly moist, medium dense	
505	25							Total Depth = 21.5' Groundwater Not Encountered Caving: Hole Measured Approximately 19.8' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/27/2022

Geotechnical Boring Log Borehole HS-2

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~527' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to T.D.' Quaternary Old Alluvium (Qoa):**	SO4
525								@ 0' - Dry tall grass with Silty Sand: light brown, dry	
			SPT-1	11 13 10		3.4	SM	@ 2.5' - Silty SAND: light brown, dry, medium dense	
	5	B-1	R-1	42 44 43	121.4	1.9		@ 5' - Silty SAND: light yellowish brown, dry, very dense	CN
520			SPT-2	11 11 10		8.5	ML	@ 7.5' - Sandy SILT: light brown, slightly moist, very stiff	-#200
	10		R-2	40 34 34	110.2	3.7	SP-SM	@ 10' - SAND with Silt: reddish brown, dry, very dense	
515									
	15		SPT-3	11 12 12		10.8	SM	@ 15' - Silty SAND: light brown, moist, dense	-#200
510									
	20		R-3	33 20 37	120.6	10.6	SC	@ 20' - Clayey SAND: light brown, moist, dense	
505									
	25		SPT-4	10 9 7		2.8	SM	@ 25' - Silty SAND: light reddish brown, slightly moist, medium dense	-#200
500									
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- SO4 SULFATE
- AL ATTERBERG LIMITS
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/27/2022

Geotechnical Boring Log Borehole HS-2

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~527' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
495	30		R-4	22 24 29	114.7	8.8	SM	@ 30' - Silty SAND: reddish brown, moist, dense	
490	35		SPT-5	5 5 5		12.9	CL	@ 35' - Sandy CLAY: brown, moist, stiff	
485	40		R-5	70/6"	118.0	4.2	SC	@ 40' - Clayey SAND: light brown, slightly moist, very dense	
480	45		SPT-6	7 10 19		1.9	SP-SM	@ 45' - SAND with Silt: light yellowish brown, dry, dense	
475	50		R-6	40 50/4"	117.9	1.9		@ 50' - SAND with Silt: light yellowish brown, dry, very dense	
470	55							Total Depth = 50.8' Groundwater Not Encountered Caving: Hole Measured Approximately 30' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
	60								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-3

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~510' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0		B-1					**@ 0' to 20' <u>Quaternary Old Alluvium (Qoa):</u>**	RV
							SC	@ 0' - Dry Grass, Clayey SAND: yellowish brown, dry	
			R-1	21 26 30	118.5	4.1	SM	@ 2.5' - Silty SAND: light brown, slightly moist, dense	
505	5		SPT-1	7 10 10		2.5		@ 5' - Silty SAND: light reddish brown, slightly moist, medium dense	-#200
			R-2	16 14 15	111.8	4.7	SC	@ 7.5' - Clayey SAND: yellowish brown, slightly moist, medium dense	CN
500	10		SPT-2	6 5 7		10.0	SM	@ 10' - Silty SAND: light brown, moist, medium dense	
495	15		R-3	26 28 26	117.1	3.8	SP-SM	@ 15' - SAND with Silt: reddish brown, slightly moist, dense	
490	20		SPT-3	4 6 6		8.2	ML	@ 20' - Sandy SILT: light brown, slightly moist, stiff	
								Total Depth = 21.5' Groundwater Not Encountered Caving: Hole Measured Approximately 17' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
485	25								
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE

GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/27/2022

Geotechnical Boring Log Borehole HS-4

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~515' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@ 0' to 20' Quaternary Old Alluvium (Qoa):** @ 0' - Dry tall grass	EI CR
			SPT-1	23 20 15		2.2	ML	@ 2.5' - Sandy SILT with Gravel: light brown, slightly moist, hard	
510	5		R-1	25 32 39	110.5	8.9	CL	@ 5' - Sandy CLAY: light reddish brown, slightly moist, hard	
			SPT-2	7 6 6		4.4	SP-SM	@ 7.5' - SAND with Silt: light brown, slightly moist, medium dense	
505	10		R-2	33 35 40	119.6	2.1		@ 10' - SAND with Silt: light reddish brown, slightly moist, very dense	
500	15		SPT-3	8 9 12		7.2	SM/ML	@ 15' - Silty SAND/Sandy SILT: brown, moist, medium dense/very stiff	
495	20		R-3	50/3"		2.0	SM	@ 20' - Silty SAND: light brown, slightly moist, very dense	
490	25							Total Depth = 20.3' Groundwater Not Encountered Caving: Hole Measured Approximately 18' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
	30								

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole HS-5

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~509' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@ 0' to 20' Quaternary Old Alluvium (Qoa):**	MD
								@ 0' - Dry grass, Silty SAND: light brown, dry	
			R-1	16 30 40	115.1	6.2	SM	@ 2.5' - Silty SAND: light brown, slightly moist, very dense	
505	5		SPT-1	9 14 11		4.3	ML	@ 5' - SILT: light brown, slightly moist, hard	
			R-2	12 14 15	122.1	5.3	SC	@ 7.5' - Clayey SAND: yellowish brown, slightly moist, medium dense	CN
500	10		SPT-2	8 11 11		3.9	SP-SM	@ 10' - SAND with Silt: reddish brown, slightly moist, medium dense	
495	15		R-3	34 35 41	129.6	6.4	SM	@ 15' - Silty SAND: reddish brown, slightly moist, very dense	
490	20		SPT-3	5 9 14		9.1	ML	@ 20' - Sandy SILT: yellowish brown, slightly moist, very stiff	
485	25							Total Depth = 21.5' Groundwater Not Encountered Caving: Hole Measured Approximately 18' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
480	30								

Last Edited: 10/28/2022

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-6

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~498' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to 20' Quaternary Old Alluvium (Qoa):** @ 0' - Dry Grass, Sandy CLAY: dry	
495			SPT-1	12 10 13		3.8	CL	@ 2.5' - Sandy CLAY: light brown, slightly moist, very stiff	
	5	B-1	R-1	44 50/5"	110.4	13.9	ML	@ 5' - Sandy SILT: light brown, moist, hard	
490			SPT-2	7 11 8		3.4		@ 7.5' - Sandy SILT: pale brown, slightly moist, very stiff	
	10		R-2	35 20 25	119.8	4.8	SM	@ 10' - Silty SAND: light brown, slightly moist, dense	
485									
	15		SPT-3	6 10 27		8.1	ML	@ 15' - Sandy SILT: yellowish brown, slightly moist, hard	
480									
	20		R-3	31 19 25	115.3	6.4		@ 20' - Sandy SILT: light brown, slightly moist, hard	
475								Total Depth = 21.5' Groundwater Not Encountered Caving: Hole Measured Approximately 19' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
	25								
470									
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole HS-7

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~501' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
500	0	B-1						**@ 0' to 50' <u>Quaternary Old Alluvium (Qoa):</u>** @ 0' - Dry grass, Silty SAND: light brown, dry	
			R-1	33 41 34	128.4	4.8	SM	@ 2.5' - Silty SAND: light brown, slightly moist, very dense	
495	5		SPT-1	10 11 9		3.0		@ 5' - Silty SAND: light brown, slightly moist, medium dense	-#200
			R-2	33 29 33	120.8	4.1	ML	@ 7.5' - Sandy SILT: light brown, slightly moist, hard	
490	10		SPT-2	12 17 12		6.3	SM	@ 10' - Silty SAND: light brown, slightly moist, dense	-#200
485	15		R-3	39 43 50/4"	127.0	9.6	CL	@ 15' - Sandy CLAY: light yellowish brown, slightly moist, hard	CN AL
480	20		SPT-3	9 7 9		5.7	SM	@ 20' - Silty SAND: yellowish brown, slightly moist, medium dense	-#200
475	25		R-4	50/5"	120.7	11.3	SC	@ 25' - Clayey SAND: brown, moist, very dense	
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole HS-7

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~501' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
470	30		SPT-4	6 7 11		14.0	CL	@ 30' - Sandy CLAY: brown, moist, very stiff	-#200
465	35		R-5	21 17 31	127.2	4.9	SC	@ 35' - Clayey SAND: brown, slightly moist, dense	
460	40		SPT-5	10 10 15		12.6		@ 40' - Clayey SAND: reddish brown, moist, dense	
455	45		R-6	37 28 30	117.0	8.3	ML	@ 45' - Sandy SILT: yellowish brown, slightly moist, hard	
450	50		SPT-6	9 15 20		13.0	CL	@ 50' - Sandy CLAY: brown, moist, hard	
445	55							Total Depth = 51.5' Groundwater Not Encountered Caving: Hole Measured Approximately 48' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
	60								

Geotechnical, Inc.

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SAMPLE TYPES:
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- G GRAB SAMPLE
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- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole HS-8

Date: 10/25/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~508' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0	B-1						**@ 0' to 1' Undocumented Fill (afu):** @ 0' - Silty SAND: reddish brown, dry; stockpiles nearby	EI
505			SPT-1	10 11 13		4.4	ML	**@ 1' to 20' Quaternary Old Alluvium (Qoa)** @ 2.5' - Sandy SILT: reddish brown, slightly moist, very stiff	
	5		R-1	32 32 50	127.3	1.5	SM	@ 5' - Silty SAND: light brown, dry, very dense	
500			SPT-2	13 9 6		9.0	SC	@ 7.5' - Clayey SAND: brown, slightly moist, medium dense	
	10		R-2	34 30 50	123.8	10.8	CL	@ 10' - Sandy CLAY: brown, moist, hard	
495									
	15		SPT-3	8 6 8		7.2		@ 15' - Sandy CLAY: yellowish brown, moist, very stiff	
490									
	20		R-3	42 43 27	127.7	9.2	SC	@ 20' - Clayey SAND: brown, moist, very dense	
485	25							Total Depth = 21.5' Groundwater Not Encountered Caving: Hole Measured Approximately 18' After Removal of the Augers Backfilled with Cuttings on 10/25/2022	
480	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole I-1

Date: 10/24/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~525' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to 10' <u>Quaternary Old Alluvium (Qoa):</u>**	
								@ 0' - Clayey SAND with dry tall grass: pale brown, dry	
			SPT-1	10 13 19		4.3	SC	@ 2.5' - Clayey SAND: pale brown, slightly moist, dense	
520	5		SPT-2	4 14 22		4.6	SM	@ 5' - Silty SAND: light brown, slightly moist, dense	
			SPT-3	10 11 12		10.2	CL	@ 7.5' - Sandy CLAY: light brown, moist, very stiff	
515	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 10/24/22 Backfilled with Cuttings on 10/26/2022	
510	15								
505	20								
500	25								
	30								

Geotechnical, Inc.

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SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
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CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole I-2

Date: 10/24/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~522' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to 10' Quaternary Old Alluvium (Qoa):**	
520								@ 0' - Silty SAND with dry tall grass: light brown, dry	
			SPT-1	9 6 11		1.4	SM	@ 2.5' - Silty SAND: light brown, dry, medium dense	
	5		SPT-2	8 9 11		2.6		@ 5' - Silty SAND: light brown, slightly moist, medium dense	
515			SPT-3	7 14 19		3.2		@ 7.5' - Silty SAND: light brown, slightly moist, dense	
	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 10/24/22 Backfilled with Cuttings on 10/26/2022	
510									
	15								
505									
	20								
500									
	25								
495									
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole I-3

Date: 10/24/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~516' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
515	0							**@ 0' to 10' Quaternary Old Alluvium (Qoa):** @ 0' - Sandy SILT with dry grass: light brown, dry	
			SPT-1	14 19 17		3.0	ML	@ 2.5' - Sandy SILT: light brown, slightly moist, dense	
510	5		SPT-2	10 12 12		2.4	SM	@ 5' - Silty SAND: light brown, slightly moist, dense	
			SPT-3	8 15 9		7.1		@ 7.5' - Silty SAND: light reddish brown, moist, dense	
505	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 10/24/22 Backfilled with Cuttings on 10/26/2022	
500	15								
495	20								
490	25								
	30								

Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Geotechnical Boring Log Borehole I-4

Date: 10/24/2022	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** HD 75
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~509' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							**@ 0' to 10' <u>Quaternary Old Alluvium (Qoa):</u>** @ 0' - Silty SAND with dry tall grass: light brown, dry	
			SPT-1	13 8 15		3.0	SM	@ 2.5' - Silty SAND: light brown, slightly moist, medium dense	
505	5		SPT-2	12 21 26		2.3		@ 5' - Silty SAND: pale brown, slightly moist, very dense	
			SPT-3	6 12 13		3.5	SM/ML	@ 7.5' - Silty SAND/Sandy SILT: pale brown, slightly moist, dense/hard	
500	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 10/24/22 Backfilled with Cuttings on 10/26/2022	
495	15								
490	20								
485	25								
480	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
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CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 10/28/2022

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 10/26/2022
Boring Number: I-1

Test hole dimensions (if circular)

Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)

Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:45	8:10	25.0	8.24	8.34	0.10	No
2	8:10	8:35	25.0	8.12	8.19	0.07	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:52	9:22	30.0	8.24	8.30	0.06	0.1
2	9:24	9:54	30.0	7.82	7.90	0.08	0.1
3	9:55	10:25	30.0	7.90	7.96	0.06	0.1
4	10:28	11:03	35.0	7.85	7.95	0.10	0.2
5	11:05	11:35	30.0	7.77	7.85	0.08	0.1
6	11:36	12:07	31.0	7.85	7.92	0.07	0.1
7	12:09	12:39	30.0	7.69	7.73	0.04	0.1
8	12:41	13:11	30.0	7.73	7.80	0.07	0.1
9	13:14	13:44	30.0	7.60	7.67	0.07	0.1
10	13:46	14:16	30.0	7.67	7.74	0.07	0.1
11	14:18	14:48	30.0	7.62	7.70	0.08	0.1
12	14:53	15:26	33.0	7.54	7.63	0.09	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52

Project Number: 22203-01

Date: 10/26/2022

Boring Number: I-2

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:49	8:14	25.0	7.30	7.63	0.33	No
2	8:15	8:40	25.0	7.12	7.31	0.19	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:55	9:26	31.0	7.42	7.60	0.18	0.3
2	9:29	9:59	30.0	7.00	7.23	0.23	0.3
3	10:00	10:30	30.0	7.23	7.41	0.18	0.3
4	10:31	11:07	36.0	7.41	7.63	0.22	0.3
5	11:09	11:39	30.0	7.28	7.46	0.18	0.3
6	11:41	12:12	31.0	7.24	7.42	0.18	0.2
7	12:14	12:44	30.0	7.14	7.34	0.20	0.3
8	12:46	13:16	30.0	7.04	7.23	0.19	0.3
9	13:17	13:49	32.0	7.23	7.43	0.20	0.3
10	13:51	14:21	30.0	7.11	7.30	0.19	0.3
11	14:23	14:55	32.0	7.11	7.31	0.20	0.3
12	14:57	15:29	32.0	6.92	7.15	0.23	0.3

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.3**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 10/26/2022
Boring Number: I-3

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:56	8:21	25.0	7.15	7.20	0.05	No
2	8:22	8:47	25.0	7.02	7.08	0.06	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:57	9:31	34.0	7.11	7.13	0.02	0.02
2	9:32	10:02	30.0	7.13	7.18	0.05	0.1
3	10:04	10:34	30.0	6.99	7.05	0.06	0.1
4	10:35	11:12	37.0	7.05	7.11	0.06	0.1
5	11:13	11:43	30.0	7.11	7.15	0.04	0.1
6	11:45	12:17	32.0	7.05	7.12	0.07	0.1
7	12:18	12:50	32.0	6.97	7.02	0.05	0.1
8	12:51	13:21	30.0	7.02	7.08	0.06	0.1
9	13:22	13:53	31.0	7.05	7.12	0.07	0.1
10	13:54	14:25	31.0	7.06	7.11	0.05	0.1
11	14:26	15:00	34.0	7.08	7.13	0.05	0.1
12	15:01	15:31	30.0	7.05	7.11	0.06	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes: Before starting test, water from previous day remianed in the hole measured at 8.99'

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 10/26/2022
Boring Number: I-4

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

Pre-Test (Sandy Soil Criteria)*

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:03	8:28	25.0	8.03	8.45	0.42	No
2	8:30	9:00	30.0	8.06	8.44	0.38	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:01	9:34	33.0	7.94	8.35	0.41	0.7
2	9:35	10:07	32.0	7.92	8.32	0.40	0.7
3	10:09	10:39	30.0	7.89	8.26	0.37	0.7
4	10:40	11:15	35.0	7.87	8.31	0.44	0.7
5	11:16	11:48	32.0	7.82	8.22	0.40	0.7
6	11:50	12:20	30.0	7.75	8.16	0.41	0.7
7	12:22	12:53	31.0	7.80	8.20	0.40	0.7
8	12:55	13:25	30.0	7.88	8.26	0.38	0.7
9	13:28	13:58	30.0	7.91	8.28	0.37	0.7
10	14:01	14:31	30.0	7.83	8.22	0.39	0.7
11	14:33	15:03	30.0	7.79	8.20	0.41	0.8
12	15:05	15:35	30.0	7.73	8.15	0.42	0.8

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.8**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on driven samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Grain Size Distribution/Fines Content: Representative samples were dried, weighed, and soaked in water until individual soil particles were separated (per ASTM D421) and then washed on a No. 200 sieve (ASTM D1140). Where applicable, the portion retained on the No. 200 sieve was dried and then sieved on a U.S. Standard brass sieve set in accordance with ASTM D6913 (sieve).

Sample Location	Description	% Passing # 200 Sieve
HS-2 @ 7.5 ft	Sandy Silt	55
HS-2 @ 15 ft	Silty Sand	48
HS-2 @ 25 ft	Silty Sand	13
HS-3 @ 5 ft	Silty Sand	15
HS-7 @ 5 ft	Silty Sand	41
HS-7 @ 10 ft	Silty Sand	35
HS-7 @ 20 ft	Silty Sand	43
HS-7 @ 30 ft	Sandy Clay	64

Atterberg Limits: The liquid and plastic limits ("Atterberg Limits") were determined per ASTM D4318 for engineering classification of fine-grained material and presented in the table below. The USCS soil classification indicated in the table below is based on the portion of sample passing the No. 40 sieve and may not necessarily be representative of the entire sample. The plot is provided in this Appendix.

Sample Location	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Soil Classification
HS-7 @ 15 ft	32	18	14	CL

Laboratory Test Results

Expansion Index: The expansion potential of selected representative samples was evaluated by the Expansion Index Test per ASTM D4829. The results are presented in the table below.

Sample Location	Expansion Index	Expansion Potential*
HS-4 @ 0-5 ft	3	Very Low
HS-8 @ 0-5 ft	7	Very Low

* Per ASTM D4829

Consolidation: Consolidation tests were performed per ASTM D2435. Samples (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curves are provided in this Appendix.

Laboratory Compaction: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D1557. The results are presented in the table below.

Sample Location	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-6 @ 0-5 ft	Yellowish Brown Silty Sand	131.0	8.5

R-value Test: R-value test was performed in general accordance with California Test Method 301. The plot is attached.

Sample No.	R-Value
HS-3 @ 0-5 ft	23

Laboratory Test Results

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (CTM 417). The test results are presented in the table below.

Sample Location	Sulfate Content (ppm)	Sulfate Content (%)
HS-2 @ 0-5 ft	102	0.010
HS-4 @ 0-5 ft	120	0.012
HS-8 @ 0-5 ft	133	0.013

Chloride Content: Chloride content was tested per CTM 422. The results are presented below.

Sample Location	Chloride Content (ppm)
HS-4 @ 0-5 ft	21

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with CTM 643 and standard geochemical methods. The results are presented in the table below.

Sample Location	pH	Minimum Resistivity (ohms-cm)
HS-4 @ 0-5 ft	7.9	2,120

ATTERBERG LIMITS

ASTM D 4318

Project Name:	ARB 52, Bakersfield	Tested By:	L. Parrella	Date:	11/14/22
Project No. :	22203-01	Input By:	L. Parrella	Date:	11/14/22
Boring No.:	HS-7	Checked By:	M. Vinet		
Sample No.:	R-3	Depth (ft.)	15.0		
Soil Identification:	Light yellowish brown sandy lean clay s(CL)				

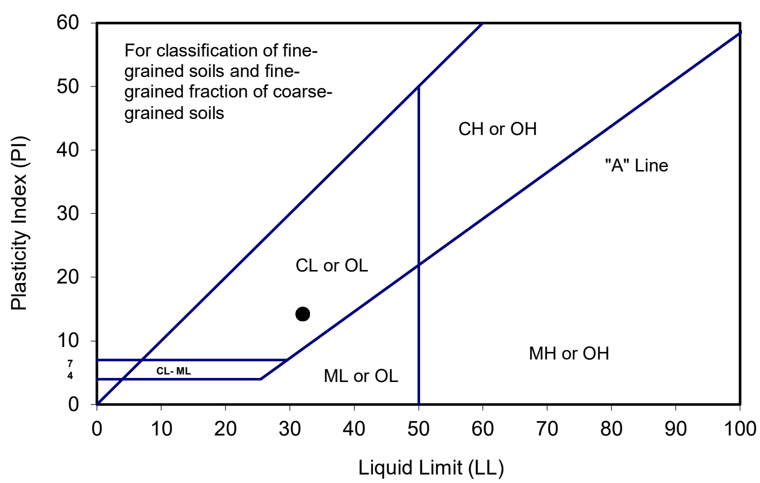
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			15	25	35	
Wet Wt. of Soil + Cont. (g)	20.61	27.26	18.60	19.99	20.53	
Dry Wt. of Soil + Cont. (g)	19.60	25.12	17.37	18.43	18.87	
Wt. of Container (g)	13.70	13.53	13.65	13.57	13.50	
Moisture Content (%) [Wn]	17.12	18.46	33.06	32.10	30.91	

Liquid Limit	**32**
Plastic Limit	**18**
Plasticity Index	**14**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 8.76

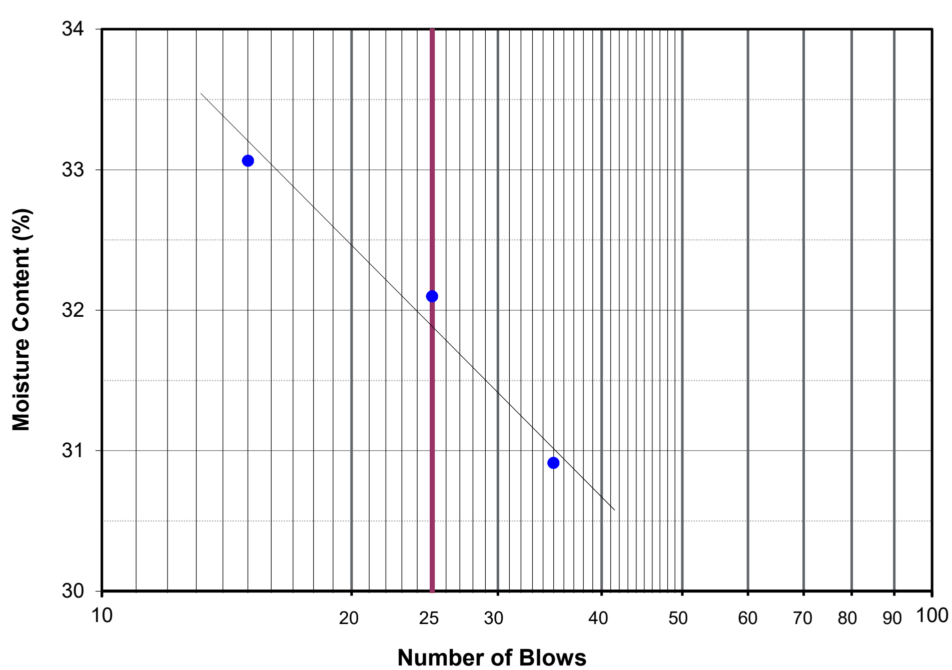
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint - Wet
- [X] Dry Preparation
  Multipoint - Dry
- [X] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



Location	Sample No.	Depth (ft)	Molding Moisture Content (%)	Initial Dry Density (pcf)	Final Moisture Content (%)	Expansion Index	Expansion Classification[1]
HS-4	B-1	0-5'	8.5	115.7	14.5	3	Very Low
HS-8	B-1	0-5'	8.5	116.7	13.6	7	Very Low

LGC Geotechnical, Inc.

EXPANSION INDEX
(ASTM D 4829)

Project Number: 22203-01
Date: Nov-22

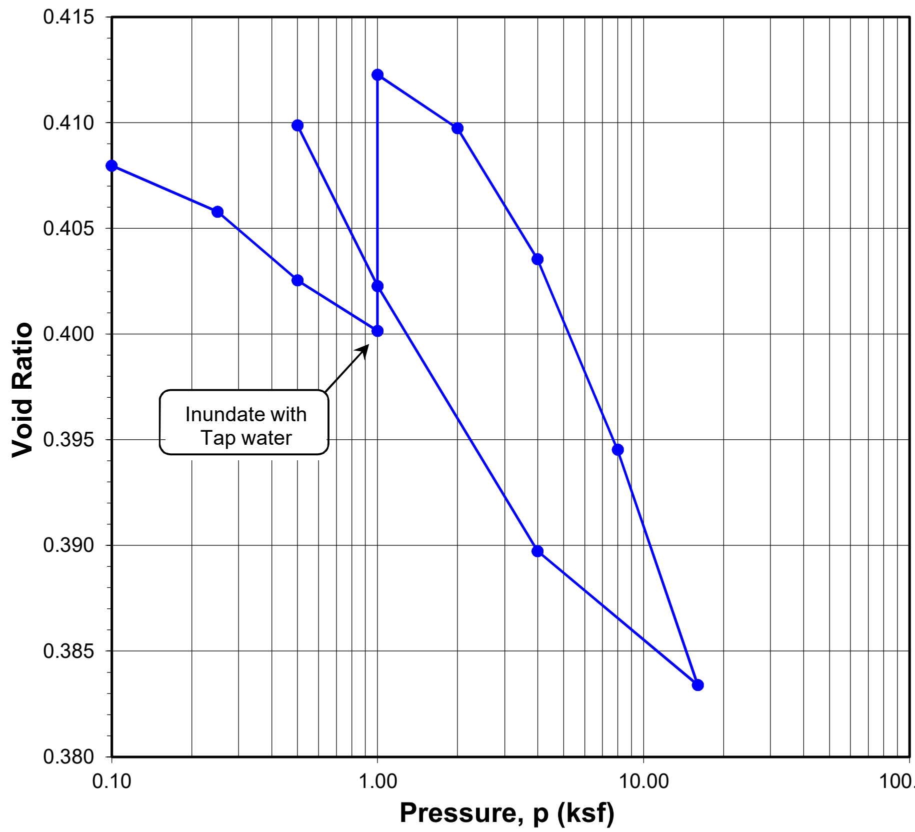
ARB 52, Bakersfield

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	ARB 52, Bakersfield	Tested By:	GB/JD	Date:	10/31/22
Project No.:	22203-01	Checked By:	J. Ward	Date:	11/28/22
Boring No.:	HS-1	Depth (ft.):	15.0		
Sample No.:	R-3	Sample Type:	Ring		
Soil Identification:	Yellowish brown lean clay (CL)				

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	203.81
Weight of Ring (g)	44.37
Height after consol. (in.)	1.0013
Before Test	
Wt.Wet Sample+Cont. (g)	186.04
Wt.of Dry Sample+Cont. (g)	171.68
Weight of Container (g)	38.28
Initial Moisture Content (%)	10.8
Initial Dry Density (pcf)	119.7
Initial Saturation (%)	71
Initial Vertical Reading (in.)	0.2836
After Test	
Wt.of Wet Sample+Cont. (g)	271.71
Wt. of Dry Sample+Cont. (g)	248.84
Weight of Container (g)	64.15
Final Moisture Content (%)	16.30
Final Dry Density (pcf)	116.5
Final Saturation (%)	99
Final Vertical Reading (in.)	0.2811
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

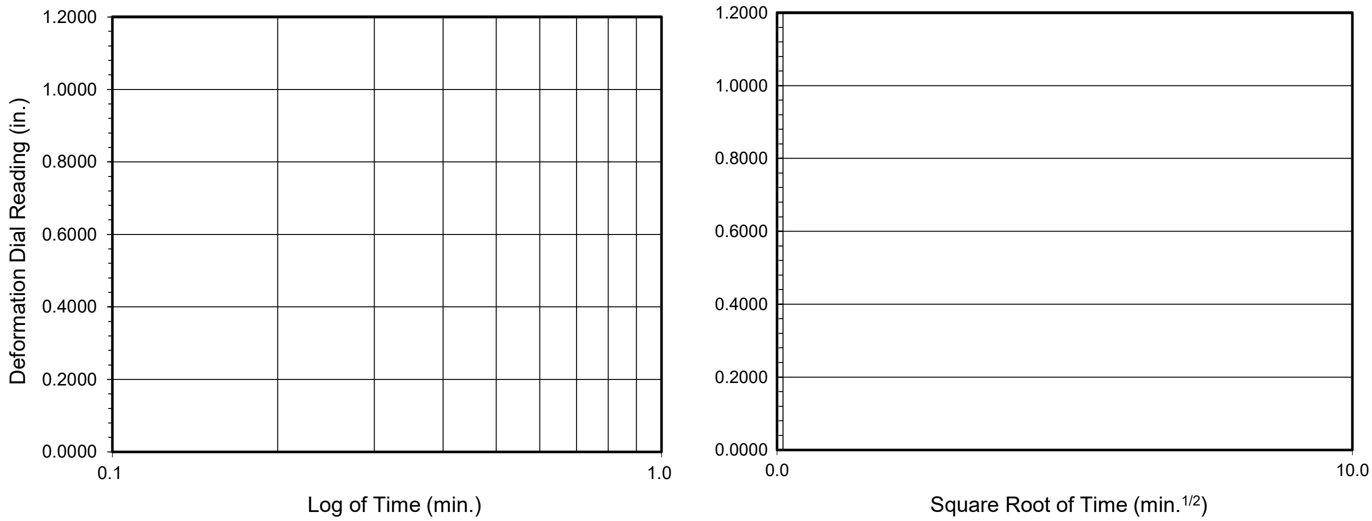


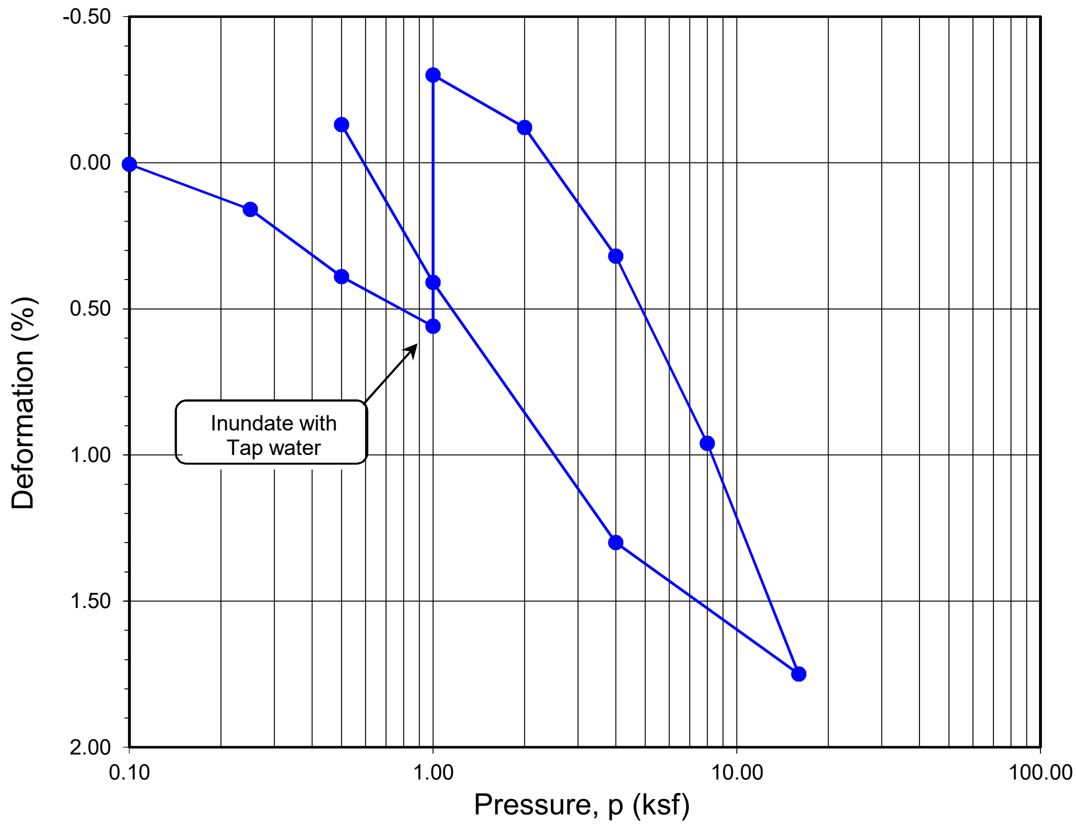
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.2836	1.0000	0.00	0.00	0.408	0.00
0.25	0.2815	0.9979	0.05	0.21	0.406	0.16
0.50	0.2787	0.9951	0.10	0.49	0.403	0.39
1.00	0.2762	0.9926	0.18	0.74	0.400	0.56
1.00	0.2848	1.0012	0.18	-0.12	0.412	-0.30
2.00	0.2821	0.9985	0.27	0.15	0.410	-0.12
4.00	0.2764	0.9928	0.40	0.72	0.404	0.32
8.00	0.2684	0.9848	0.56	1.52	0.395	0.96
16.00	0.2584	0.9748	0.77	2.52	0.383	1.75
4.00	0.2652	0.9816	0.54	1.84	0.390	1.30
1.00	0.2759	0.9923	0.36	0.77	0.402	0.41
0.50	0.2811	0.9975	0.38	0.25	0.410	-0.13

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-1	**R-3**	**15.0**	**10.8**	**16.3**	**119.7**	**116.5**	**0.408**	**0.410**	**71**	**99**

Soil Identification: Yellowish brown lean clay (CL)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

ARB 52, Bakersfield

11-22

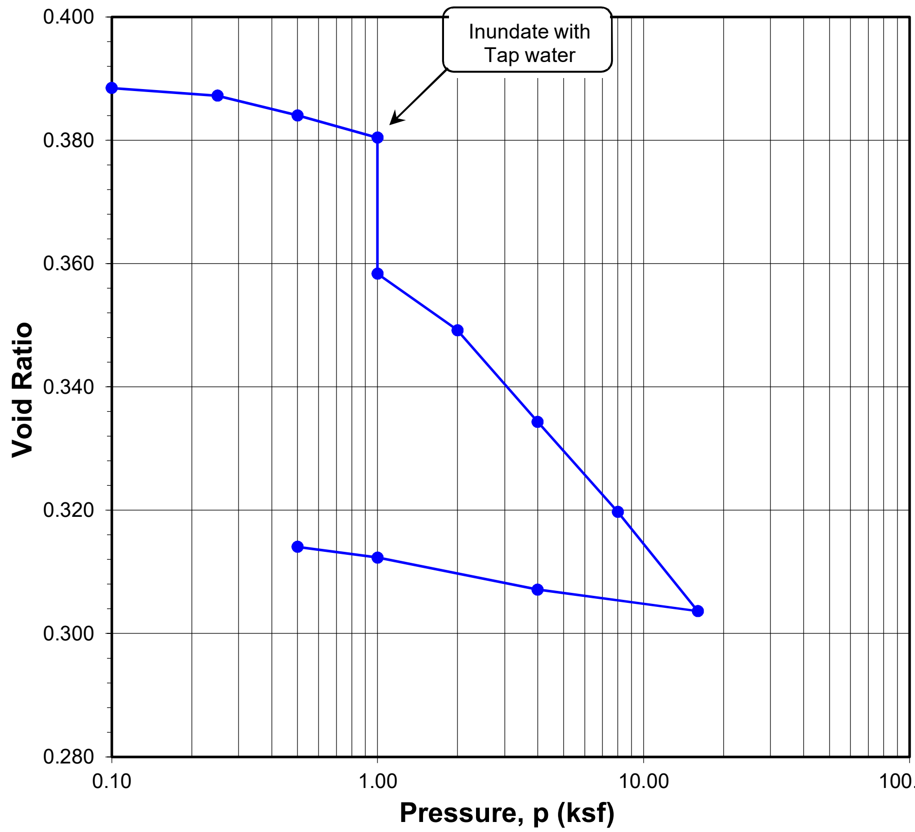
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: ARB 52, Bakersfield
Project No.: 22203-01
Boring No.: HS-2
Sample No.: R-1
Soil Identification: Light yellowish brown silty sand (SM)

Tested By: GB/JD Date: 10/31/22
Checked By: J. Ward Date: 11/28/22
Depth (ft.): 5.0
Sample Type: Ring

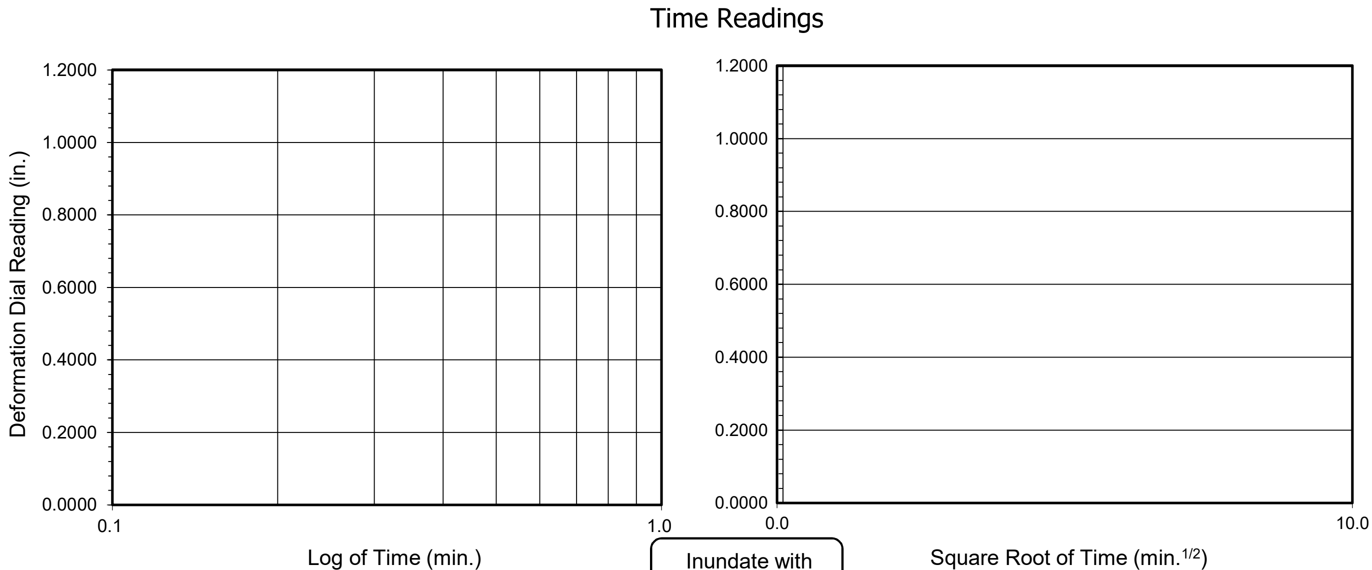
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	193.55
Weight of Ring (g)	44.89
Height after consol. (in.)	0.9463
Before Test	
Wt.Wet Sample+Cont. (g)	197.38
Wt.of Dry Sample+Cont. (g)	194.83
Weight of Container (g)	57.15
Initial Moisture Content (%)	1.9
Initial Dry Density (pcf)	121.4
Initial Saturation (%)	13
Initial Vertical Reading (in.)	0.3382
After Test	
Wt.of Wet Sample+Cont. (g)	271.67
Wt. of Dry Sample+Cont. (g)	256.05
Weight of Container (g)	67.66
Final Moisture Content (%)	10.89
Final Dry Density (pcf)	126.1
Final Saturation (%)	87
Final Vertical Reading (in.)	0.2830
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

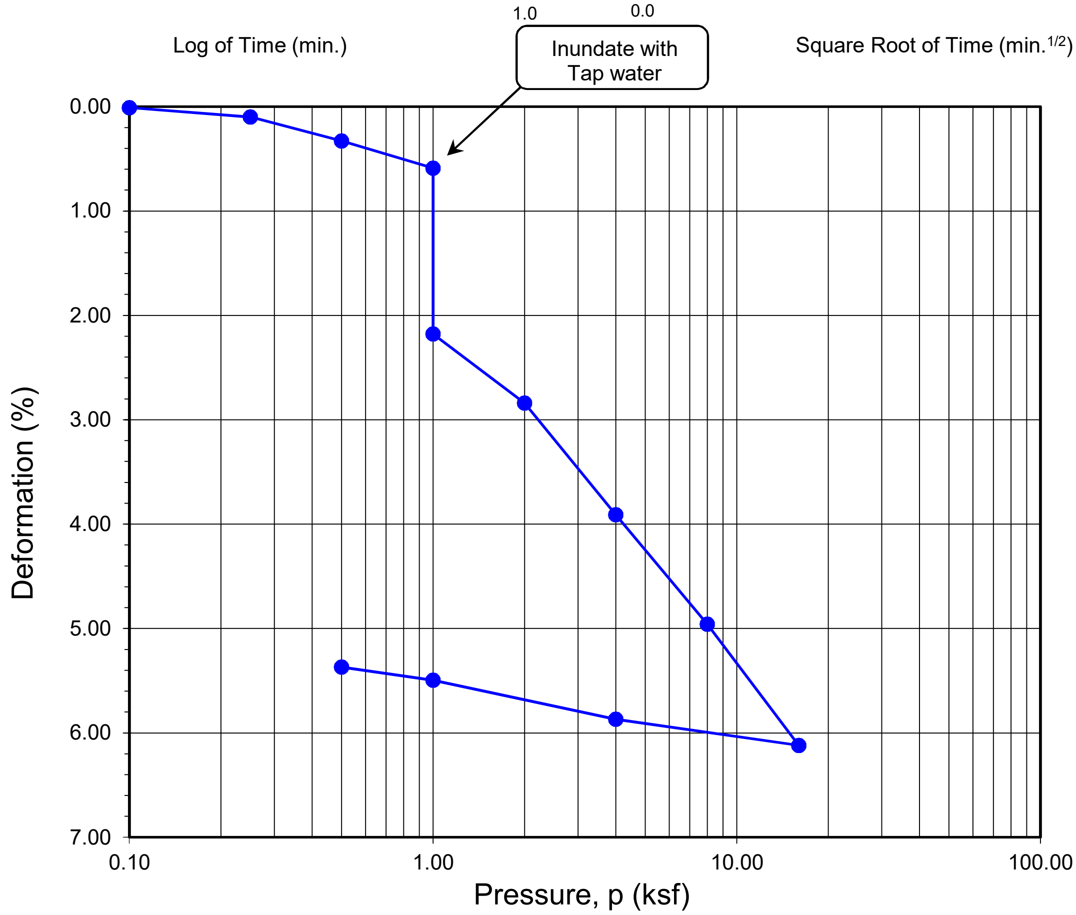


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3381	0.9999	0.00	0.01	0.388	0.01
0.25	0.3370	0.9988	0.02	0.12	0.387	0.10
0.50	0.3345	0.9963	0.04	0.37	0.384	0.33
1.00	0.3316	0.9934	0.07	0.66	0.380	0.59
1.00	0.3157	0.9775	0.07	2.25	0.358	2.18
2.00	0.3087	0.9705	0.11	2.95	0.349	2.84
4.00	0.2973	0.9591	0.18	4.09	0.334	3.91
8.00	0.2858	0.9476	0.28	5.24	0.320	4.96
16.00	0.2729	0.9347	0.41	6.53	0.304	6.12
4.00	0.2765	0.9383	0.30	6.17	0.307	5.87
1.00	0.2814	0.9432	0.19	5.69	0.312	5.50
0.50	0.2830	0.9448	0.15	5.52	0.314	5.37

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-2	**R-1**	**5.0**	**1.9**	**10.9**	**121.4**	**126.1**	**0.389**	**0.314**	**13**	**87**

Soil Identification: Light yellowish brown silty sand (SM)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

ARB 52, Bakersfield

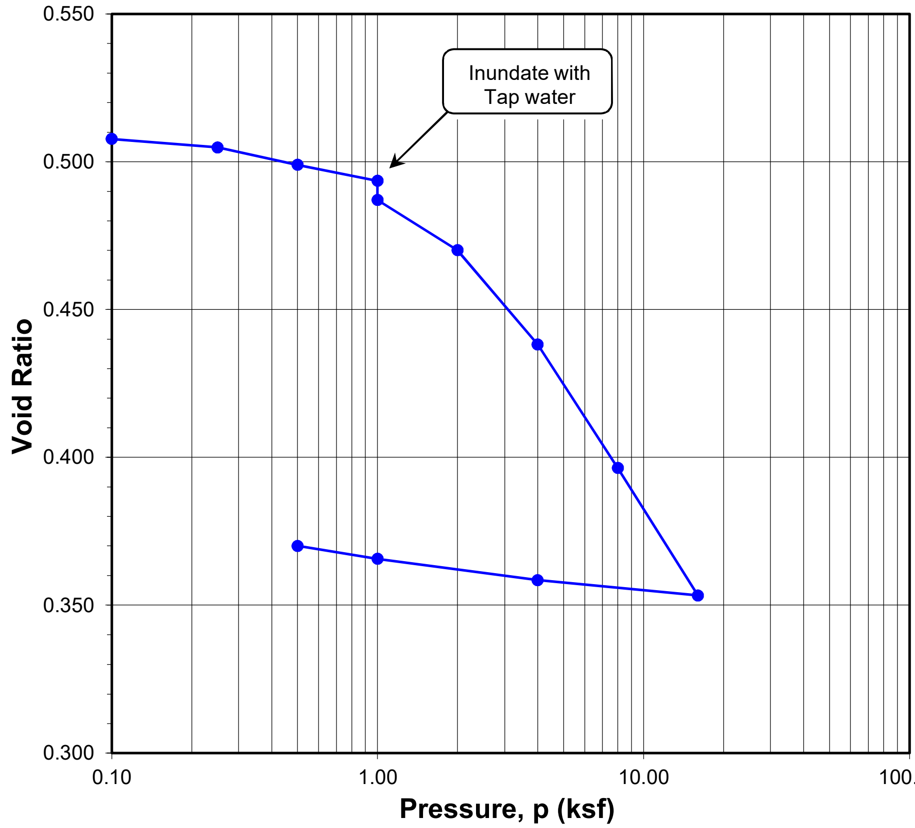
11-22

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: ARB 52, Bakersfield
Tested By: GB/JD Date: 10/31/22
Project No.: 22203-01
Checked By: J. Ward Date: 11/29/22
Boring No.: HS-3
Depth (ft.): 7.5
Sample No.: R-2
Sample Type: Ring
Soil Identification: Yellowish brown clayey sand (SC)

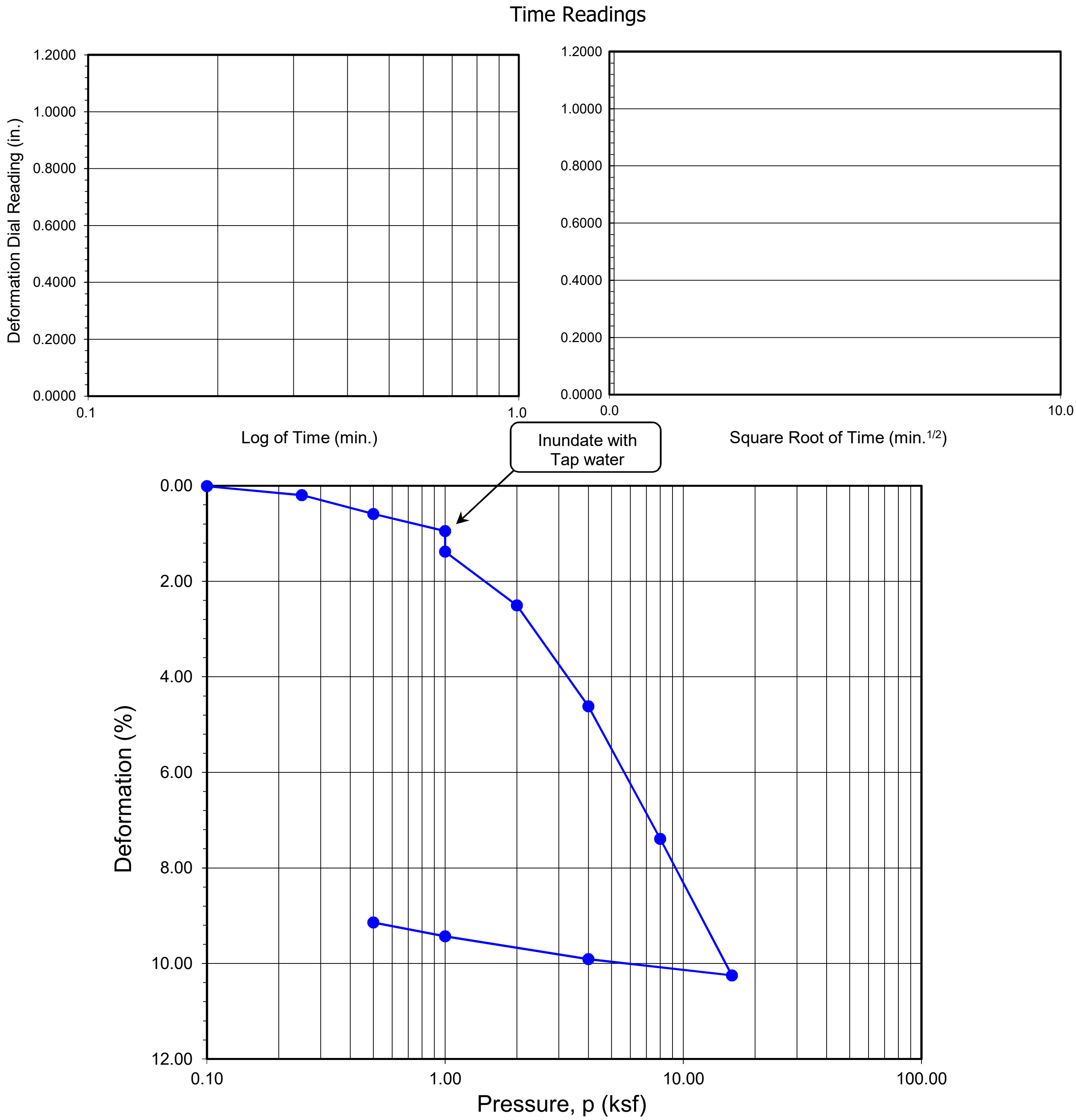
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	185.82
Weight of Ring (g)	45.15
Height after consol. (in.)	0.9086
Before Test	
Wt.Wet Sample+Cont. (g)	188.27
Wt.of Dry Sample+Cont. (g)	182.50
Weight of Container (g)	58.48
Initial Moisture Content (%)	4.7
Initial Dry Density (pcf)	111.8
Initial Saturation (%)	25
Initial Vertical Reading (in.)	0.2825
After Test	
Wt.of Wet Sample+Cont. (g)	252.78
Wt. of Dry Sample+Cont. (g)	235.83
Weight of Container (g)	58.51
Final Moisture Content (%)	12.82
Final Dry Density (pcf)	121.0
Final Saturation (%)	88
Final Vertical Reading (in.)	0.1870
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43



Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.2824	0.9999	0.00	0.01	0.508	0.01
0.25	0.2800	0.9975	0.05	0.25	0.505	0.20
0.50	0.2755	0.9930	0.11	0.70	0.499	0.59
1.00	0.2710	0.9885	0.20	1.15	0.494	0.95
1.00	0.2667	0.9842	0.20	1.58	0.487	1.38
2.00	0.2544	0.9719	0.31	2.81	0.470	2.50
4.00	0.2318	0.9493	0.45	5.07	0.438	4.62
8.00	0.2025	0.9200	0.61	8.00	0.396	7.39
16.00	0.1719	0.8894	0.81	11.06	0.353	10.25
4.00	0.1767	0.8942	0.67	10.58	0.358	9.91
1.00	0.1833	0.9008	0.49	9.92	0.366	9.43
0.50	0.1870	0.9045	0.41	9.55	0.370	9.14

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)



Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-3	**R-2**	**7.5**	**4.7**	**12.8**	**111.8**	**121.0**	**0.508**	**0.370**	**25**	**88**

Soil Identification: Yellowish brown clayey sand (SC)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

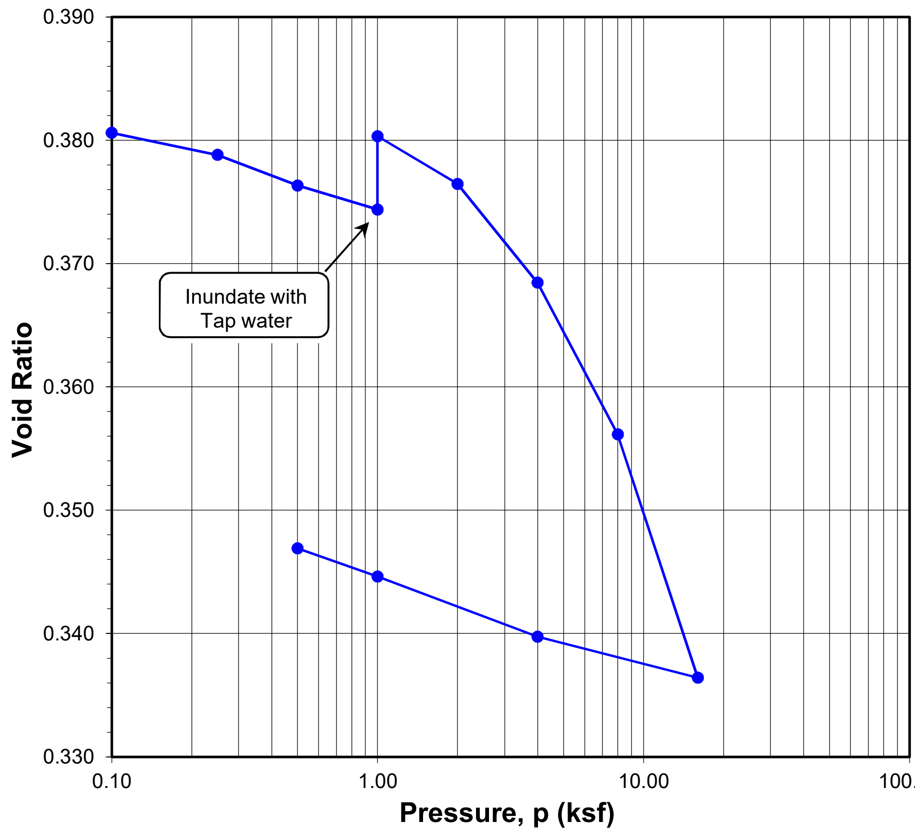
ARB 52, Bakersfield

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	ARB 52, Bakersfield	Tested By: GB/JD	Date: 10/31/22
Project No.:	22203-01	Checked By: J. Ward	Date: 11/29/22
Boring No.:	HS-5	Depth (ft.): 7.5	
Sample No.:	R-2	Sample Type: Ring	
Soil Identification:	Yellowish brown clayey sand (SC)		

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	199.78
Weight of Ring (g)	45.19
Height after consol. (in.)	0.9755
Before Test	
Wt.Wet Sample+Cont. (g)	229.89
Wt.of Dry Sample+Cont. (g)	221.27
Weight of Container (g)	59.04
Initial Moisture Content (%)	5.3
Initial Dry Density (pcf)	122.1
Initial Saturation (%)	38
Initial Vertical Reading (in.)	0.3409
After Test	
Wt.of Wet Sample+Cont. (g)	275.60
Wt. of Dry Sample+Cont. (g)	257.81
Weight of Container (g)	66.52
Final Moisture Content (%)	12.18
Final Dry Density (pcf)	124.6
Final Saturation (%)	93
Final Vertical Reading (in.)	0.3129
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

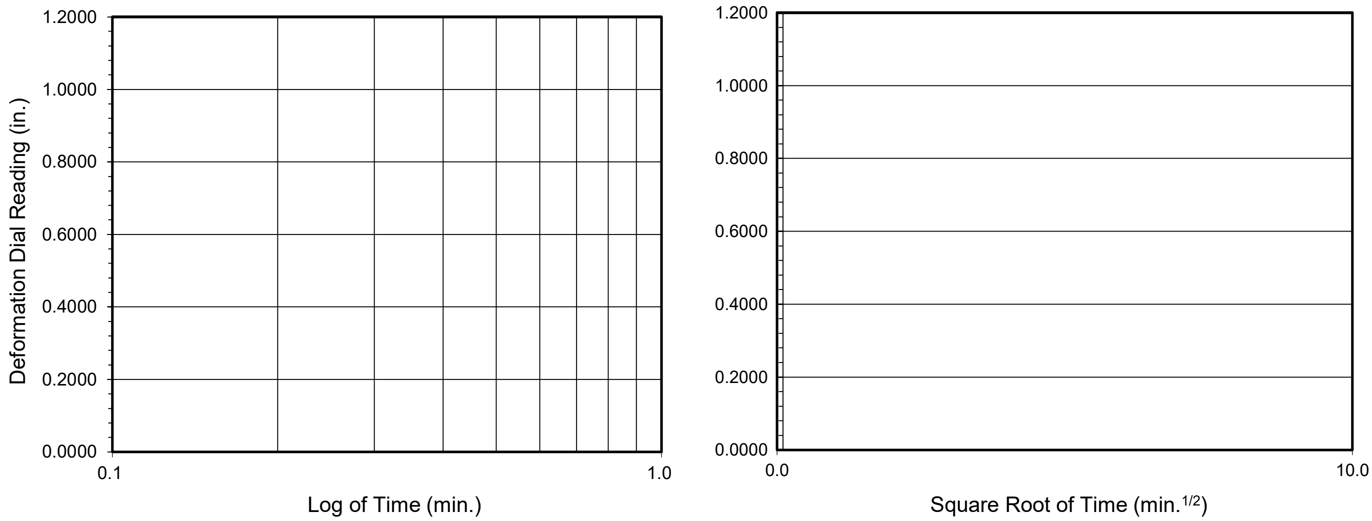


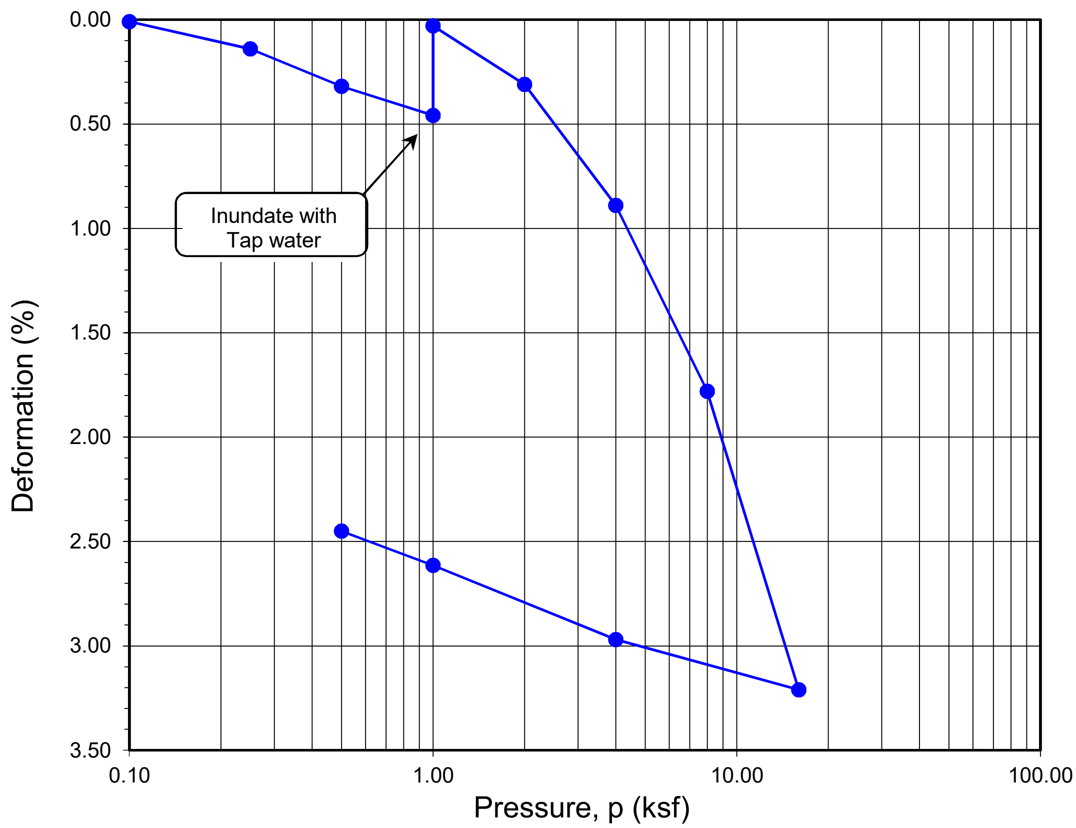
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3408	0.9999	0.00	0.01	0.381	0.01
0.25	0.3392	0.9983	0.03	0.17	0.379	0.14
0.50	0.3371	0.9962	0.06	0.38	0.376	0.32
1.00	0.3352	0.9943	0.11	0.57	0.374	0.46
1.00	0.3395	0.9986	0.11	0.14	0.380	0.03
2.00	0.3358	0.9949	0.20	0.51	0.376	0.31
4.00	0.3287	0.9878	0.33	1.22	0.368	0.89
8.00	0.3183	0.9774	0.48	2.26	0.356	1.78
16.00	0.3021	0.9612	0.67	3.88	0.336	3.21
4.00	0.3062	0.9653	0.50	3.47	0.340	2.97
1.00	0.3109	0.9700	0.39	3.00	0.345	2.61
0.50	0.3129	0.9720	0.35	2.80	0.347	2.45

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-5	**R-2**	**7.5**	**5.3**	**12.2**	**122.1**	**124.6**	**0.381**	**0.347**	**38**	**93**

Soil Identification: Yellowish brown clayey sand (SC)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

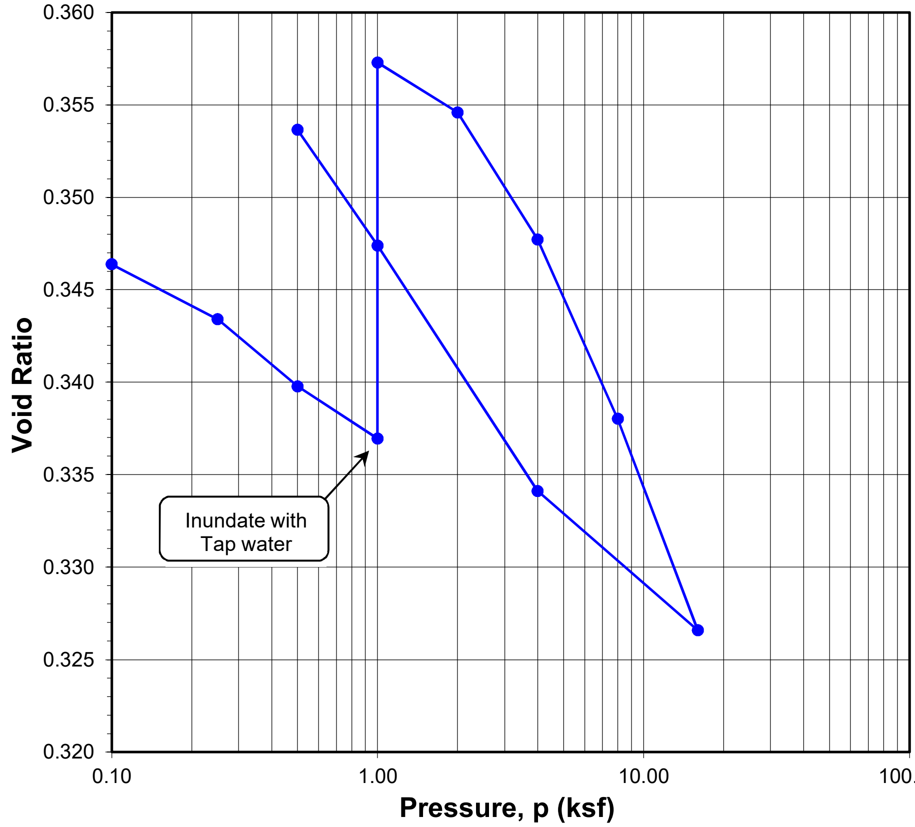
ARB 52, Bakersfield

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	ARB 52, Bakersfield	Tested By: GB/JD	Date: 10/31/22
Project No.:	22203-01	Checked By: J. Ward	Date: 11/29/22
Boring No.:	HS-7	Depth (ft.): 15.0	
Sample No.:	R-3	Sample Type: Ring	
Soil Identification:	Light yellowish brown sandy lean clay s(CL)		

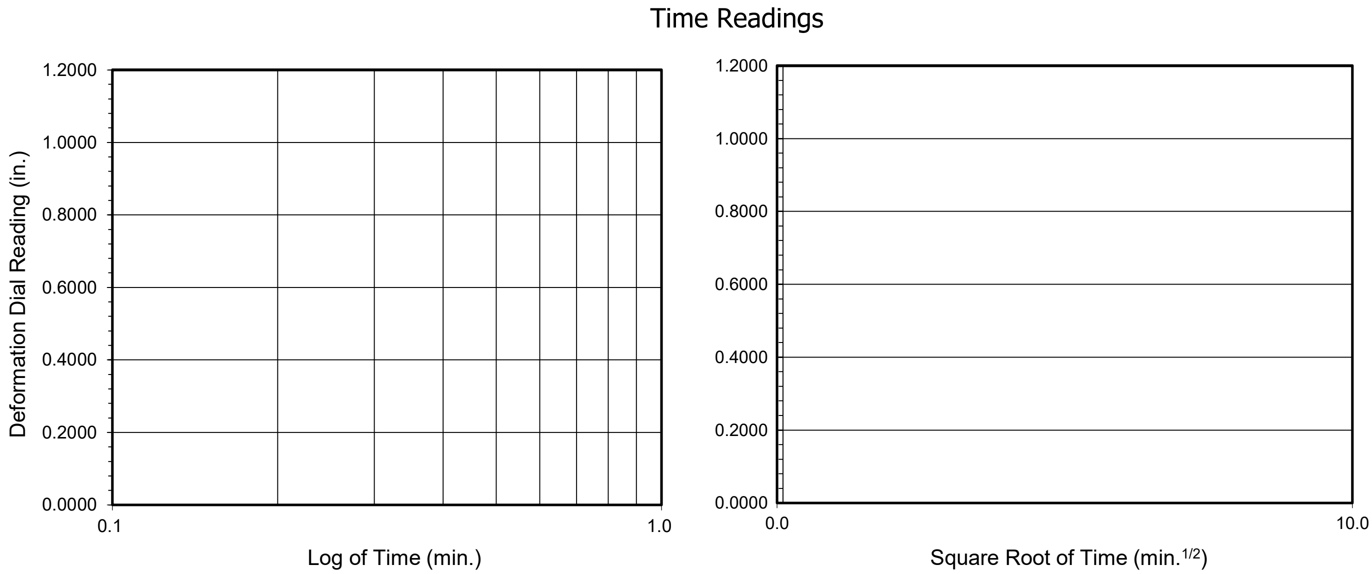
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	212.25
Weight of Ring (g)	44.92
Height after consol. (in.)	1.0050
Before Test	
Wt.Wet Sample+Cont. (g)	210.69
Wt.of Dry Sample+Cont. (g)	197.67
Weight of Container (g)	61.71
Initial Moisture Content (%)	9.6
Initial Dry Density (pcf)	127.0
Initial Saturation (%)	76
Initial Vertical Reading (in.)	0.3209
After Test	
Wt.of Wet Sample+Cont. (g)	273.49
Wt. of Dry Sample+Cont. (g)	253.19
Weight of Container (g)	57.26
Final Moisture Content (%)	13.44
Final Dry Density (pcf)	125.0
Final Saturation (%)	100
Final Vertical Reading (in.)	0.3216
Specific Gravity (assumed)	2.74
Water Density (pcf)	62.43

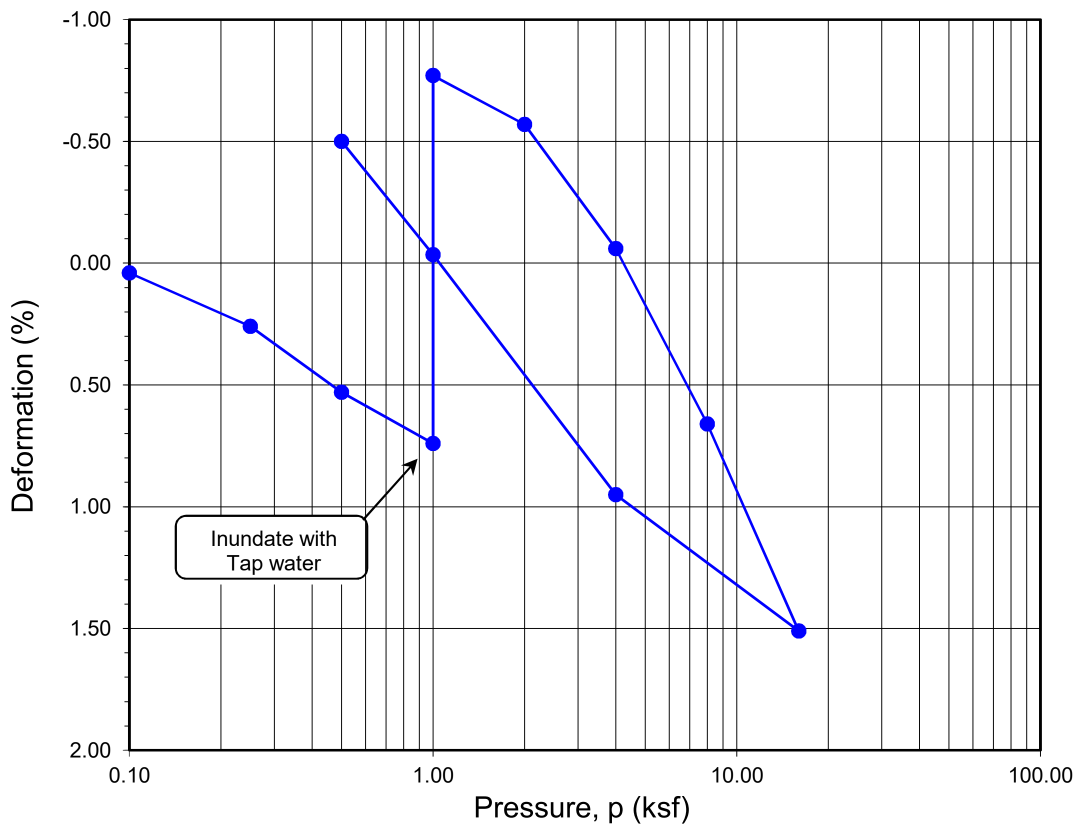


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3205	0.9996	0.00	0.04	0.346	0.04
0.25	0.3176	0.9967	0.07	0.33	0.343	0.26
0.50	0.3143	0.9934	0.13	0.66	0.340	0.53
1.00	0.3114	0.9905	0.21	0.95	0.337	0.74
1.00	0.3265	1.0056	0.21	-0.56	0.357	-0.77
2.00	0.3233	1.0024	0.33	-0.24	0.355	-0.57
4.00	0.3169	0.9960	0.46	0.40	0.348	-0.06
8.00	0.3079	0.9870	0.64	1.30	0.338	0.66
16.00	0.2972	0.9763	0.86	2.37	0.327	1.51
4.00	0.3046	0.9837	0.68	1.63	0.334	0.95
1.00	0.3163	0.9954	0.50	0.47	0.347	-0.03
0.50	0.3216	1.0007	0.43	-0.07	0.354	-0.50

Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)





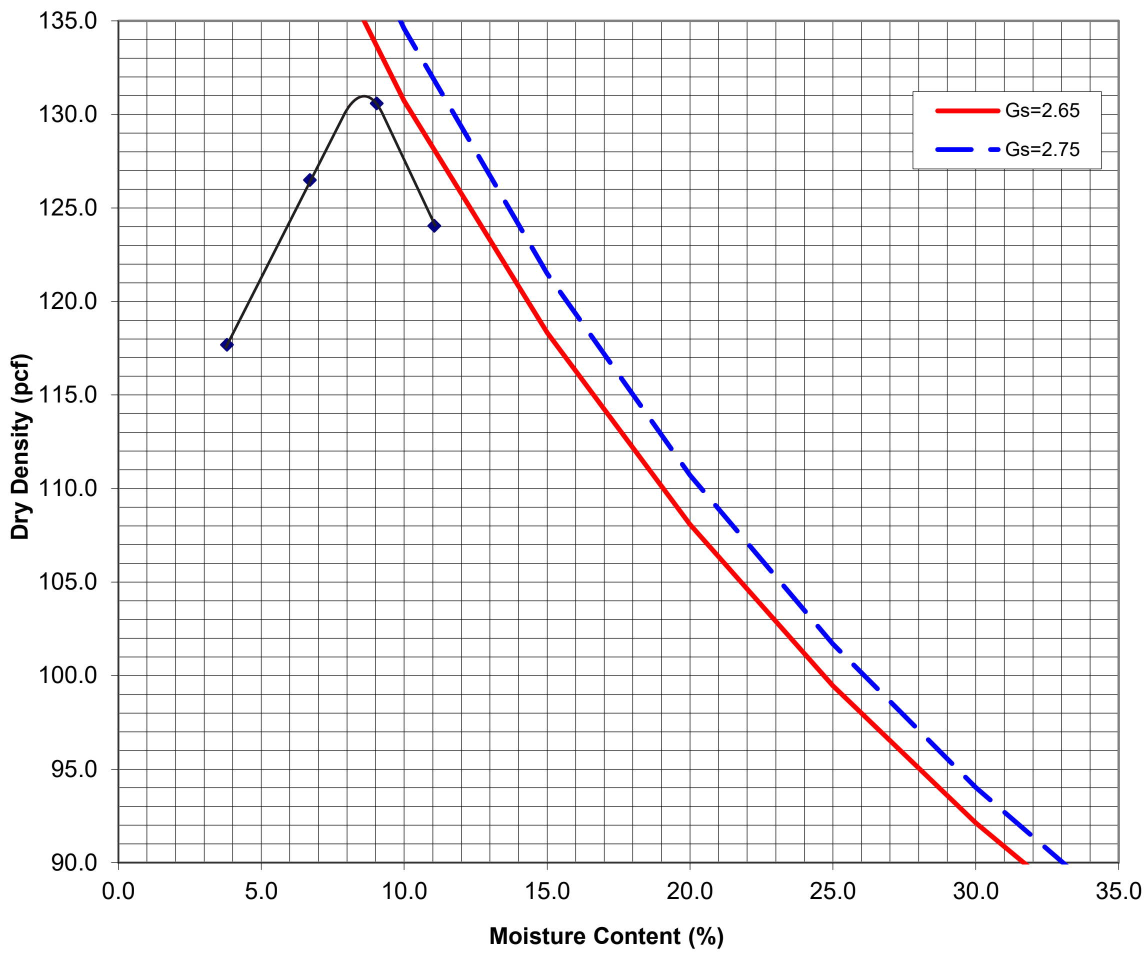
Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-7	**R-3**	**15.0**	**9.6**	**13.4**	**127.0**	**125.0**	**0.347**	**0.354**	**76**	**100**

Soil Identification: Light yellowish brown sandy lean clay s(CL)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

ARB 52, Bakersfield



Location:	Sample No.:	Depth (ft)	Sample Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
HS-5	**B-1**	**0-5'**	**Yellowish brown silty SAND (SM)**	**131.0**	**8.5**

LGC Geotechnical, Inc.

LABORATORY COMPACTION
(ASTM D 1557)

Project Number: 22203-01
Date: Nov-22

ARB 52, Bakersfield

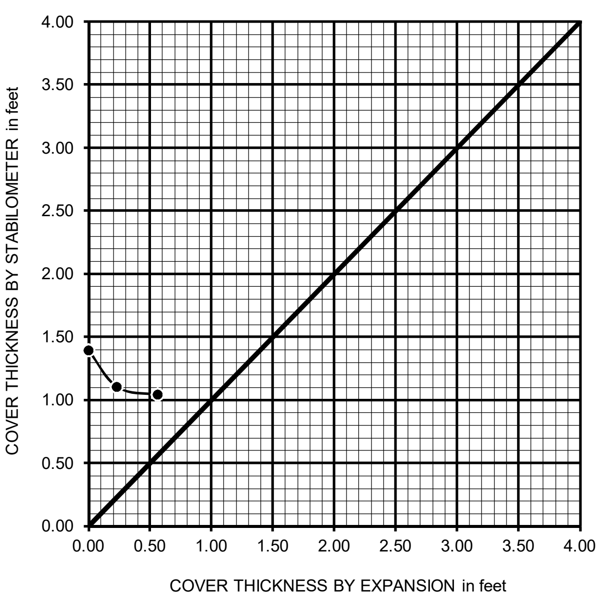
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	ARB 52, Bakersfield	PROJECT NUMBER:	22203-01
BORING NUMBER:	HS-3	DEPTH (FT.):	0-5
SAMPLE NUMBER:	B-1	TECHNICIAN:	OHF/ACS
SAMPLE DESCRIPTION:	Yellowish brown clayey sand (SC)	DATE COMPLETED:	11/10/2022

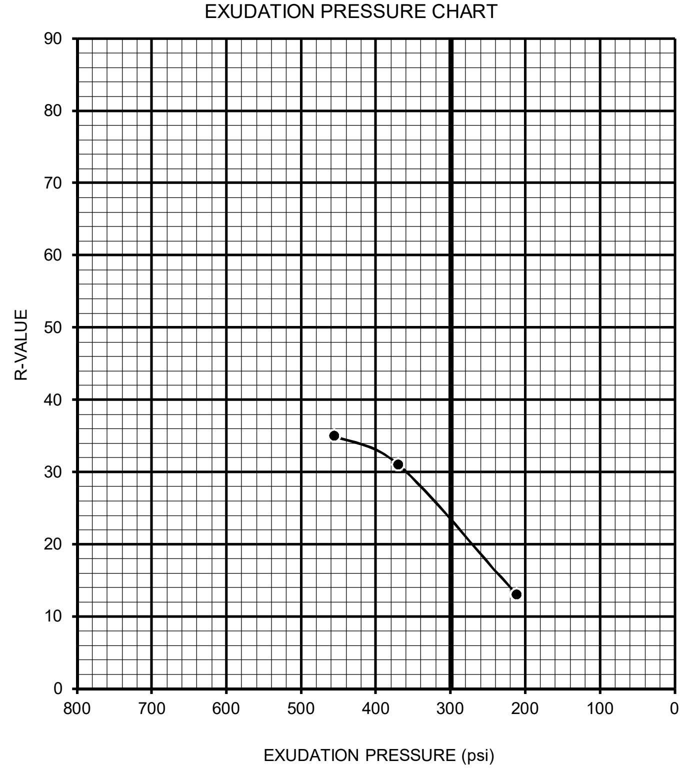
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	11.5	12.0	13.2
HEIGHT OF SAMPLE, Inches	2.47	2.45	2.52
DRY DENSITY, pcf	126.5	126.5	122.9
COMPACTOR PRESSURE, psi	140	110	70
EXUDATION PRESSURE, psi	456	370	212
EXPANSION, Inches x 10exp-4	17	7	0
STABILITY Ph 2,000 lbs (160 psi)	86	91	125
TURNS DISPLACEMENT	4.05	4.25	4.53
R-VALUE UNCORRECTED	35	31	13
R-VALUE CORRECTED	35	31	13

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.04	1.10	1.39
EXPANSION PRESSURE THICKNESS, ft.	0.57	0.23	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	38
R-VALUE BY EXUDATION:	23
EQUILIBRIUM R-VALUE:	23

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: ARB 52, Bakersfield | Tested By : J. Domingo | Date: 11/01/22

Project No. : 22203-01 | Checked By: J. Ward | Date: 11/29/22

Boring No.	HS-2	HS-8		
Sample No.	B-1	B-1		
Sample Depth (ft)	0-5	0-5		
Soil Identification:	Light yellowish brown SM	Light yellowish brown SM		
Wet Weight of Soil + Container (g)	172.52	164.75		
Dry Weight of Soil + Container (g)	168.95	160.20		
Weight of Container (g)	61.68	39.04		
Moisture Content (%)	3.33	3.76		
Weight of Soaked Soil (g)	100.58	100.81		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	15	17		
Crucible No.	5	7		
Furnace Temperature (°C)	860	860		
Time In / Time Out	9:05/9:50	9:05/9:50		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	18.5067	22.7059		
Wt. of Crucible (g)	18.5043	22.7028		
Wt. of Residue (g) (A)	0.0024	0.0031		
PPM of Sulfate (A) x 41150	98.76	127.56		
PPM of Sulfate, Dry Weight Basis	**102**	**133**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)				
ml of AgNO3 Soln. Used in Titration (C)				
PPM of Chloride (C -0.2) * 100 * 30 / B				
PPM of Chloride, Dry Wt. Basis	**N/A**	**N/A**		

pH TEST, DOT California Test 643

pH Value	**N/A**	**N/A**		
Temperature °C				

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: ARB 52, Bakersfield | Tested By : J. Domingo | Date: 11/01/22

Project No. : 22203-01 | Checked By: J. Ward | Date: 11/29/22

Boring No.	HS-4			
Sample No.	B-1			
Sample Depth (ft)	0-5			
Soil Identification:	Light yellowish brown SM			
Wet Weight of Soil + Container (g)	168.11			
Dry Weight of Soil + Container (g)	164.20			
Weight of Container (g)	60.77			
Moisture Content (%)	3.78			
Weight of Soaked Soil (g)	100.64			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	61			
Crucible No.	6			
Furnace Temperature (°C)	860			
Time In / Time Out	9:05/9:50			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	25.7436			
Wt. of Crucible (g)	25.7408			
Wt. of Residue (g) (A)	0.0028			
PPM of Sulfate (A) x 41150	115.22			
PPM of Sulfate, Dry Weight Basis	**120**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	0.3			
PPM of Chloride (C -0.2) * 100 * 30 / B	20			
PPM of Chloride, Dry Wt. Basis	**21**			

pH TEST, DOT California Test 643

pH Value	**7.88**			
Temperature °C	21.3			

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	ARB 52, Bakersfield	Tested By :	J. Han	Date:	11/14/22
Project No. :	22203-01	Checked By:	J. Ward	Date:	11/29/22
Boring No.:	HS-4	Depth (ft.) :	0-5		
Sample No. :	B-1				

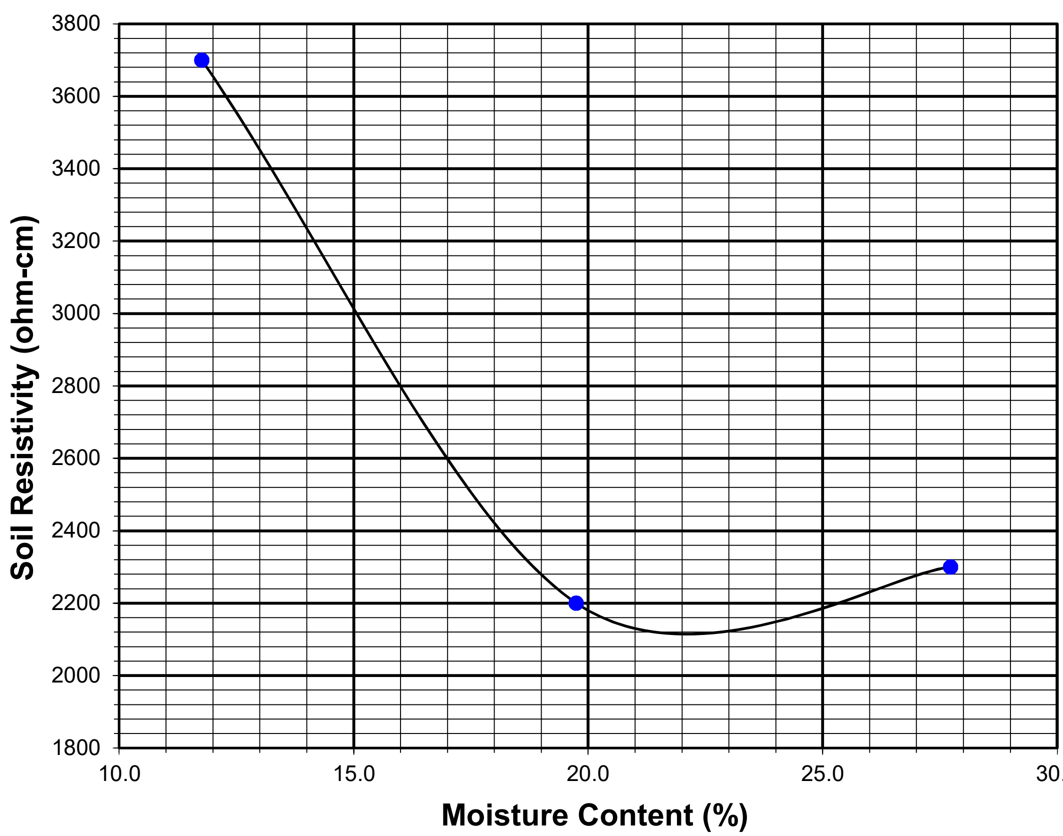
Soil Identification:* Light yellowish brown SM

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	11.76	3700	3700
2	20	19.75	2200	2200
3	30	27.73	2300	2300
4				
5				

Moisture Content (%) (MCi)	3.78
Wet Wt. of Soil + Cont. (g)	168.11
Dry Wt. of Soil + Cont. (g)	164.20
Wt. of Container (g)	60.77
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
2120	**22.1**	**120**	**21**	**7.88**	**21.3**



Appendix D
General Earthwork and Grading Specifications

General Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of “equipment” of work and the estimated quantities of daily earthwork

contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the
Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be over-excavated as specified in the following section. Scarification shall continue until soils are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Over-excavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of the geotechnical consultant. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than
5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

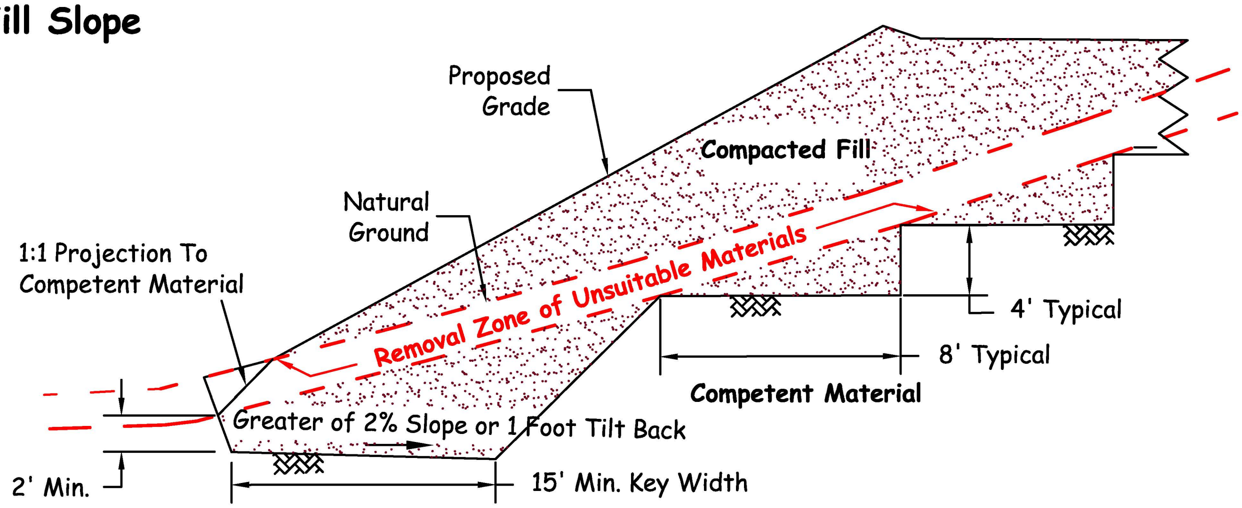
7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

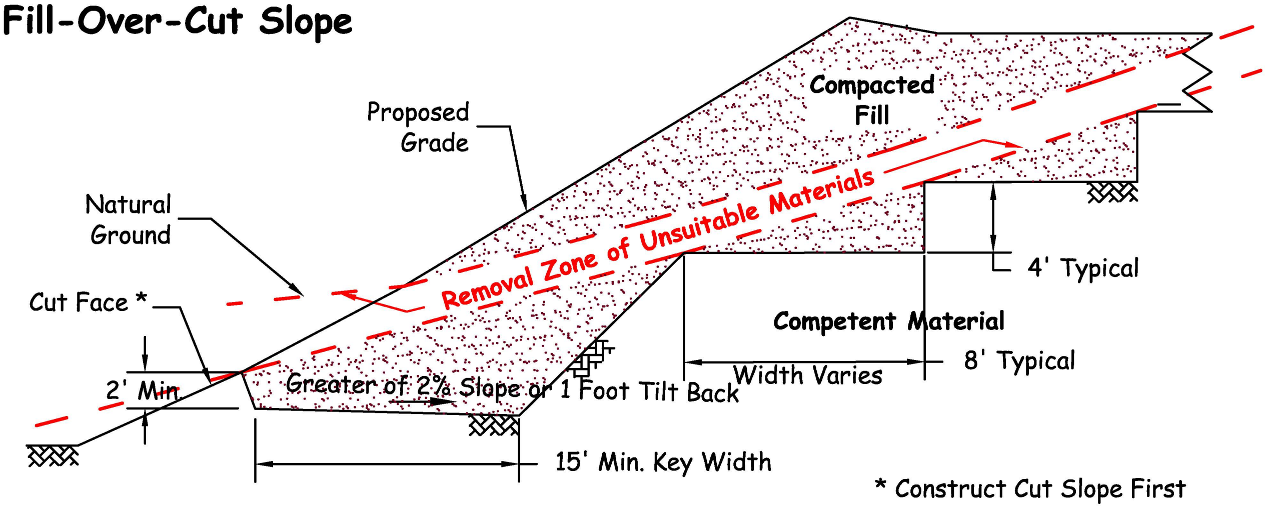
7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

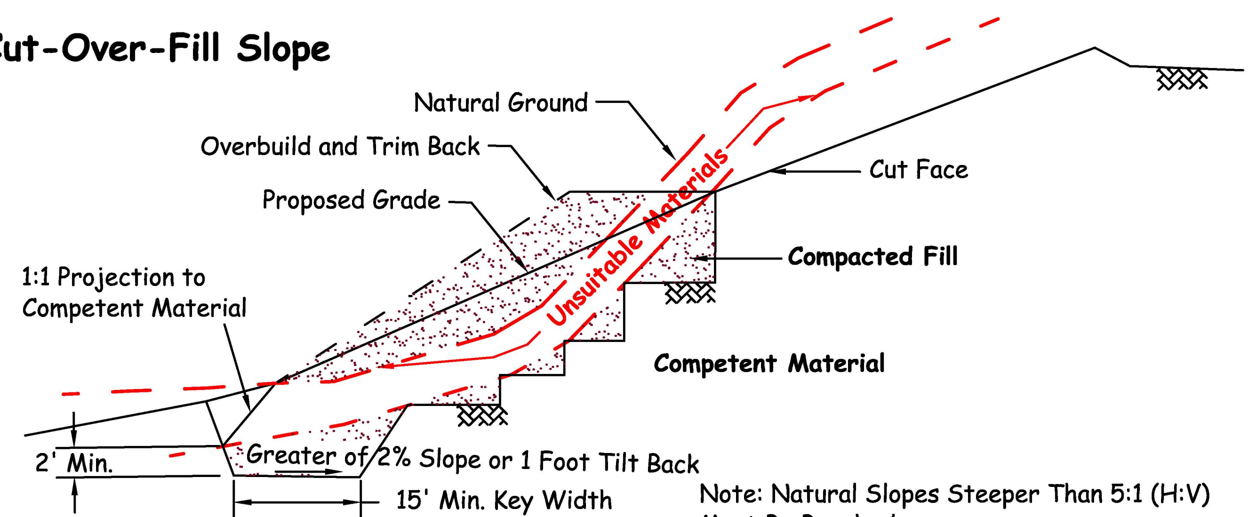
Fill Slope



Fill-Over-Cut Slope



Cut-Over-Fill Slope



Note: Natural Slopes Steeper Than 5:1 (H:V) Must Be Benched.

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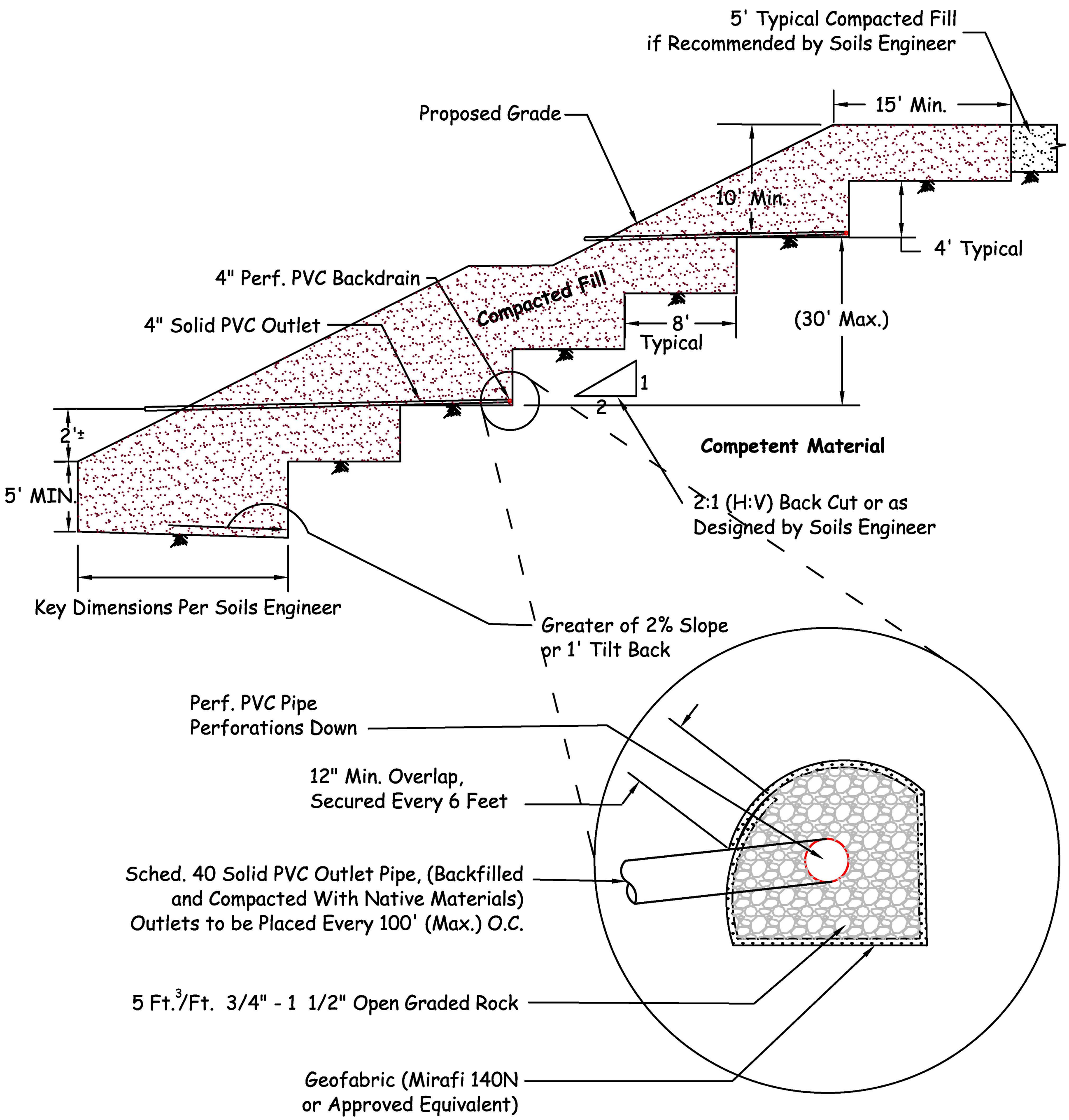
KEYING AND BENCHING



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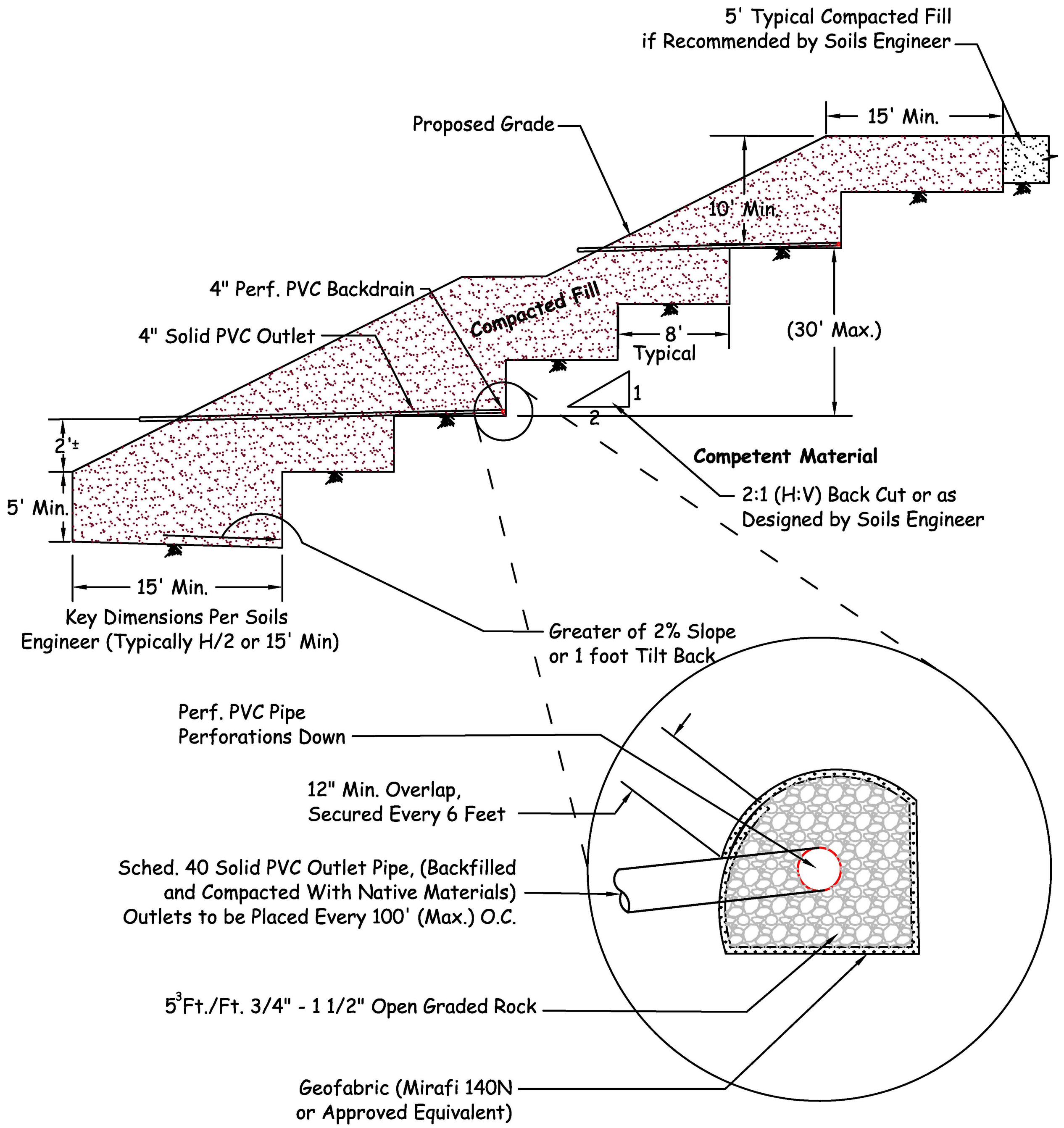
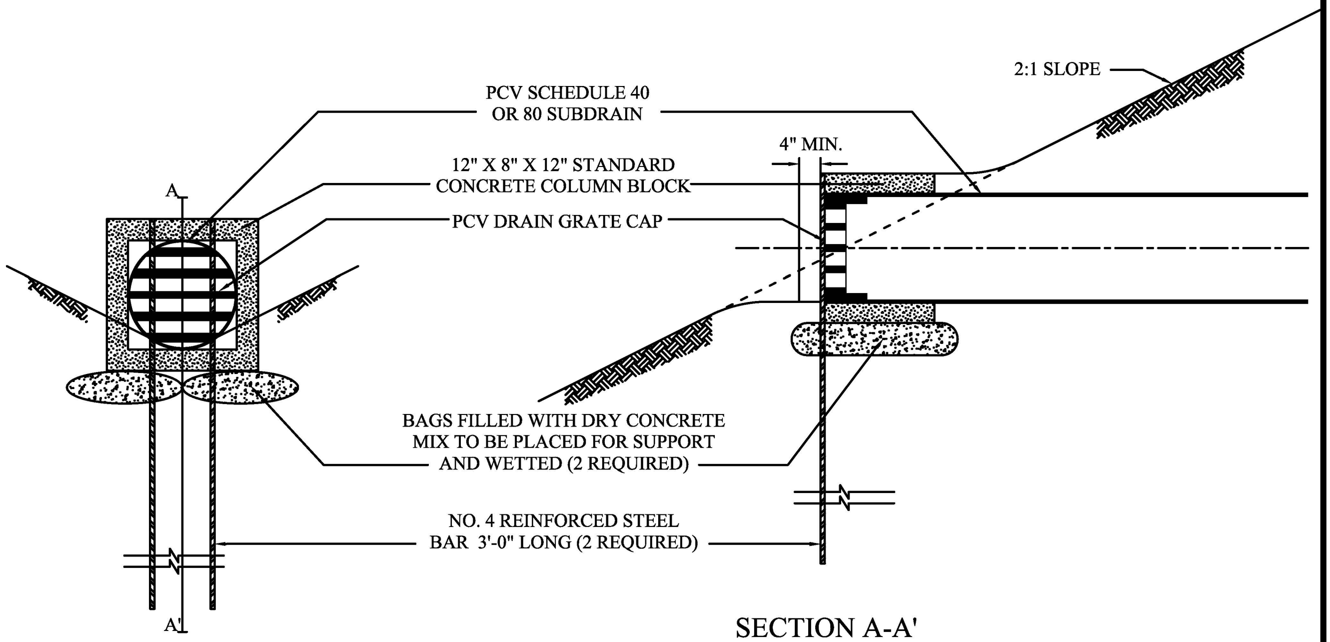
TYPICAL BUTTRESS DETAIL



LGC Geotechnical, Inc.

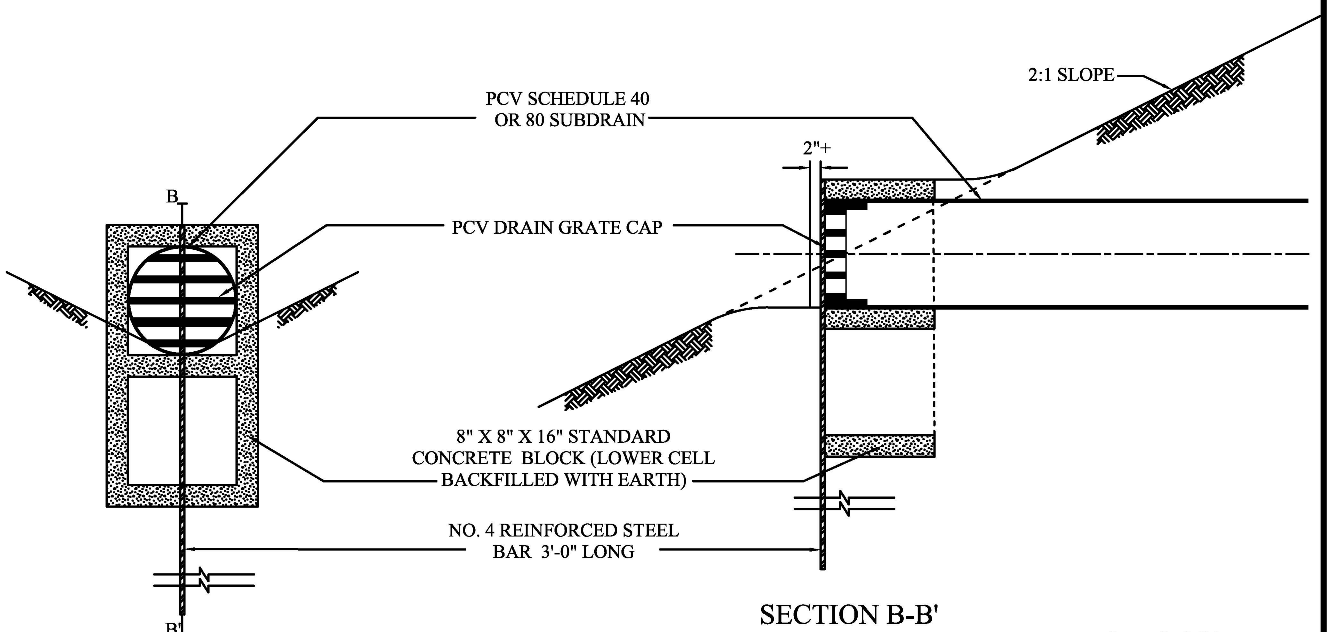
TYPICAL STABILIZATION FILL DETAIL

SUBDRAIN OUTLET MARKER -6" & 8" PIPE



SECTION A-A'

SUBDRAIN OUTLET MARKER -4" PIPE



SECTION B-B'

NOT TO SCALE

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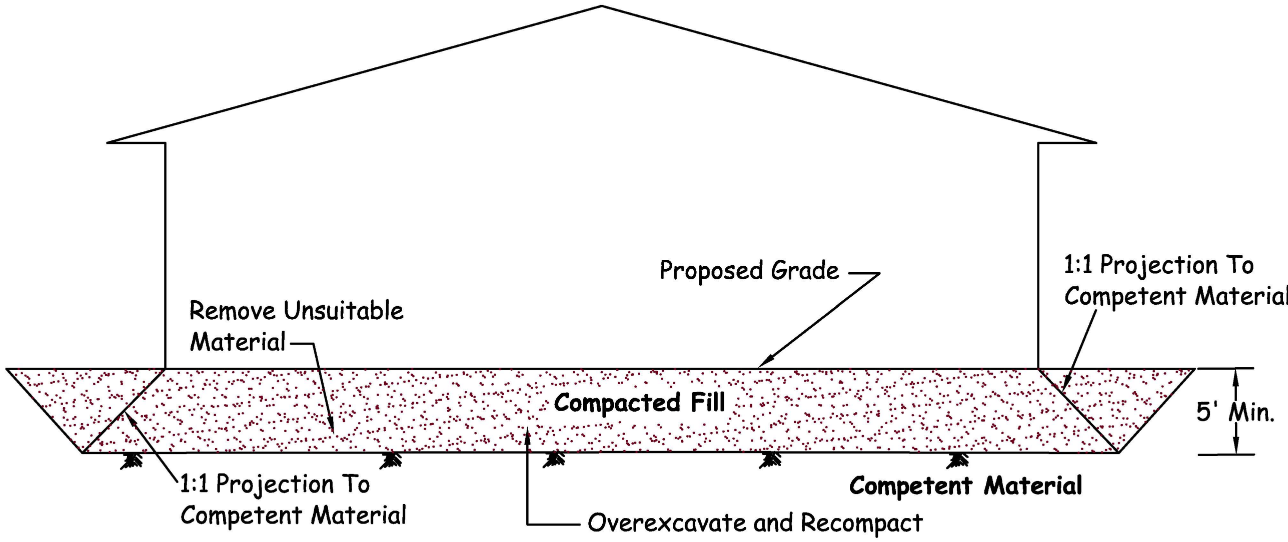
SUBDRAIN OUTLET MARKER DETAIL

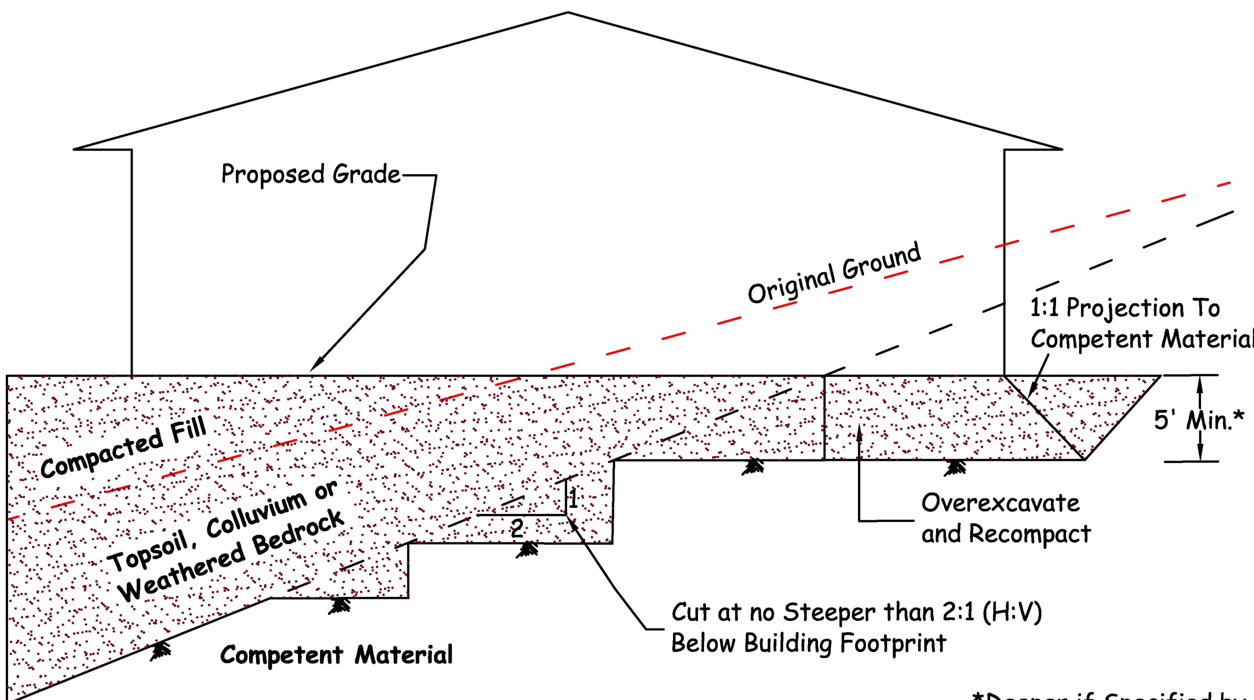
Cut Lot
(Exposing Unsuitable Soils at Design Grade)



Note 1: Removal Bottom Should be Graded With Minimum 2% Fall Towards Street or Other Suitable Area (as Determined by Soils Engineer) to Avoid Ponding Below Building

Note 2: Where Design Cut Lots are Excavated Entirely Into Competent Material, Overexcavation May Still be Required for Hard-Rock Conditions or for Materials With Variable Expansion Characteristics.

Cut/Fill Transition Lot



*Deeper if Specified by Soils Engineer

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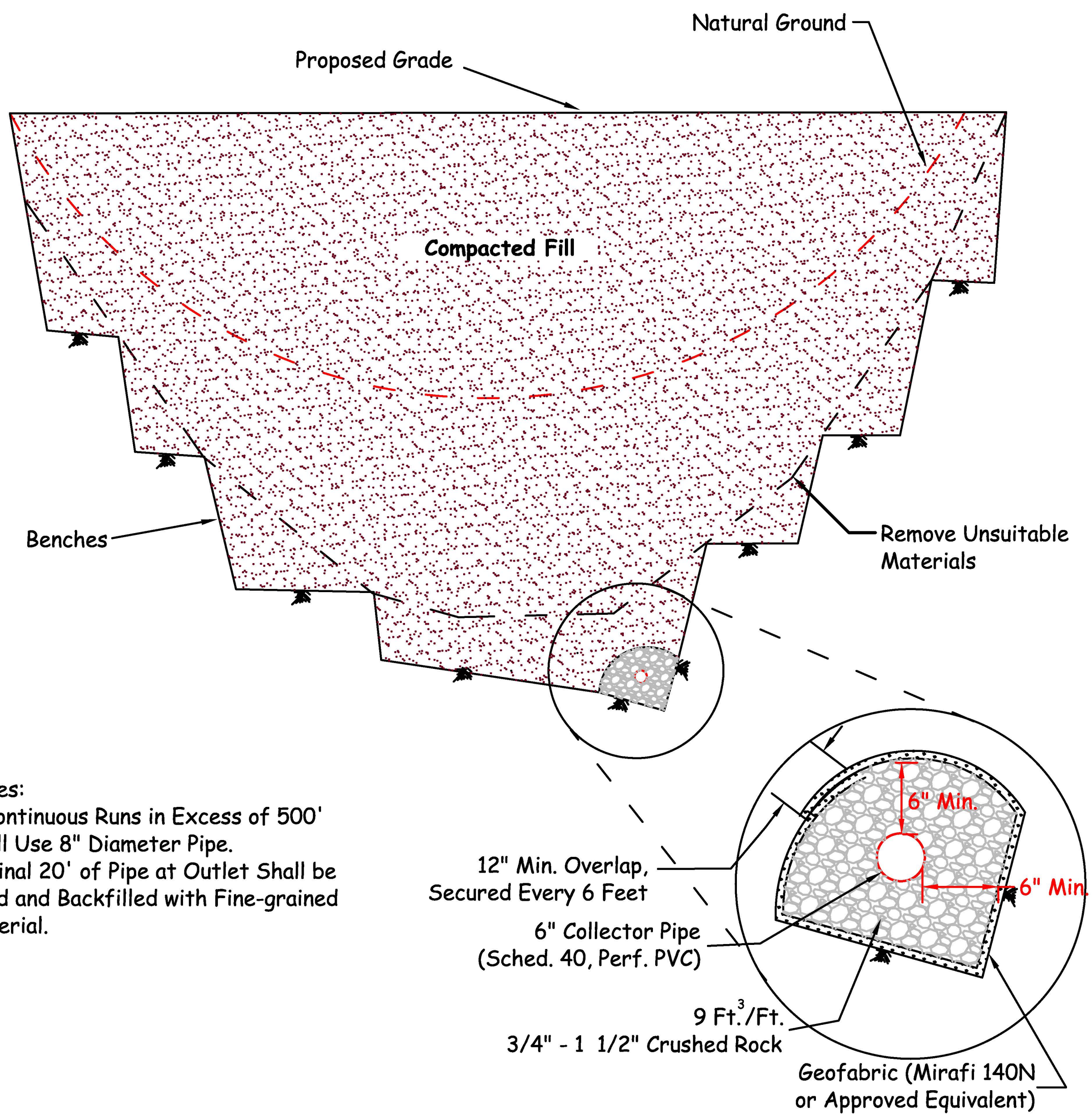
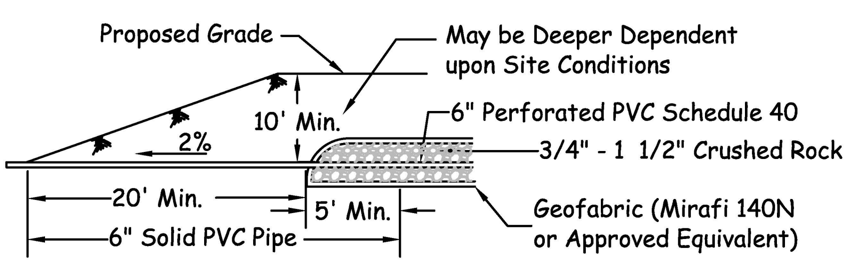
CUT AND TRANSITION LOT OVEREXCAVATION DETAIL



Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

Proposed Outlet Detail



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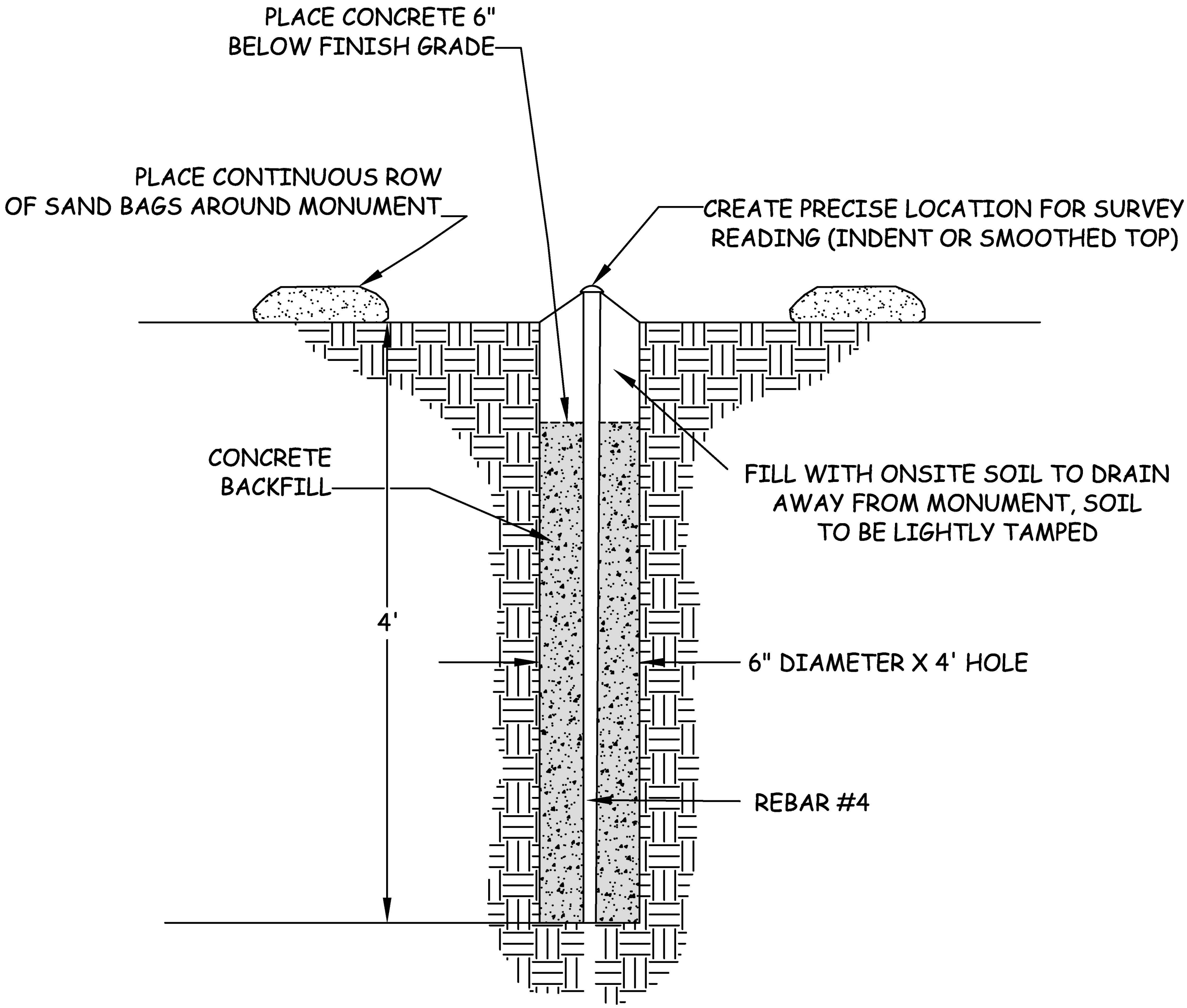
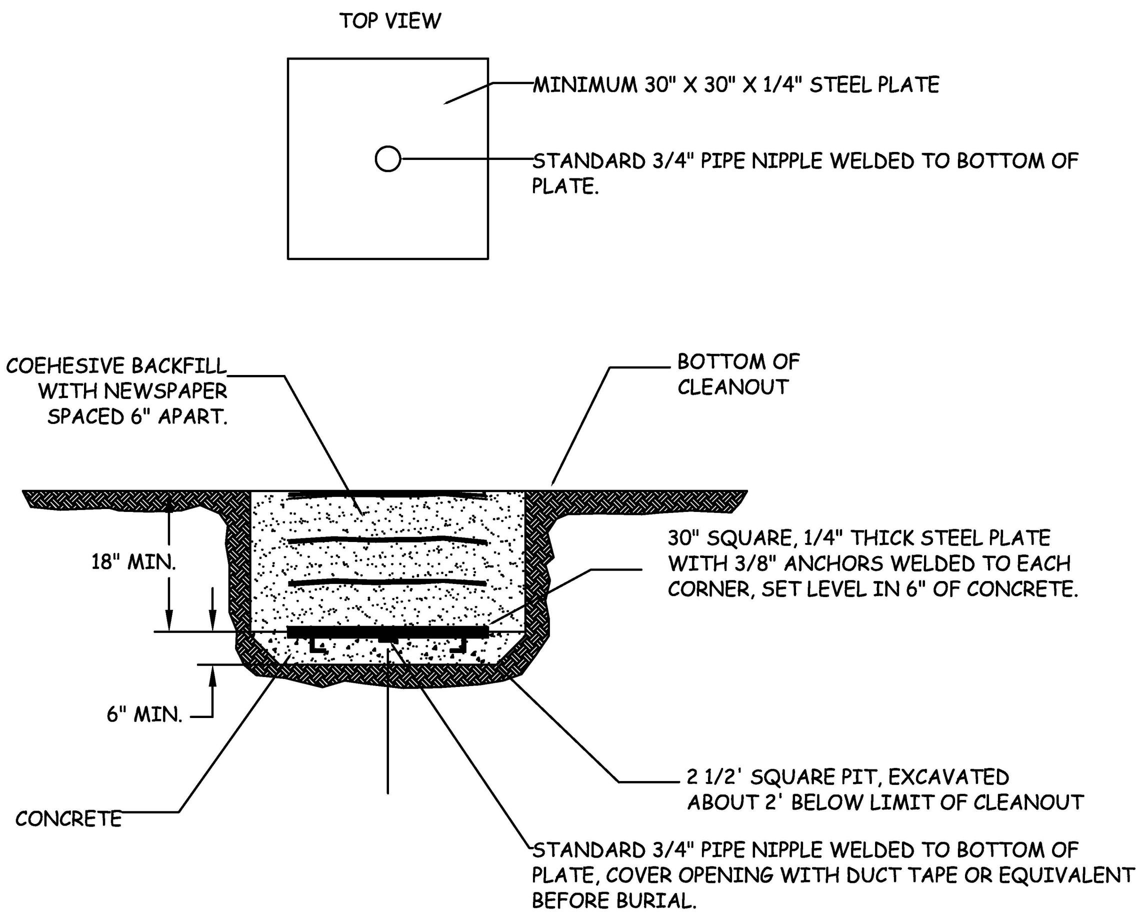
CANYON SUBDRAINS



NO CONSTRUCTION EQUIPMENT WITHIN 25 FEET
OF ANY INSTALLED SETTLEMENT MONUMENTS

LGC Geotechnical, Inc.

TYPICAL SURFACE SETTLEMENT MONUMENT



1. SURVEY FOR HORIZONTAL AND VERTICAL LOCATION TO NEAREST .01 INCH PRIOR TO BACKFILL USING KNOW LOCATIONS THAT WILL REMAIN INTACT DURING THE DURATION OF THE MONITORING PROGRAM. KNOW POINTS EXPLICITELY NOT ALLOWED ARE THOSE LOCATED ON FILL OR THAT WILL BE DESTROYED DURING GRADING.
2. IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE DURING GRADING, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATES TO WORKING ORDER.
3. DRILL TO RECOVER AND ATTACH RISER PIPE.

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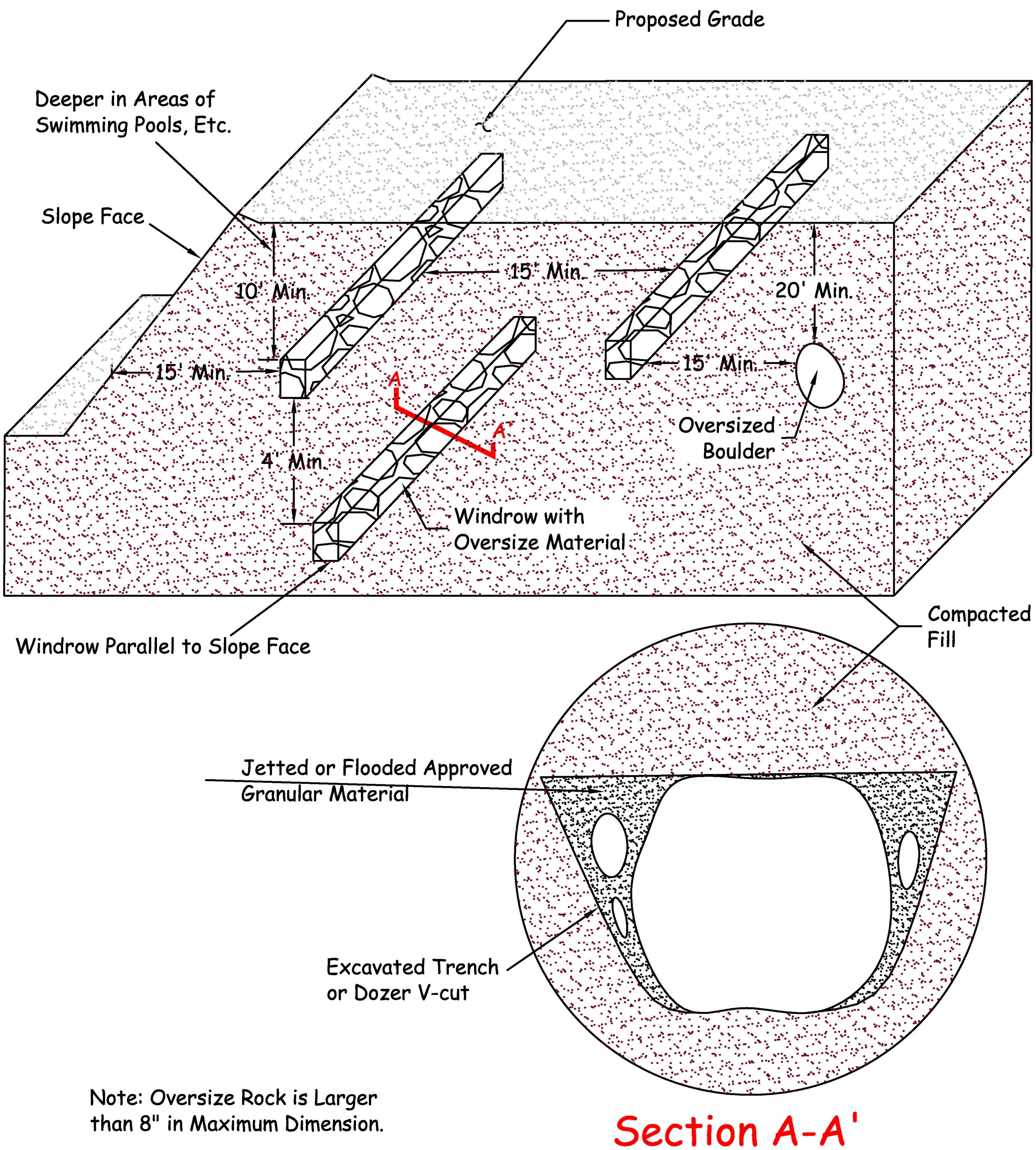
TYPICAL SETTLEMENT PLATE AND RISER



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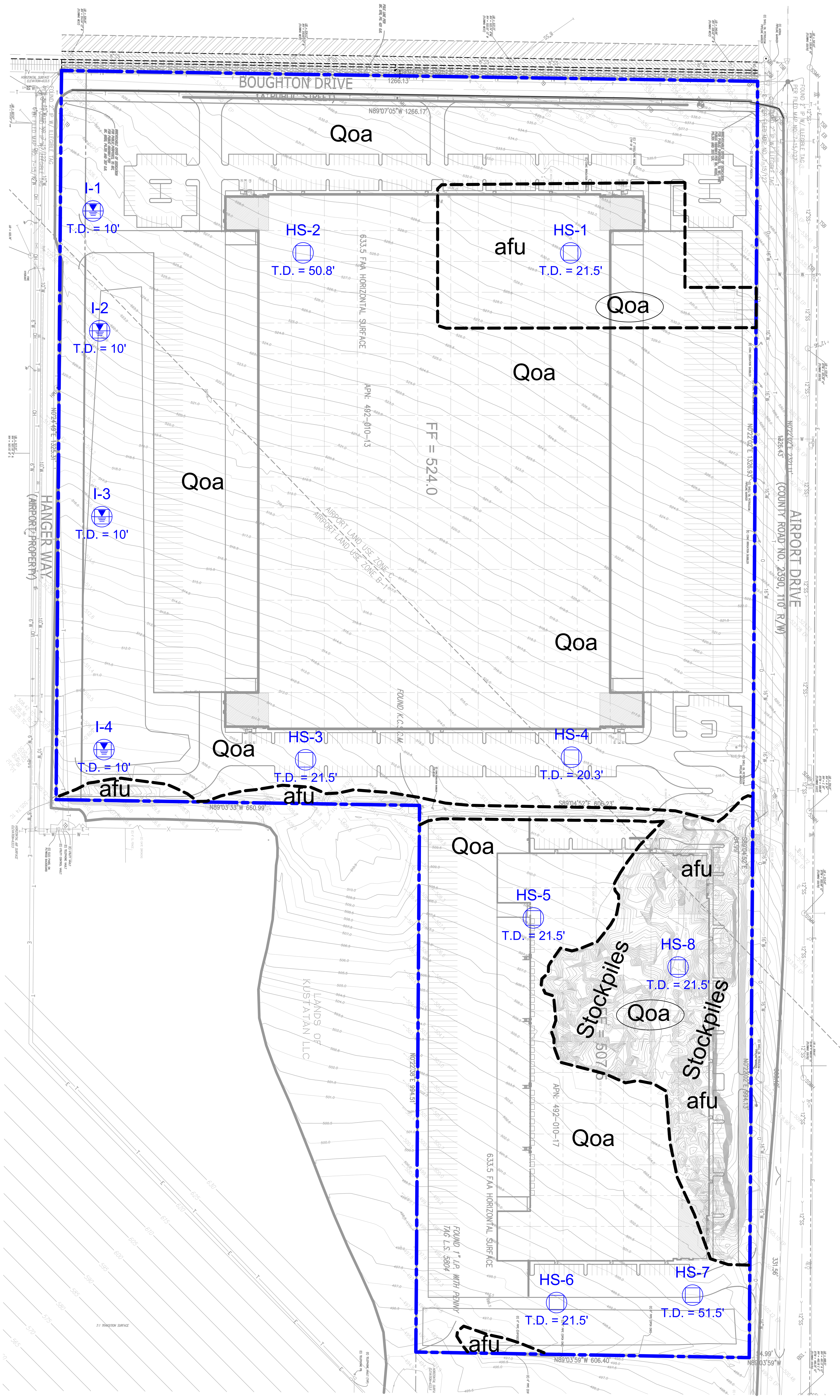
OVERSIZE ROCK DISPOSAL DETAIL

LEGEND

afu	Artificial Fill - Undocumented
Qoa	Quaternary Old Alluvium, Circled Where Buried
	Approximate Geologic Contact
	Approximate Limits of Site
HS-8 T.D. = 21.5'	Approximate Location of Hollow Stem Auger Boring by LGC Geotechnical, With Total Depth in Feet
I-4 T.D. = 10'	Approximate Location of Hollow Stem Auger Infiltration Boring by LGC Geotechnical, With Total Depth in Feet



LGC Geotechnical, Inc.		

LGC Geotechnical, Inc.
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Geotechnical Map

PROJECT NAME	IPG- ARB 52
PROJECT NO.	22203-01
ENG. / GEOL.	BTZ / KBC
SCALE	1" = 100'
DATE	December 2022

SHEET 1 of 1

April 18, 2023 Project No. 22203-01

Mr. Craig Wilde
Industrial Property Group, Inc.
10515 20th Street Southeast
Lake Stevens, Washington 98258

Subject: ***Geotechnical Addendum Report (Infiltration Evaluation), Proposed ARB 52 Industrial Development, Bakersfield, California***

Reference: LGC Geotechnical, 2022, Preliminary Geotechnical Evaluation, Proposed Industrial Development, Southwest of the Intersection of Boughton Drive and Airport Drive, Kern County, California, Project No. 22203-01, dated December 7, 2022.

Introduction

In accordance with your request and authorization, LGC Geotechnical, Inc. has performed a supplemental geotechnical evaluation (infiltration testing) for the proposed ARB 52 industrial development to be located southwest of the intersection of Boughton Drive and Airport Drive in Bakersfield, California. The proposed infiltration basin locations have been relocated subsequent to our previous geotechnical evaluation (LGC Geotechnical, 2022). Accordingly, we have performed additional infiltration testing at the locations of the new proposed basins.

As part of this report, we have: 1) performed the excavation of fifteen small-diameter borings ranging in depth from approximately 5 feet to 50 feet below existing grade; 2) performed in-situ field infiltration tests within Borings I-5 through I-18; 3) performed select laboratory testing of select samples; and 4) prepared this summary report of results of infiltration testing.

Background

LGG Geotechnical has previously performed a geotechnical field evaluation of the site including falling-head percolation tests (I-1 through I-4) which are documented in the referenced geotechnical report (LGC Geotechnical, 2022). **This report is not a stand-alone document and must be used in conjunction with the project geotechnical report (LGC Geotechnical, 2022) for completeness.**

Supplemental Subsurface Exploration

Fifteen borings (HS-9 and I-5 through I-18) were excavated using a truck-mounted drill rig equipped with 6-inch and 8-inch-diameter hollow-stem augers to depths ranging from approximately 5 to 50 feet below existing grade. An LGC Geotechnical representative observed the drilling operations, logged the borings, and collected soil samples for laboratory testing. Driven soil samples were collected by means of the Modified California Drive (MCD) sampler. The MCD sampler (2.4-inch ID, 3.0-inch OD) was driven using a 140-pound hammer falling 30 inches to advance the sampler a total depth of 18 inches or until refusal. The raw blow counts for each 6-inch increment of penetration were recorded on the boring logs. After removal of the augers the depth of the boring due to caving was measured in HS-9 and is noted on the boring log. The borings were backfilled with cuttings. The approximate locations of our subsurface explorations are provided on our Geotechnical Map (Sheet 1). The boring logs are provided in Appendix A.

At the completion of excavation of Infiltration borings (I-5 through I-18) an infiltration well was constructed within each boring for testing as outlined in the "Field Percolation Testing" Section below. At the completion of infiltration testing, the installed pipe was removed, and the resulting void backfilled with native soils. Please note that some settlement of the backfill may occur over time and the excavations should be topped off as needed.

Field Infiltration Testing

Fourteen falling-head field percolation tests (I-5 through I-18) were performed in the approximate locations indicated on the Geotechnical Map (Sheet 1). A 3-inch diameter perforated PVC pipe was placed in the borehole, and the annulus was backfilled with gravel, including placement of approximately 2 inches of gravel at the bottom of the borehole. The infiltration wells were pre-soaked the day prior to testing. During the pre-test, if the water level drops more than 6 inches in 25 minutes for two consecutive readings, the test procedure for coarse-grained soils should be followed. If the water level does not meet that criterion, the procedure for fine-grained soils should be followed. The procedure for coarse-grained soils requires performing the test for one hour and taking one reading every 10 minutes from a fixed reference point. The procedure for fine-grained soils requires performing the test for six hours and taking one reading every 30 minutes from a fixed reference point. The calculated (observed) infiltration is normalized relative to the three-dimensional flow that occurs within the field test to a one-dimensional flow out of the bottom of the boring only (i.e., "Porchet Method"). The observed infiltration rates are provided in Table 1 on the following page and do not include any factors of safety.

TABLE 1

Summary of Field Infiltration Testing

Infiltration Test Location	Infiltration Test Approximate Depth (ft)	Observed Infiltration Rate (inch/hr.) *
I-5	10	0.1
I-6	15	1.1
I-7	10	14.8
I-8	15	0.2
I-9	17	0.5
I-10	12	1.0
I-11	10	0.5
I-12	5	1.1
I-13	10	0.3
I-14	15	1.8
I-15	10	0.1
I-16	15	0.1
I-17	18	0.0
I-18	13	0.1

*Does not include a factor of safety

It should also be emphasized that infiltration test results are only representative of the location and depth where they are performed. Varying subsurface conditions may exist outside of the test locations which could alter the calculated infiltration rates indicated above. The percolation tests were performed using relatively clean water free of particulates, silt, etc. Field percolation test data is presented in Appendix B. Refer to further discussion provided below.

Laboratory Testing

Representative driven samples were obtained for laboratory testing during our field evaluation. Laboratory testing included in-situ moisture content and in-situ dry density, hydraulic conductivity, consolidation and collapse/swell potential.

The following is a summary of the laboratory test results:

- Dry density of the samples collected ranged from approximately 107 pounds per cubic foot (pcf) to 129 pcf, with an average of 107 pcf. Field moisture contents ranged from approximately 2 to 16 percent, with an average of 8 percent.
- Hydraulic conductivity falling head tests were performed on select samples. Hydraulic conductivity rates (average of last 4 readings) ranged from approximately 3.6E-08 cm/sec to 3.5E-05 cm/sec. The data is provided in Appendix C.
- Consolidation and collapse/swell tests were performed on select samples. Collapse at water inundation ranged from negligible to approximately 1.75 percent. Swell at water inundation

ranged from approximately 0.75 percent to 1.25 percent. The deformation versus vertical stress plots are provided in Appendix C.

Laboratory test results are provided in Appendix C. In-situ dry density and moisture content test results are provided on the borings logs.

Conclusions

- In general, our subsurface evaluations indicate that the site primarily contains medium dense to dense sands with varying amounts of silts and stiff to hard silts and clays to the maximum explored depth of approximately 50 feet below existing grade.
- Groundwater was not encountered to the maximum explored depth of approximately 50 feet below existing ground surface. Previously groundwater was not encountered to the maximum explored depth of approximately 50 feet below existing ground surface and historical high groundwater is anticipated to be greater than 50 feet below existing ground surface (LGC Geotechnical, 2022).
- The field infiltration tests indicated observed infiltration rates ranging from zero to 1.8 inch/hour. These values do not include any factor of safety. The infiltration rate of 14.8 inch/hour for I-7 should be considered an anomaly and not considered relevant to the site. The site contains significant amounts of soil with high fines content (i.e., clays), and these soils typically have very low infiltration rates.

Subsurface Water Infiltration

Recent regulatory changes have occurred that mandate that storm water be infiltrated below grade rather than collected in a conventional storm drain system. It should be noted that collecting and concentrating surface water for the purpose of intentionally infiltrating it below grade, conflicts with the geotechnical engineering objective of directing surface water away from slopes, structures and other improvements. The geotechnical stability and integrity of a site is reliant upon appropriately handling surface water. In general, we do not recommend that surface water be intentionally infiltrated into the subsurface soils.

If it is determined that water must be infiltrated due to regulatory requirements, we recommend the absolute minimum amount of water be infiltrated and that the infiltration areas not be located near slopes or near settlement sensitive existing/proposed improvements. Contamination and environmental suitability of the site for infiltration is not the purview of the geotechnical consultant and should be evaluated by others. LGC Geotechnical only addressed the geotechnical issues associated with stormwater infiltration.

As with all systems that are designed to concentrate surface flow and direct the water into the subsurface soils, some minor settlement, nuisance type localized saturation and/or other water related issues should be expected. Due to variability in geologic and hydraulic conductivity characteristics, these effects may be experienced at the onsite location and/or potentially at other locations well beyond the physical limits of the subject site. Infiltrated water may enter underground utility pipe zones or flow along heterogeneous soil layers or geologic structure and migrate laterally impacting other improvements which may be located far away or at an elevation much different than the infiltration source.

Based on the results of our field infiltration testing the observed (no factor of safety) infiltration rates ranged from zero to 1.8 inches per hour (refer to Table 1). The design infiltration rate is typically determined by dividing the observed infiltration rate by a factor of safety. Please note that the infiltration values reported herein are for native materials only and are not for compacted fill.

The following should be considered for design of any required infiltration system:

- Water discharge from any infiltration/dry well systems should not occur within the zone of influence of foundation footings (column and load bearing wall locations). Adequate distances should be maintained between infiltration locations and structures. The invert of any storm water infiltration system should be set back a minimum of 15 feet from building structures and outside a 1:1 plane drawn up from the bottom of adjacent foundations.
- An adequate setback distance between any infiltration facility and adjacent property lines should be maintained.
- We recommend the design of any infiltration system include at least one redundancy or overflow system. It may be prudent to provide an overflow system directly connected to the storm drain system in order to prevent failure of the infiltration system, either as a result of lower than anticipated infiltration and/or very high flow volumes.
- The infiltration values provided are based on clean water and this requires the removal of trash, debris, soil particles, etc., and on-going maintenance. Over time, siltation and plugging may reduce the infiltration rate and subsequent effectiveness of the infiltration system. It should be noted that methods to prevent this shall be the responsibility of the infiltration designer and are not the purview of the geotechnical consultant. If adequate measures cannot be incorporated into the design and maintenance of the system, then the infiltration rates may need to be further reduced. These and other factors should be considered in selecting a design infiltration rate.
- Any designed infiltration system will require routine periodic maintenance.
- Contamination and environmental suitability of the site for infiltration was not evaluated by LGC Geotechnical and should be evaluated by others (environmental consultant). We have only addressed the geotechnical issues associated with stormwater infiltration.

LGC Geotechnical should be provided with details for any planned required dry well system early in the design process for geotechnical input.

Should you have any questions, please do not hesitate to contact our office. We appreciate the opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Brad Zellmer, GE 2618
Project Engineer

Kevin B. Colson, CEG 2210
Vice President

BTZ/KBC/amm

Appendices: Appendix A - Geotechnical Boring Logs
Appendix B - Infiltration Test Data
Appendix C - Laboratory Test Results

Attachments: Sheet 1 – Geotechnical Map

Distribution: (1) Addressee (1 electronic copy & 4 wet-signed copies for agency submittal)

Appendix A
Geotechnical Boring Logs

Geotechnical Boring Log Borehole HS-9

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~513' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510									
	5								
505									
	10		R-1	7 13 15	122.9	2.5	SM	@ 10' - Silty SAND: yellowish brown, slightly moist, medium dense	HC
500									
	15								
495									
	20		R-2	23 30 38	114.5	16.15	CL	@ 20' - CLAY with Sand: yellowish brown, moist, hard	HC
490									
	25								
485									
	30								

Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
HC HYDRAULIC CONDUCTIVITY
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole HS-9

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 6"
Elevation of Top of Hole: ~513' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 2 of 2

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	30		R-3	9 22 32	129.1	5.0	CL	@ 30' - Sandy CLAY: yellowish brown, slightly moist, hard	HC
480									
	35								
475									
	40		R-4,R4A	10 14 21	117.9	2.8	SC-SM	@ 40' - Silty,Clayey SAND: yellowish brown, slightly moist, medium dense	HC CN
470									
	45								
465									
	50		R-5	20 26 31	107.2	10.9	CL	@ 50' - CLAY: brown, slightly moist, hard	HC
460								Total Depth = 51.5' Groundwater Not Encountered Caving: Hole measured approximately 41 feet after removal of augers Backfilled with Cuttings on 3/6/2023	
	55								
455									
	60								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole I-5

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~516' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
515	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510	5								
			R-1	20 24 28	127.7	5.8	CL	@ 8.5' - Sandy CLAY: brown, slightly moist, hard	
505	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
500	15								
495	20								
490	25								
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-6

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~516' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
515	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510	5								
505	10								
			R-1	30 29 34	125.8	8.0	CL	@ 13.5' - Sandy CLAY: light olive brown, slightly moist, hard	CO
500	15							Total Depth = 15' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
495	20								
490	25								
	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/14/2023

Geotechnical Boring Log Borehole I-7

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~515' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510	5								
			R-1	12 14 15	112.8	2.0	SP-SM	@ 8.5' - SAND with Silt: yellowish brown, slightly moist, medium dense	CO
505	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
500	15								
495	20								
490	25								
	30								

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-8

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~515' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510	5								
505	10								
			R-1	27 50/6"	127.7	5.8	CL	@ 13.5' - Sandy CLAY: yellowish brown, slightly moist, hard	
500	15							Total Depth = 15' Groundwater Not Encountered Backfilled with Cuttings on 3/6/2023	
495	20								
490	25								
	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-9

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~512' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510									
	5								
505									
	10								
500									
	15		R-1	11 12 16	SC	118.9	7.6	@ 15.5' - Clayey SAND: light brown, slightly moist, medium dense	
495								Total Depth = 17' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
	20								
490									
	25								
485									
	30								

Last Edited: 3/13/2023

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Geotechnical Boring Log Borehole I-10

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~512' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
510									
	5								
505									
	10		R-1	13 20 32	114.3	13.6	CL	@ 10.5' - CLAY with Sand: yellowish brown, moist, hard	CO
500								Total Depth = 12' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
	15								
495									
	20								
490									
	25								
485									
	30								

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- ▽ GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-11

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~510' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
505	5								
			R-1	15 27 30	122.7	3.8	SP-SC	@ 8.5' - SAND with Clay: light brown, slightly moist, dense	CO
500	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
495	15								
490	20								
485	25								
	30								

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SAMPLE TYPES:

B	BULK SAMPLE
R	RING SAMPLE (CA Modified Sampler)
G	GRAB SAMPLE
SPT	STANDARD PENETRATION TEST SAMPLE
▽	GROUNDWATER TABLE

TEST TYPES:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
SA	SIEVE ANALYSIS
S&H	SIEVE AND HYDROMETER
EI	EXPANSION INDEX
CN	CONSOLIDATION
CR	CORROSION
AL	ATTERBERG LIMITS
CO	COLLAPSE/SWELL
RV	R-VALUE
-#200	% PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-12

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~510' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
			R-1	29 50/5"	120.3	3.3	SC-SM	@ 3.5' - Clayey SAND: yellowish brown, slightly moist, very dense	CO
505	5							Total Depth = 5' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
500	10								
495	15								
490	20								
485	25								
	30								

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SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE

GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-13

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~504' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
500	5								
495			R-1	18 22 19	122.5	4.9	SC	@ 8.5' - Clayey SAND: light brown, slightly moist, dense	
	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
490	15								
485	20								
480	25								
475	30								

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SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE
GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-14

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~504' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
500	5								
495	10								
490			R-1	17 18 24	123.2	3.5	SC	@ 13.5' - Clayey SAND: olive yellow, slightly moist, dense	CO
	15							Total Depth = 15' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
485	20								
480	25								
475	30								

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-15

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~496' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
495	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
490	5		R-1	8 9 9	114.9	7.8	ML	@ 8.5' - Sandy SILT: brown, slightly moist, stiff	
485	10							Total Depth = 10' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
480	15								
475	20								
470	25								
	30								

LGC Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-16

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~496' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
495	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
490	5								
485	10		R-1	13 28 32	124.4	9.5	SC	@ 13.5' - Clayey SAND with Caliche: light brown, slightly moist, dense	
480	15							Total Depth = 15' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
475	20								
470	25								
	30								

LGC Geotechnical, Inc.

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SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-17

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~500' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
495	5								
490	10								
485	15								
			R-1	11 14 18	115.8	16.1	SC	@ 16.5' - Clayey SAND: light brown, wet, medium dense	
								Total Depth = 18' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
480	20								
475	25								
	30								

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SAMPLE TYPES:
B BULK SAMPLE
R RING SAMPLE (CA Modified Sampler)
G GRAB SAMPLE
SPT STANDARD PENETRATION TEST SAMPLE

GROUNDWATER TABLE

TEST TYPES:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
SA SIEVE ANALYSIS
S&H SIEVE AND HYDROMETER
EI EXPANSION INDEX
CN CONSOLIDATION
CR CORROSION
AL ATTERBERG LIMITS
CO COLLAPSE/SWELL
RV R-VALUE
-#200 % PASSING # 200 SIEVE

Last Edited: 3/13/2023

Geotechnical Boring Log Borehole I-18

Date: 3/6/2023	**Drilling Company:** Choice Drilling
Project Name: IPG - ARB 52	**Type of Rig:** Truck Mounted Rig
Project Number: 22203-01	**Drop:** 30" **Hole Diameter:** 8"
Elevation of Top of Hole: ~500' MSL	**Drive Weight:** 140 pounds
Hole Location: See Geotechnical Map	Page 1 of 1

Logged By JMN
Sampled By JMN
Checked By KBC/BTZ

Elevation (ft)	Depth (ft)	Graphic Log	Sample Number	Blow Count	Dry Density (pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Type of Test
	0							@ 0' - Grass, Silty SAND: reddish brown, slightly moist	
495	5								
490	10								
			R-1	16 19 20	119.4	10.8	SC	@ 11.5' - Clayey SAND: light brown, very moist, dense	
								Total Depth = 13' Groundwater Not Encountered 3" Perforated Pipe with Filter Sock Installed Surrounded by Gravel, and Presoaked on 3/6/23 Backfilled with Cuttings on 3/7/2023	
485	15								
480	20								
475	25								
	30								

Geotechnical, Inc.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED. THE DESCRIPTIONS PROVIDED ARE QUALITATIVE FIELD DESCRIPTIONS AND ARE NOT BASED ON QUANTITATIVE ENGINEERING ANALYSIS.

SAMPLE TYPES:
- B BULK SAMPLE
- R RING SAMPLE (CA Modified Sampler)
- G GRAB SAMPLE
- SPT STANDARD PENETRATION TEST SAMPLE
- GROUNDWATER TABLE

TEST TYPES:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- SA SIEVE ANALYSIS
- S&H SIEVE AND HYDROMETER
- EI EXPANSION INDEX
- CN CONSOLIDATION
- CR CORROSION
- AL ATTERBERG LIMITS
- CO COLLAPSE/SWELL
- RV R-VALUE
- -#200 % PASSING # 200 SIEVE

Appendix B
Infiltration Test Data

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/7/2023
Boring Number: I-5

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:13	8:39	26.0	7.87	7.92	0.05	No
2	8:40	9:06	26.0	7.92	7.96	0.04	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:10	9:40	30.0	7.60	7.67	0.07	0.1
2	9:42	10:16	34.0	7.52	7.60	0.08	0.1
3	10:16	10:46	30.0	7.60	7.63	0.03	0.0
4	10:48	11:18	30.0	7.47	7.52	0.05	0.1
5	11:20	11:50	30.0	7.33	7.35	0.02	0.0
6	11:52	12:22	30.0	7.30	7.33	0.03	0.0
7	12:24	12:54	30.0	7.18	7.24	0.06	0.1
8	12:57	13:29	32.0	7.10	7.16	0.06	0.1
9	13:31	14:01	30.0	7.03	7.08	0.05	0.1
10	14:03	14:33	30.0	7.01	7.07	0.06	0.1
11	14:35	15:07	32.0	6.94	7.02	0.08	0.1
12	15:08	15:38	30.0	6.99	7.03	0.04	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes:
Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/7/2023
Boring Number: I-6

Test hole dimensions (if circular)	
Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:19	8:44	25.0	13.06	13.55	0.49	No
2	8:46	9:11	25.0	12.64	13.24	0.60	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:15	9:45	30.0	12.69	13.30	0.61	1.1
2	9:46	10:18	32.0	12.91	13.44	0.53	1.0
3	10:20	10:50	30.0	12.77	13.34	0.57	1.1
4	10:52	11:22	30.0	12.85	13.37	0.52	1.0
5	11:25	11:55	30.0	12.84	13.36	0.52	1.0
6	11:57	12:27	30.0	12.78	13.32	0.54	1.0
7	12:29	13:00	31.0	12.80	13.34	0.54	1.0
8	13:03	13:33	30.0	12.81	13.36	0.55	1.1
9	13:35	14:05	30.0	12.82	13.35	0.53	1.0
10	14:07	14:37	30.0	12.73	13.31	0.58	1.1
11	14:39	15:11	32.0	12.85	13.40	0.55	1.0
12	15:13	15:43	30.0	12.85	13.39	0.54	1.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **1.1**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/7/2023
Boring Number: I-7

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:27	8:52	25.0	8.00	10.13	2.13	Yes
2	8:54	9:19	25.0	7.90	10.13	2.23	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:22	9:33	11.0	8.10	9.80	1.70	15.2
2	9:36	9:48	12.0	8.33	9.79	1.46	13.2
3	9:50	10:01	11.0	7.35	9.79	2.44	16.7
4	10:02	10:12	10.0	8.00	9.59	1.59	13.9
5	10:14	10:24	10.0	8.03	9.62	1.59	14.2
6	10:27	10:37	10.0	7.95	9.64	1.69	14.8

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **14.8**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/7/2023
Boring Number: I-8

Test hole dimensions (if circular)

Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)

Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:31	8:56	25.0	12.90	12.95	0.05	No
2	8:58	9:24	26.0	12.70	12.75	0.05	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:26	9:57	31.0	12.63	12.72	0.09	0.1
2	9:59	10:29	30.0	12.54	12.63	0.09	0.1
3	10:29	10:59	30.0	12.63	12.72	0.09	0.1
4	11:01	11:31	30.0	12.49	12.58	0.09	0.1
5	11:33	12:03	30.0	12.53	12.63	0.10	0.2
6	12:05	12:35	30.0	12.50	12.60	0.10	0.2
7	12:37	13:07	30.0	12.48	12.59	0.11	0.2
8	13:09	13:39	30.0	12.43	12.53	0.10	0.1
9	13:42	14:12	30.0	12.37	12.48	0.11	0.2
10	14:14	14:44	30.0	12.31	12.41	0.10	0.1
11	14:45	15:15	30.0	12.25	12.37	0.12	0.2
12	15:17	15:47	30.0	12.18	12.31	0.13	0.2

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.2**

Sketch:

Notes:
Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/7/2023
Boring Number: I-9

Test hole dimensions (if circular)	
Boring Depth (feet)*:	17
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:37	9:03	26.0	14.99	15.23	0.24	No
2	9:04	9:29	25.0	14.57	14.82	0.25	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:31	10:04	33.0	14.48	14.85	0.37	0.5
2	10:06	10:39	33.0	14.51	14.88	0.37	0.5
3	10:41	11:11	30.0	14.56	14.92	0.36	0.6
4	11:14	11:44	30.0	14.41	14.81	0.40	0.6
5	11:45	12:15	30.0	14.50	14.85	0.35	0.6
6	12:18	12:48	30.0	14.54	14.86	0.32	0.5
7	12:50	13:20	30.0	14.51	14.83	0.32	0.5
8	13:23	13:53	30.0	14.54	14.88	0.34	0.6
9	13:55	14:25	30.0	14.56	14.9	0.34	0.6
10	14:28	14:58	30.0	14.61	14.99	0.38	0.6
11	15:04	15:34	30.0	14.70	15.06	0.36	0.6
12	15:36	16:06	30.0	14.50	14.82	0.32	0.5

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.5**

Sketch:

Notes:
Water from intial presoak found in hole before start of test

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/9/2023
Boring Number: I-10

Test hole dimensions (if circular)	
Boring Depth (feet)*:	12
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:48	8:13	25.0	8.69	9.50	0.81	Yes
2	8:16	8:41	25.0	7.85	8.70	0.85	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:44	8:55	11.0	7.80	8.12	0.32	0.8
2	8:57	9:07	10.0	7.69	8.06	0.37	1.0
3	9:08	9:21	13.0	7.53	7.98	0.45	0.9
4	9:22	9:32	10.0	7.56	7.91	0.35	0.9
5	9:33	9:43	10.0	7.50	7.86	0.36	1.0
6	9:47	9:57	10.0	7.48	7.87	0.39	1.0

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **1.0**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/9/2023
Boring Number: I-11

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

Pre-Test (Sandy Soil Criteria)*

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	7:53	8:18	25.0	8.15	8.22	0.07	No
2	8:20	8:46	26.0	8.04	8.11	0.07	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:48	9:18	30.0	7.91	8.00	0.09	0.2
2	9:19	9:39	20.0	7.71	7.78	0.07	0.2
3	9:40	10:10	30.0	7.66	7.78	0.12	0.2
4	10:11	10:31	20.0	7.46	7.57	0.11	0.2
5	10:33	11:03	30.0	7.18	7.37	0.19	0.3
6	11:05	11:35	30.0	6.85	7.17	0.32	0.4
7	11:37	12:07	30.0	6.77	7.10	0.33	0.4
8	12:11	12:41	30.0	6.69	7.04	0.35	0.4
9	12:43	13:13	30.0	6.68	7.03	0.35	0.4
10	13:15	13:46	31.0	6.65	7.02	0.37	0.4
11	13:47	14:17	30.0	6.65	7.01	0.36	0.4
12	14:19	14:49	30.0	6.52	6.92	0.40	0.5

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.5**

Sketch:

Notes:
Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672   tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/9/2023
Boring Number: I-12

Test hole dimensions (if circular)

Boring Depth (feet)*:	5
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)

Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:01	8:26	25.0	1.65	2.42	0.77	Yes
2	8:29	8:54	25.0	1.57	2.26	0.69	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:00	9:10	10.0	1.17	1.58	0.41	1.3
2	9:14	9:24	10.0	1.11	1.50	0.39	1.2
3	9:26	9:36	10.0	1.19	1.56	0.37	1.2
4	9:38	9:49	11.0	1.10	1.49	0.39	1.1
5	9:51	10:01	10.0	1.04	1.42	0.38	1.2
6	10:02	10:12	10.0	1.13	1.49	0.36	1.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) 1.1

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-13

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:23	8:53	30.0	7.65	7.67	0.02	No
2	8:54	9:19	25.0	7.59	7.73	0.14	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:21	9:54	33.0	7.40	7.56	0.16	0.2
2	9:55	10:25	30.0	7.18	7.34	0.16	0.2
3	10:26	10:56	30.0	7.12	7.30	0.18	0.2
4	10:57	11:27	30.0	7.07	7.24	0.17	0.2
5	11:28	11:58	30.0	7.08	7.25	0.17	0.2
6	11:59	12:29	30.0	7.03	7.21	0.18	0.2
7	12:31	13:01	30.0	7.03	7.20	0.17	0.2
8	13:03	13:33	30.0	6.87	7.08	0.21	0.3
9	13:35	14:05	30.0	6.78	7.02	0.24	0.3
10	14:07	14:37	30.0	6.70	6.95	0.25	0.3
11	14:39	15:09	30.0	6.57	6.86	0.29	0.3
12	15:12	15:42	30.0	6.57	6.84	0.27	0.3

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.3**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-14

Test hole dimensions (if circular)	
Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

Pre-Test (Sandy Soil Criteria)*

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:20	8:45	25.0	12.58	13.55	0.97	Yes
2	8:49	9:14	25.0	12.62	13.58	0.96	Yes

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:17	9:27	10.0	12.18	12.74	0.56	2.5
2	9:28	9:39	11.0	12.12	12.71	0.59	2.3
3	9:40	9:50	10.0	12.16	12.57	0.41	1.8
4	9:52	10:04	12.0	12.17	12.78	0.61	2.3
5	10:06	10:17	11.0	11.90	12.48	0.58	2.1
6	10:19	10:29	10.0	11.88	12.35	0.47	1.8

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **1.8**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-15

Test hole dimensions (if circular)	
Boring Depth (feet)*:	10
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:15	8:40	25.0	8.25	8.39	0.14	No
2	8:41	9:08	27.0	7.82	7.95	0.13	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:09	9:42	33.0	7.80	7.96	0.16	0.3
2	9:43	10:14	31.0	7.73	7.88	0.15	0.2
3	10:15	10:50	35.0	7.66	7.82	0.16	0.2
4	10:51	11:21	30.0	7.65	7.79	0.14	0.2
5	11:22	11:52	30.0	7.68	7.82	0.14	0.2
6	11:53	12:23	30.0	7.63	7.74	0.11	0.2
7	12:24	12:54	30.0	7.52	7.66	0.14	0.2
8	12:58	13:28	30.0	7.54	7.67	0.13	0.2
9	13:30	14:00	30.0	7.58	7.62	0.04	0.1
10	14:02	14:32	30.0	7.34	7.46	0.12	0.2
11	14:34	15:04	30.0	7.21	7.30	0.09	0.1
12	15:06	15:36	30.0	7.12	7.18	0.06	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes:

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-16

Test hole dimensions (if circular)

Boring Depth (feet)*:	15
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)

Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:10	8:35	25.0	12.69	12.74	0.05	No
2	8:36	9:04	28.0	12.29	12.35	0.06	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:06	9:36	30.0	12.04	12.11	0.07	0.1
2	9:37	10:12	35.0	11.94	12.01	0.07	0.1
3	10:13	10:47	34.0	11.74	11.82	0.08	0.1
4	10:48	11:18	30.0	11.57	11.67	0.10	0.1
5	11:19	11:49	30.0	11.54	11.64	0.10	0.1
6	11:50	12:20	30.0	11.48	11.58	0.10	0.1
7	12:21	12:52	31.0	11.39	11.50	0.11	0.1
8	12:56	13:26	30.0	11.14	11.23	0.09	0.1
9	13:27	13:57	30.0	11.10	11.2	0.10	0.1
10	13:58	14:28	30.0	11.04	11.14	0.10	0.1
11	14:30	15:00	30.0	11.00	11.10	0.10	0.1
12	15:02	15:32	30.0	10.98	11.09	0.11	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes:

Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

LGC Geotechnical, Inc.

Infiltration Test Data Sheet

LGC Geotechnical, Inc
131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-17

Test hole dimensions (if circular)

Boring Depth (feet)*:	18
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)

Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:04	8:29	25.0	10.32	10.37	0.05	No
2	8:30	9:00	30.0	9.88	9.96	0.08	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	9:01	9:32	31.0	9.52	9.62	0.10	0.0
2	9:34	10:08	34.0	8.99	9.02	0.03	0.0
3	10:10	10:40	30.0	8.86	8.87	0.01	0.0
4	10:42	11:12	30.0	8.80	8.87	0.07	0.0
5	11:14	11:44	30.0	8.81	8.86	0.05	0.0
6	11:46	12:16	30.0	8.79	8.86	0.07	0.0
7	12:18	12:48	30.0	8.78	8.82	0.04	0.0
8	12:50	13:20	30.0	8.74	8.79	0.05	0.0
9	13:22	13:52	30.0	8.69	8.73	0.04	0.0
10	13:53	14:23	30.0	8.60	8.63	0.03	0.0
11	14:26	14:56	30.0	8.59	8.62	0.03	0.0
12	14:57	15:27	30.0	8.57	8.60	0.03	0.0

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.0**

Sketch:

Notes:
Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)
Spreadsheet Revised on: 6/29/2018

Infiltration Test Data Sheet

LGC Geotechnical, Inc

131 Calle Iglesia Suite 200, San Clemente, CA 92672 tel. (949) 369-6141

Project Name: ARB 52
Project Number: 22203-01
Date: 3/8/2023
Boring Number: I-18

Test hole dimensions (if circular)	
Boring Depth (feet)*:	13
Boring Diameter (inches):	8
Pipe Diameter (inches):	3

*measured at time of test

Test pit dimensions (if rectangular)	
Pit Depth (feet):	
Pit Length (feet):	
Pit Breadth (feet):	

*Pre-Test (Sandy Soil Criteria)**

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval (min)	Initial Depth to Water (feet)	Final Depth to Water (feet)	Total Change in Water Level (feet)	Greater Than or Equal to 0.5 feet (yes/no)
1	8:00	8:25	25.0	10.58	10.68	0.10	No
2	8:26	8:57	31.0	10.87	10.98	0.11	No

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight, and then obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches

Main Test Data

Trial No.	Start Time (24:HR)	Stop Time (24:HR)	Time Interval, Δt (min)	Initial Depth to Water, D_o (feet)	Final Depth to Water, D_f (feet)	Change in Water Level, ΔD (feet)	Observed Infiltration Rate(in/hr)
1	8:59	9:30	31.0	10.31	10.42	0.11	0.2
2	9:31	10:01	30.0	10.21	10.30	0.09	0.1
3	10:01	10:36	35.0	10.13	10.25	0.12	0.14
4	10:38	11:08	30.0	10.06	10.13	0.07	0.1
5	11:09	11:39	30.0	10.00	10.12	0.12	0.15
6	11:40	12:10	30.0	10.00	10.09	0.09	0.12
7	12:11	12:41	30.0	9.98	10.08	0.10	0.1
8	12:42	13:12	30.0	10.00	10.09	0.09	0.1
9	13:14	13:44	30.0	9.96	10.06	0.10	0.1
10	13:46	14:16	30.0	9.88	9.99	0.11	0.1
11	14:18	14:48	30.0	9.70	9.81	0.11	0.1
12	14:50	15:20	30.0	9.52	9.65	0.13	0.1

Observed Infiltration Rate (Does Not Include Any Factor of Safety) **0.1**

Sketch:

Notes:

Water from intial presoak found in hole before start of test

Based on Guidelines from: San Bernardino County (2013)

Spreadsheet Revised on: 6/29/2018

Geotechnical, Inc.

Appendix C
Laboratory Test Results

APPENDIX C

Laboratory Test Results

The laboratory testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soils. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Moisture and Density Determination Tests: Moisture content (ASTM D2216) and dry density determinations (ASTM D2937) were performed on driven samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from undisturbed or disturbed samples.

Hydraulic Conductivity: Hydraulic conductivity tests were performed per ASTM D5084 (Falling Head Method). A summary of the results is presented in the table below. The data is presented in this Appendix.

Sample Location	**USCS Soil Classification**	**Hydraulic Conductivity* (cm/sec)**
HS-9 @ 10 ft	SM	3.5E-05
HS-9 @ 20 ft	CL	4.7E-08
HS-9 @ 30 ft	CL	3.6E-08
HS-9 @ 40 ft	SC-SM	6.2E-06
HS-9 @ 50 ft	CL	5.4E-08

*Average of Last 4 Readings

Collapse/Swell Potential: Collapse/swell tests were performed per ASTM D4546. Samples (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and loaded to their approximate in-situ effective stress. The curves are presented in this Appendix.

Consolidation: A consolidation test was performed per ASTM D2435. A sample (2.4 inches in diameter and 1 inch in height) were placed in a consolidometer and increasing loads were applied. The samples were allowed to consolidate under "double drainage" and total deformation for each loading step was recorded. The percent consolidation for each load step was recorded as the ratio of the amount of vertical compression to the original sample height. The consolidation pressure curve is provided in this Appendix.

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD

ASTM D 5084

Project Name:	ARB 52, Bakersfield	Tested by:	A. Santos	Date:	03/22/23
Project No.:	22203-01	Input By:	J. Ward	Date:	04/12/23
Boring No.:	HS-9	Sample Type:	Ring		
Sample No.:	R-1	Depth (ft.)	10.0		
Soil Identification:	Yellowish brown silty sand (SM)				

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.416	2.440
	2	2.416	2.441
	3	2.416	2.444
	Average	2.416	2.442
Height (in)	1	3.046	2.903
	2	3.045	2.906
	3	3.043	2.908
	Average	3.045	2.906
Moisture Content (%)		2.52	13.12
Wt. Wet Sample + Container (g)		209.40	569.80
Wt. Dry Sample + Container (g)		205.20	512.40
Wt. Container (g)		38.60	74.90
Density and Saturation			
Wt. Wet Sample + Container (g)		596.60	Calculated from initial dry weight and final moisture
Wt. Container (g)		134.90	
Wet Density (pcf)		126.0	142.6
Dry Density (pcf)		122.9	126.1
Void Ratio		0.371	0.337
Total Porosity		0.271	0.252
Pore Volume (cc)		61.9	56.2
% Saturation		18.3	105.2

Specific Gravity, Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 95

Consolidation

Cell Pressure (psi) =	95.78	Burette Area (sq. in.)=	0.411
Back Pressure(psi) =	89.80	Initial Burette Ht.(cm)=	9.8
Effective Pressure (psi) =	5.98	Final Burette Ht.(cm)=	10.0

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	ARB 52, Bakersfield	Cell Pressure:	95.78 psi	Initial Sample Height:	3.0447 in
Project No:	22203-01	Bottom Pressure (Pb):	91.04 psi	Initial Area of Sample:	4.5844 in.²
Boring No.:	HS-9	Top Pressure (Pt):	89.80 psi	Final Sample Ht.* (L):	3.0423 in
Sample No. :	R-1	Consolidation Pressure:	5.98 psi	Final Sample Area* (A):	4.5773 in.²
Depth(ft):	10.0	Burette Area (influent) (Ai):	0.361 in.²		
Sample Type:	Ring	Burette Area (effluent) (Ao):	0.411 in.²		
Soil Identification:	Yellowish brown silty sand (SM)	Vol. Change During Consol.:	0.032 in.³		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
27-Mar-23	10:21:00	0		25.1	5.0	Initial Reading		
27-Mar-23	10:24:00	3	19.0	24.0	6.0	3.6E-05	3.7E-05	0.97
27-Mar-23	10:27:00	3	19.0	23.0	7.0	3.5E-05	3.6E-05	0.88
27-Mar-23	10:30:00	3	19.0	22.0	7.9	3.3E-05	3.4E-05	0.98
27-Mar-23	10:33:00	3	19.0	21.0	8.8	3.4E-05	3.5E-05	0.98
27-Mar-23	10:36:00	3	19.0	20.0	9.7	3.5E-05	3.6E-05	0.98
27-Mar-23	10:39:00	3	19.0	19.0	10.6	3.5E-05	3.6E-05	0.98

RESULTS

Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**3.5E-05**
Upper Limit	4.4E-05
Lower Limit	2.7E-05

Remarks

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

SATURATED HYDRAULIC CONDUCTIVITY
FALLING HEAD METHOD
ASTM D 5084

Project Name:	ARB 52, Bakersfield	Tested by:	OHF/ACS	Date:	03/27/23
Project No.:	22203-01	Input By:	J. Ward	Date:	04/12/23
Boring No.:	HS-9	Sample Type:	Ring		
Sample No.:	R-2	Depth (ft.)	20.0		

Soil Identification: Yellowish brown lean clay with sand (CL)s

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.416	2.440
	2	2.416	2.441
	3	2.417	2.440
	Average	2.416	2.440
Height (in)	1	3.042	3.052
	2	3.042	3.053
	3	3.041	3.053
	Average	3.042	3.053
Moisture Content (%)		16.15	17.43
Wt. Wet Sample + Container (g)		217.30	586.10
Wt. Dry Sample + Container (g)		192.50	511.33
Wt. Container (g)		38.90	82.44
Density and Saturation			
Wt. Wet Sample + Container (g)		623.00	Calculated from initial dry weight and final moisture
Wt. Container (g)		136.00	
Wet Density (pcf)		133.0	131.4
Dry Density (pcf)		114.5	111.9
Void Ratio		0.472	0.507
Total Porosity		0.321	0.336
Pore Volume (cc)		73.3	78.7
% Saturation		92.4	92.9

Specific Gravity, Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 95

Consolidation

Cell Pressure (psi) =	101.64	Burette Area (sq. in.)=	0.399
Back Pressure(psi) =	90.58	Initial Burette Ht.(cm)=	13.6
Effective Pressure (psi) =	11.06	Final Burette Ht.(cm)=	15.0

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	ARB 52, Bakersfield	Cell Pressure:	101.64 psi	Initial Sample Height:	3.0417 in
Project No:	22203-01	Bottom Pressure (Pb):	93.52 psi	Initial Area of Sample:	4.5857 in.²
Boring No.:	HS-9	Top Pressure (Pt):	90.58 psi	Final Sample Ht.* (L):	3.0257 in
Sample No. :	R-2	Consolidation Pressure:	11.06 psi	Final Sample Area* (A):	4.5372 in.²
Depth(ft):	20.0	Burette Area (influent) (Ai):	0.036 in.²		
Sample Type:	Ring	Burette Area (effluent) (Ao):	0.036 in.²		
Soil Identification:	Yellowish brown lean clay with sand (CL)s	Vol. Change During Consol.:	0.220 in.³		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
31-Mar-23	07:42:00	0		25.6	5.0	Initial Reading		
31-Mar-23	08:02:00	20	18.5	25.4	5.2	4.5E-08	4.7E-08	1.00
31-Mar-23	08:32:00	30	18.5	25.1	5.5	4.5E-08	4.7E-08	1.00
31-Mar-23	09:02:00	30	18.6	24.8	5.8	4.5E-08	4.7E-08	1.00
31-Mar-23	09:32:00	30	18.7	24.5	6.1	4.5E-08	4.7E-08	1.00
31-Mar-23	10:02:00	30	19.0	24.2	6.4	4.5E-08	4.6E-08	1.00
31-Mar-23	10:32:00	30	19.1	23.9	6.7	4.5E-08	4.6E-08	1.00

RESULTS	
Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**4.7E-08**
Upper Limit	5.8E-08
Lower Limit	3.5E-08

Remarks

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD

ASTM D 5084

Project Name:	ARB 52, Bakersfield	Tested by:	OHF/ACS
Date:	03/27/23		
Project No.:	22203-01	Input By:	J. Ward
Date:	04/12/23		
Boring No.:	HS-9	Sample Type:	Ring
Sample No.:	R-3	Depth (ft.)	30.0
Soil Identification:	Yellowish brown sandy lean clay s(CL)		

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.405	2.420
	2	2.406	2.421
	3	2.408	2.424
	Average	2.406	2.422
Height (in)	1	3.069	3.030
	2	3.070	3.028
	3	3.070	3.028
	Average	3.070	3.029
Moisture Content (%)		5.00	12.19
Wt. Wet Sample + Container (g)		182.80	590.30
Wt. Dry Sample + Container (g)		175.90	534.40
Wt. Container (g)		37.80	75.80
Density and Saturation			
Wt. Wet Sample + Container (g)		631.70	Calculated from initial dry weight and final moisture
Wt. Container (g)		134.90	
Wet Density (pcf)		135.6	145.0
Dry Density (pcf)		129.1	129.2
Void Ratio		0.305	0.305
Total Porosity		0.234	0.233
Pore Volume (cc)		53.5	53.4
% Saturation		44.2	108.1

Specific Gravity, Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 95

Consolidation

Cell Pressure (psi) =	106.06	Burette Area (sq. in.)=	0.411
Back Pressure(psi) =	90.08	Initial Burette Ht.(cm)=	15.8
Effective Pressure (psi) =	15.98	Final Burette Ht.(cm)=	17.1

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	ARB 52, Bakersfield	Cell Pressure:	106.06 psi	Initial Sample Height:	3.0697 in
Project No:	22203-01	Bottom Pressure (Pb):	92.80 psi	Initial Area of Sample:	4.5478 in.^{2}
Boring No.:	HS-9	Top Pressure (Pt):	90.08 psi	Final Sample Ht.* (L):	3.0542 in
Sample No. :	R-3	Consolidation Pressure:	15.98 psi	Final Sample Area* (A):	4.5019 in.^{2}
Depth(ft):	30.0	Burette Area (influent) (Ai):	0.036 in.^{2}		
Sample Type:	Ring	Burette Area (effluent) (Ao):	0.041 in.^{2}		
Soil Identification:	Yellowish brown sandy lean clay s(CL)	Vol. Change During Consol.:	0.210 in.^{3}		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
31-Mar-23	07:40:00	0		27.0	3.5	Initial Reading		
31-Mar-23	08:00:00	20	18.5	26.8	3.8	6.4E-08	6.7E-08	0.59
31-Mar-23	08:30:00	30	18.5	26.6	4.0	3.4E-08	3.6E-08	0.88
31-Mar-23	09:00:00	30	18.6	26.4	4.2	3.4E-08	3.6E-08	0.88
31-Mar-23	09:30:00	30	18.7	26.2	4.4	3.4E-08	3.6E-08	0.88
31-Mar-23	10:00:00	30	19.0	26.0	4.6	3.4E-08	3.5E-08	0.88
31-Mar-23	10:30:00	30	19.1	25.8	4.8	3.5E-08	3.5E-08	0.88

RESULTS

Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**3.6E-08**
Upper Limit	4.4E-08
Lower Limit	2.7E-08

Remarks

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD

ASTM D 5084

Project Name:	ARB 52, Bakersfield	Tested by: A. Santos	Date: 03/31/23
Project No.:	22203-01	Input By: J. Ward	Date: 04/12/23
Boring No.:	HS-9	Sample Type:	Ring
Sample No.:	R-4	Depth (ft.)	40.0
Soil Identification:	Yellowish brown silty, clayey sand (SC-SM)		

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.403	2.435
	2	2.405	2.436
	3	2.405	2.436
	Average	2.404	2.436
Height (in)	1	3.011	3.001
	2	3.012	3.000
	3	3.014	3.002
	Average	3.012	3.001
Moisture Content (%)		3.13	15.81
Wt. Wet Sample + Container (g)		193.20	560.93
Wt. Dry Sample + Container (g)		188.50	495.60
Wt. Container (g)		38.20	82.42
Density and Saturation			
Wt. Wet Sample + Container (g)		575.90	Calculated from initial dry weight and final moisture
Wt. Container (g)		133.10	
Wet Density (pcf)		123.3	135.5
Dry Density (pcf)		119.6	117.0
Void Ratio		0.409	0.441
Total Porosity		0.290	0.306
Pore Volume (cc)		65.1	70.1
% Saturation		20.6	96.8

Specific Gravity, Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 97

Consolidation

Cell Pressure (psi) =	113.04	Burette Area (sq. in.)=	0.399
Back Pressure(psi) =	91.02	Initial Burette Ht.(cm)=	12.3
Effective Pressure (psi) =	22.02	Final Burette Ht.(cm)=	15.0

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	ARB 52, Bakersfield	Cell Pressure:	113.04	psi	Initial Sample Height:	3.0123	in
Project No:	22203-01	Bottom Pressure (Pb):	94.04	psi	Initial Area of Sample:	4.5402	in.²
Boring No.:	HS-9	Top Pressure (Pt):	91.02	psi	Final Sample Ht.* (L):	2.9812	in
Sample No. :	R-4	Consolidation Pressure:	22.02	psi	Final Sample Area* (A):	4.4454	in.²
Depth(ft):	40.0	Burette Area (influent) (Ai):	0.357	in.²			
Sample Type:	Ring	Burette Area (effluent) (Ao):	0.399	in.²			
Soil Identification:	Yellowish brown silty, clayey sand (SC-SM)	Vol. Change During Consol.:	0.424	in.³			

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
05-Apr-23	08:25:00	0		25.3	5.5	Initial Reading		
05-Apr-23	08:30:00	5	18.9	24.5	6.4	7.9E-06	8.1E-06	0.80
05-Apr-23	08:35:00	5	18.9	23.9	6.9	5.1E-06	5.3E-06	1.07
05-Apr-23	08:40:00	5	18.9	23.3	7.6	6.1E-06	6.3E-06	0.77
05-Apr-23	08:45:00	5	18.9	22.6	8.2	6.1E-06	6.3E-06	1.04
05-Apr-23	08:50:00	5	18.9	21.9	8.8	6.1E-06	6.3E-06	1.04
05-Apr-23	08:55:00	5	18.9	21.3	9.4	5.7E-06	5.9E-06	0.89
05-Apr-23	09:00:00	5	18.9	20.6	10.0	6.2E-06	6.4E-06	1.04

RESULTS	
Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**6.2E-06**
Upper Limit	7.8E-06
Lower Limit	4.7E-06

Remarks

k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

SATURATED HYDRAULIC CONDUCTIVITY
FALLING HEAD METHOD
ASTM D 5084

Project Name:	ARB 52, Bakersfield	Tested by: ACS/OHF	Date: 03/31/23
Project No.:	22203-01	Input By: J. Ward	Date: 04/12/23
Boring No.:	HS-9	Sample Type:	Ring
Sample No.:	R-5	Depth (ft.)	50.0
Soil Identification:	Brown lean clay (CL)		

		INITIAL CONDITION	FINAL CONDITION
Diameter (in)	1	2.412	2.417
	2	2.414	2.420
	3	2.415	2.418
	Average	2.414	2.418
Height (in)	1	3.051	3.068
	2	3.052	3.068
	3	3.052	3.066
	Average	3.052	3.067
Moisture Content (%)		10.96	21.30
Wt. Wet Sample + Container (g)		204.20	551.60
Wt. Dry Sample + Container (g)		187.80	467.90
Wt. Container (g)		38.20	74.90
Density and Saturation			
Wt. Wet Sample + Container (g)		575.60	Calculated from initial dry weight and final moisture
Wt. Container (g)		139.50	
Wet Density (pcf)		119.0	128.9
Dry Density (pcf)		107.2	106.3
Void Ratio		0.572	0.586
Total Porosity		0.364	0.370
Pore Volume (cc)		83.3	85.3
% Saturation		51.7	98.1

Specific Gravity, Gs (assumed) = 2.70

Back Pressure Saturation

B Value (%) = 95

Consolidation

Cell Pressure (psi) =	117.00	Burette Area (sq. in.)=	0.411
Back Pressure(psi) =	89.90	Initial Burette Ht.(cm)=	10.1
Effective Pressure (psi) =	27.10	Final Burette Ht.(cm)=	13.1

SATURATED HYDRAULIC CONDUCTIVITY

FALLING HEAD METHOD (ASTM D 5084)

Project Name:	ARB 52, Bakersfield	Cell Pressure:	117.00 psi	Initial Sample Height:	3.0517 in
Project No:	22203-01	Bottom Pressure (Pb):	94.36 psi	Initial Area of Sample:	4.5756 in.^{2}
Boring No.:	HS-9	Top Pressure (Pt):	89.90 psi	Final Sample Ht.* (L):	3.0163 in
Sample No. :	R-5	Consolidation Pressure:	27.10 psi	Final Sample Area* (A):	4.4683 in.^{2}
Depth(ft):	50.0	Burette Area (influent) (Ai):	0.036 in.^{2}		
Sample Type:	Ring	Burette Area (effluent) (Ao):	0.041 in.^{2}		
Soil Identification:	Brown lean clay (CL)	Vol. Change During Consol.:	0.485 in.^{3}		

* After Consolidation

Date	Time (min.)	Incremental Elapsed Time (t) (min)	Temperature (°C)	Water Height Influent Burette (hi) (cm)	Water Height Effluent Burette (ho) (cm)	Uncorrected Hydraulic Conductivity (cm/sec)	Corrected Conductivity at 20 °C (cm/sec)	Inflow Rate / Outflow Rate
05-Apr-23	08:30:00	0		26.5	3.7	Initial Reading		
05-Apr-23	09:00:00	30	18.9	26.0	4.1	4.9E-08	5.0E-08	1.10
05-Apr-23	09:30:00	30	18.9	25.5	4.6	5.4E-08	5.6E-08	0.88
05-Apr-23	10:00:00	30	18.9	25.0	5.1	5.5E-08	5.6E-08	0.88
05-Apr-23	10:30:00	30	18.9	24.5	5.6	5.5E-08	5.6E-08	0.88
05-Apr-23	11:00:00	30	18.9	24.0	6.0	4.9E-08	5.1E-08	1.10
05-Apr-23	11:30:00	30	18.9	23.5	6.4	5.0E-08	5.1E-08	1.10
05-Apr-23	12:00:00	30	18.9	23.0	6.9	5.5E-08	5.7E-08	0.88

RESULTS	
Hydraulic Conductivity (cm/sec)	
Average of Last 4 Readings	**5.4E-08**
Upper Limit	6.7E-08
Lower Limit	4.0E-08

Remarks

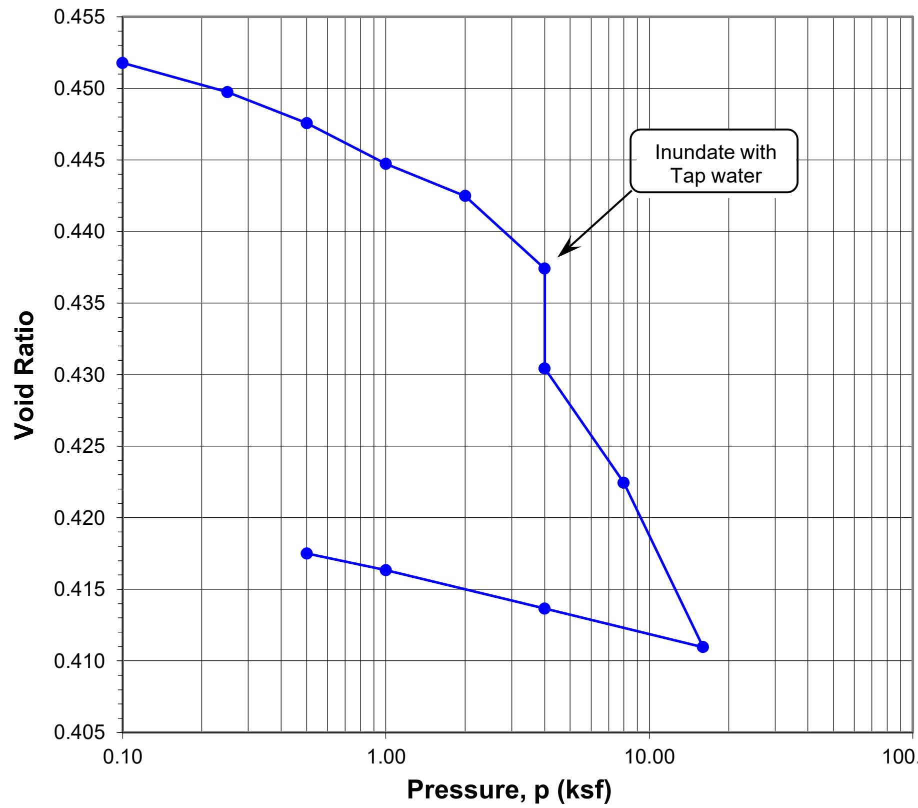
k=Ai.Ao.L.ln(h1/h2)/(A.t.(Ai+Ao)) where h1, h2= ((Pb-Pt)/Y+(hi-ho) at t0-(change in hi + change in ho) at t1 and t2

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name:	ARB 52, Bakersfield	Tested By: GB/JD	Date: 03/20/23
Project No.:	22203-01	Checked By: J. Ward	Date: 04/12/23
Boring No.:	HS-9	Depth (ft.): 40.0	
Sample No.:	R-4A	Sample Type:	Ring
Soil Identification:	Yellowish brown silty sand (SM)		

Sample Diameter (in.):	2.415
Sample Thickness (in.):	1.000
Weight of Sample + ring (g):	186.04
Weight of Ring (g):	43.02
Height after consol. (in.):	0.9761
Before Test	
Wt. of Wet Sample+Cont. (g):	218.83
Wt. of Dry Sample+Cont. (g):	215.11
Weight of Container (g):	64.77
Initial Moisture Content (%)	2.5
Initial Dry Density (pcf)	116.1
Initial Saturation (%):	15
Initial Vertical Reading (in.)	0.1325
After Test	
Wt. of Wet Sample+Cont. (g):	252.91
Wt. of Dry Sample+Cont. (g):	234.21
Weight of Container (g):	51.34
Final Moisture Content (%)	13.37
Final Dry Density (pcf):	119.2
Final Saturation (%):	87
Final Vertical Reading (in.)	0.1608
Specific Gravity (assumed):	2.70
Water Density (pcf):	62.43

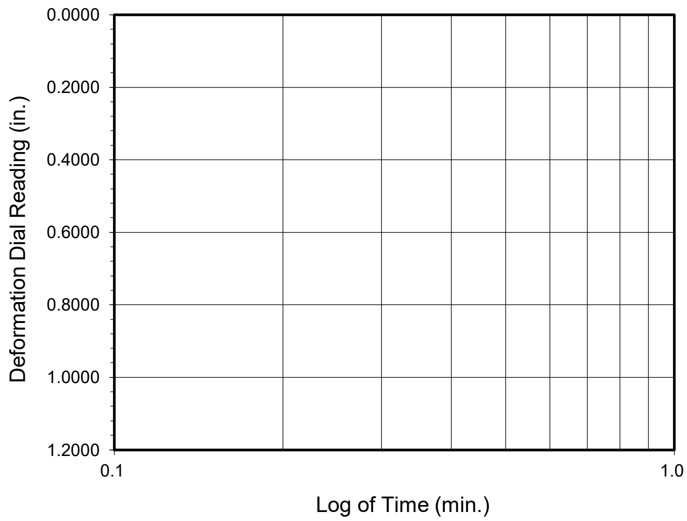


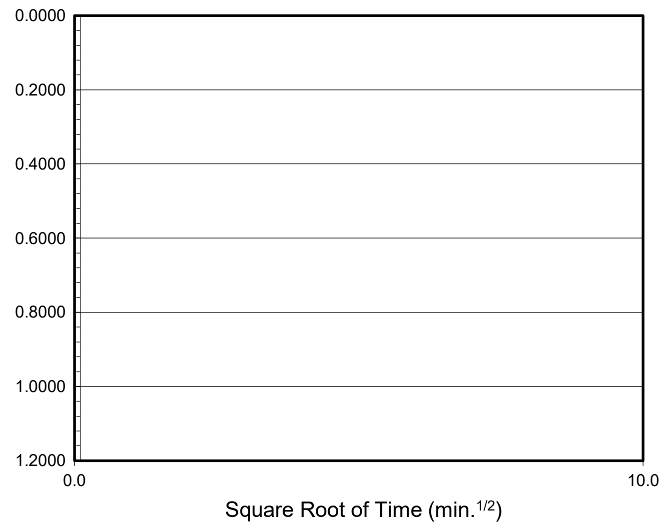
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.1328	0.9997	0.00	0.03	0.452	0.03
0.25	0.1348	0.9977	0.06	0.23	0.450	0.17
0.50	0.1369	0.9956	0.12	0.44	0.448	0.32
1.00	0.1397	0.9929	0.20	0.71	0.445	0.51
2.00	0.1422	0.9903	0.30	0.97	0.442	0.67
4.00	0.1468	0.9857	0.41	1.43	0.437	1.02
4.00	0.1516	0.9809	0.41	1.91	0.430	1.50
8.00	0.1585	0.9740	0.55	2.60	0.422	2.05
16.00	0.1681	0.9644	0.72	3.56	0.411	2.84
4.00	0.1651	0.9675	0.60	3.26	0.414	2.66
1.00	0.1621	0.9704	0.49	2.96	0.416	2.47
0.50	0.1608	0.9717	0.44	2.83	0.418	2.39

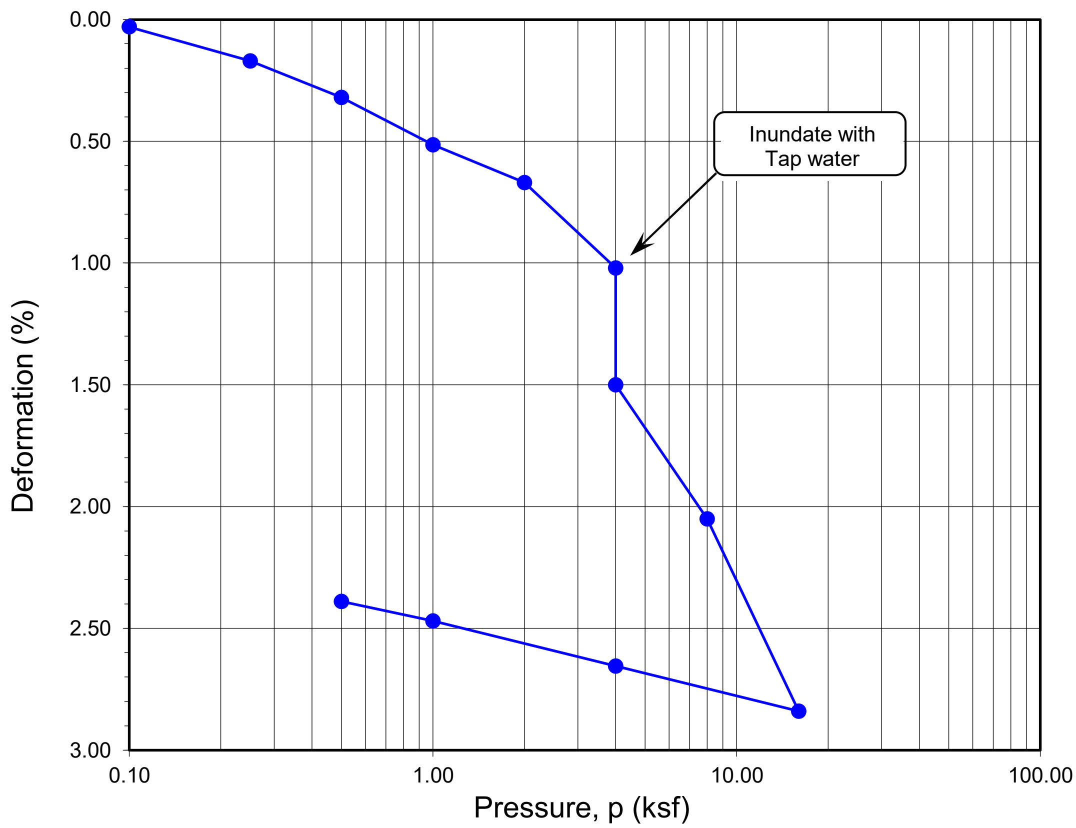
Time Readings

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)

Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
HS-9	**R-4A**	**40**	**2.5**	**13.4**	**116.1**	**119.2**	**0.452**	**0.418**	**15**	**87**

Soil Identification: Yellowish brown silty sand (SM)

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 22203-01

ARB 52, Bakersfield

04-23

ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	ARB 52, Bakersfield	Tested By:	G. Bathala	Date:	03/28/23
Project No.:	22203-01	Checked By:	J. Ward	Date:	04/12/23
Boring No.:	I-6	Sample Type:	Ring		
Sample No.:	R-1	Depth (ft.)	13.5		

Sample Description: Light olive brown sandy lean clay s(CL)

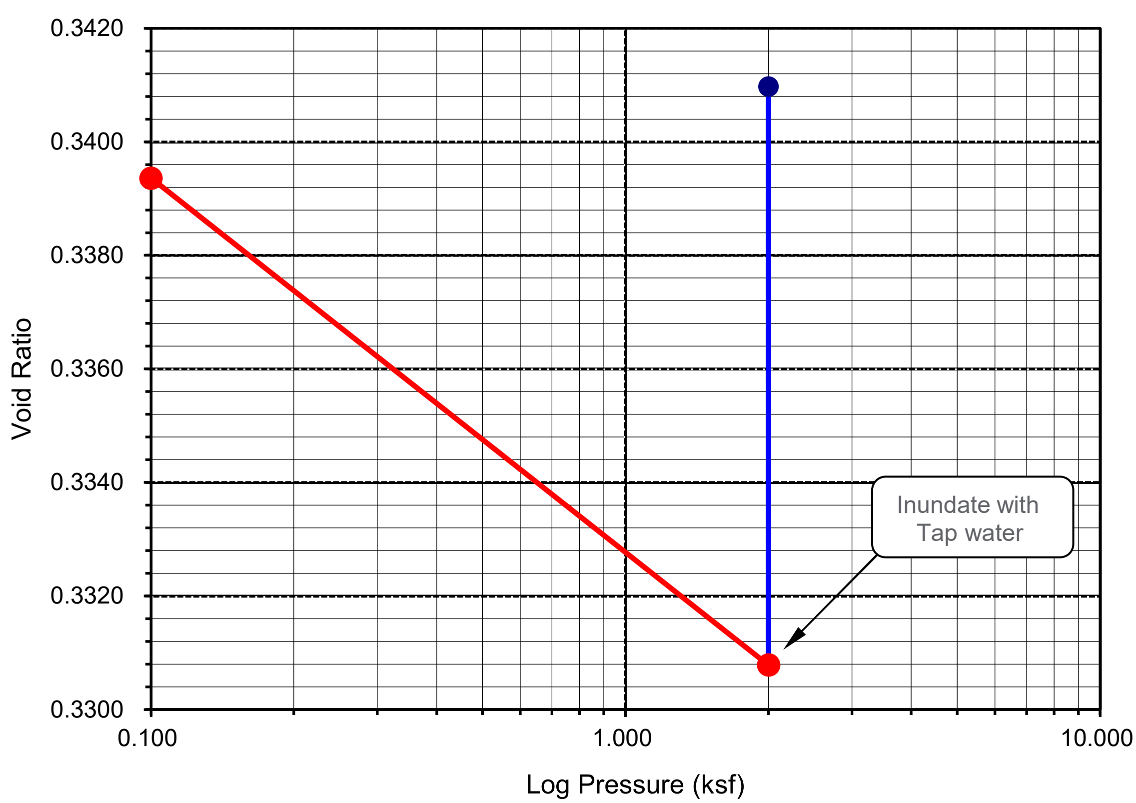
Initial Dry Density (pcf):	125.8
Initial Moisture (%):	8.04
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1570
Diameter(in):	2.415

Final Dry Density (pcf):	126.7
Final Moisture (%) :	16.4
Initial Void ratio:	0.3402
Specific Gravity(assumed):	2.70
Initial Saturation (%)	63.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1576	0.9994	0.00	-0.06	0.3394	-0.06
2.000	0.1678	0.9892	0.38	-1.08	0.3308	-0.70
H2O	0.1602	0.9968	0.38	-0.32	0.3410	0.06

Percent Swell (+) / Settlement (-) After Inundation = 0.77

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS
ASTM D 4546

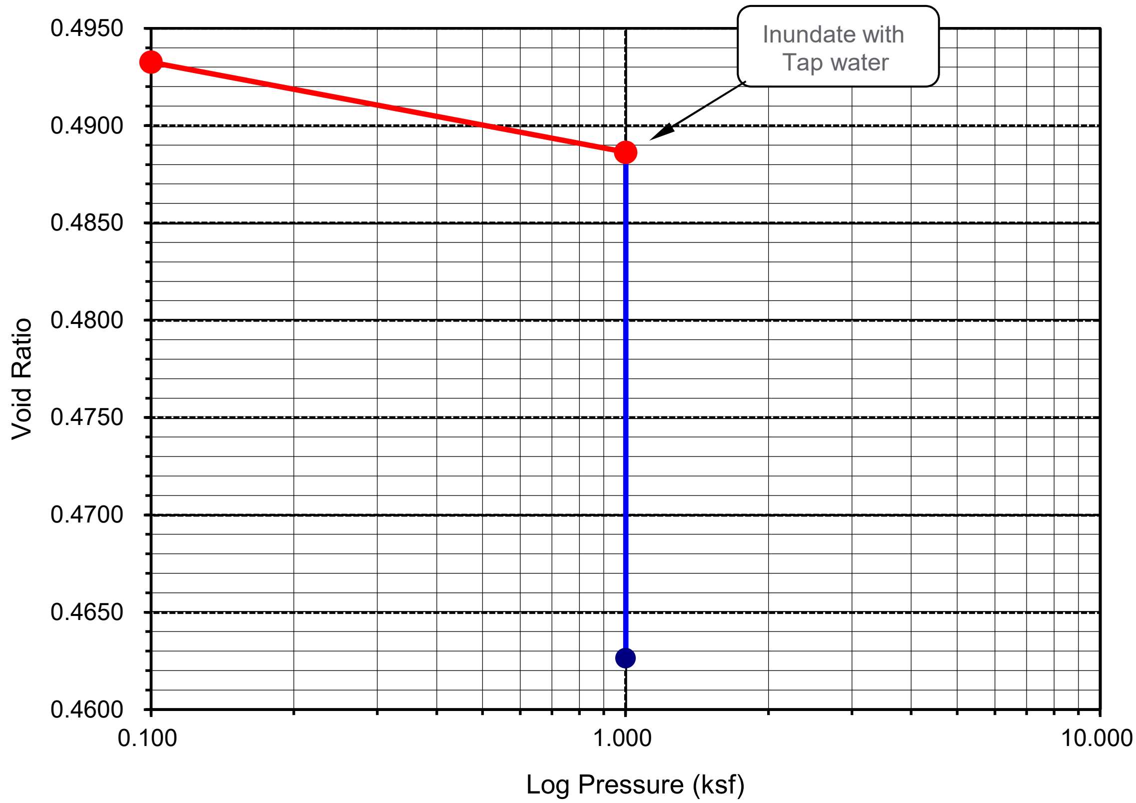
Project Name:	ARB 52, Bakersfield	Tested By:	G. Bathala
Date:	03/28/23		
Project No.:	22203-01	Checked By:	J. Ward
Date:	04/12/23		
Boring No.:	I-7	Sample Type:	Ring
Sample No.:	R-1	Depth (ft.)	8.5
Sample Description:	Yellowish brown poorly-graded sand with silt (SP-SM)		

Initial Dry Density (pcf):	112.8	Final Dry Density (pcf):	115.8
Initial Moisture (%):	2.08	Final Moisture (%) :	14.0
Initial Length (in.):	1.0000	Initial Void ratio:	0.4937
Initial Dial Reading:	0.0364	Specific Gravity(assumed):	2.70
Diameter(in):	2.415	Initial Saturation (%)	11.4

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.0367	0.9997	0.00	-0.03	0.4933	-0.03
1.000	0.0420	0.9944	0.22	-0.56	0.4886	-0.34
H2O	0.0594	0.9770	0.22	-2.30	0.4626	-2.08

Percent Swell (+) / Settlement (-) After Inundation = -1.75

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS
ASTM D 4546

Project Name: ARB 52, Bakersfield
Project No.: 22203-01
Boring No.: I-10
Sample No.: R-1
Sample Description: Yellowish brown lean clay with sand (CL)s

Tested By: G. Bathala Date: 03/28/23
Checked By: J. Ward Date: 04/12/23
Sample Type: Ring
Depth (ft.) 10.5

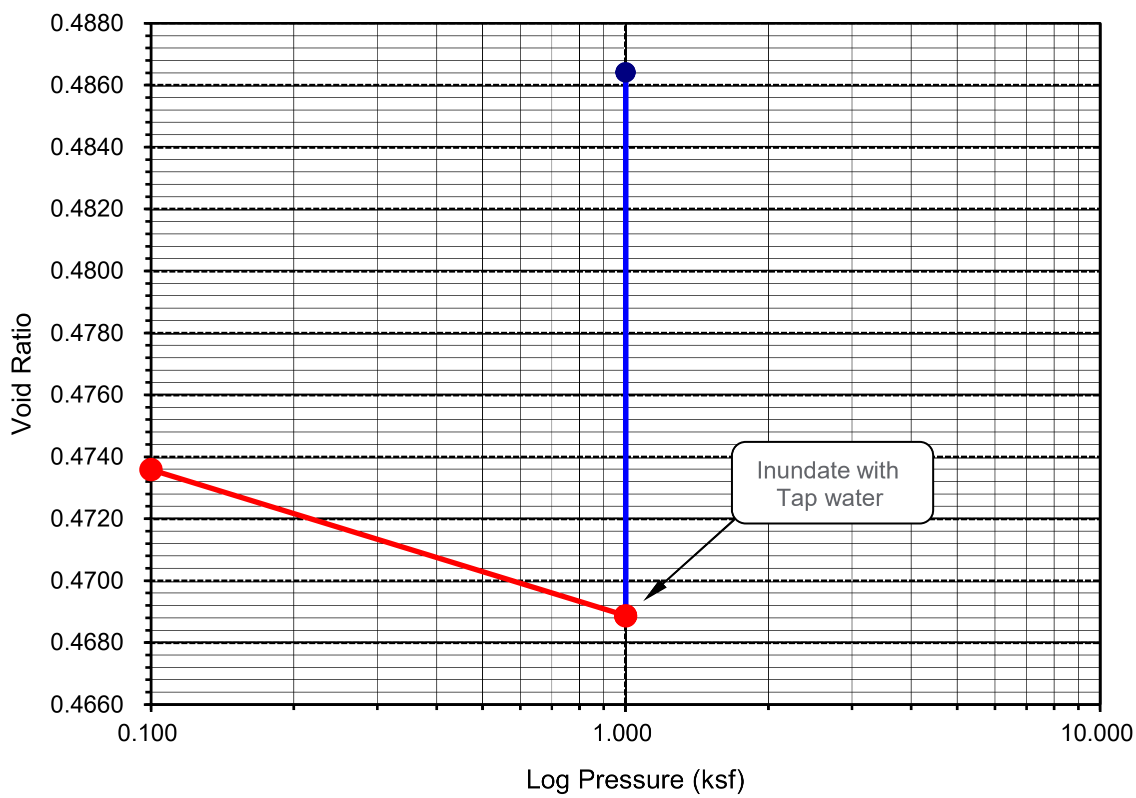
Initial Dry Density (pcf):	114.3
Initial Moisture (%):	13.60
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1098
Diameter(in):	2.415

Final Dry Density (pcf):	113.8
Final Moisture (%) :	18.3
Initial Void ratio:	0.4742
Specific Gravity(assumed):	2.70
Initial Saturation (%)	77.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1102	0.9996	0.00	-0.04	0.4736	-0.04
1.000	0.1153	0.9945	0.19	-0.55	0.4689	-0.36
H2O	0.1034	1.0064	0.19	0.64	0.4864	0.83

Percent Swell (+) / Settlement (-) After Inundation = 1.19

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	ARB 52, Bakersfield	Tested By:	G. Bathala	Date:	03/29/23
Project No.:	22203-01	Checked By:	J. Ward	Date:	04/12/23
Boring No.:	I-12	Sample Type:	Ring		
Sample No.:	R-1	Depth (ft.)	3.5		
Sample Description:	Yellowish brown silty, clayey sand (SC-SM)				

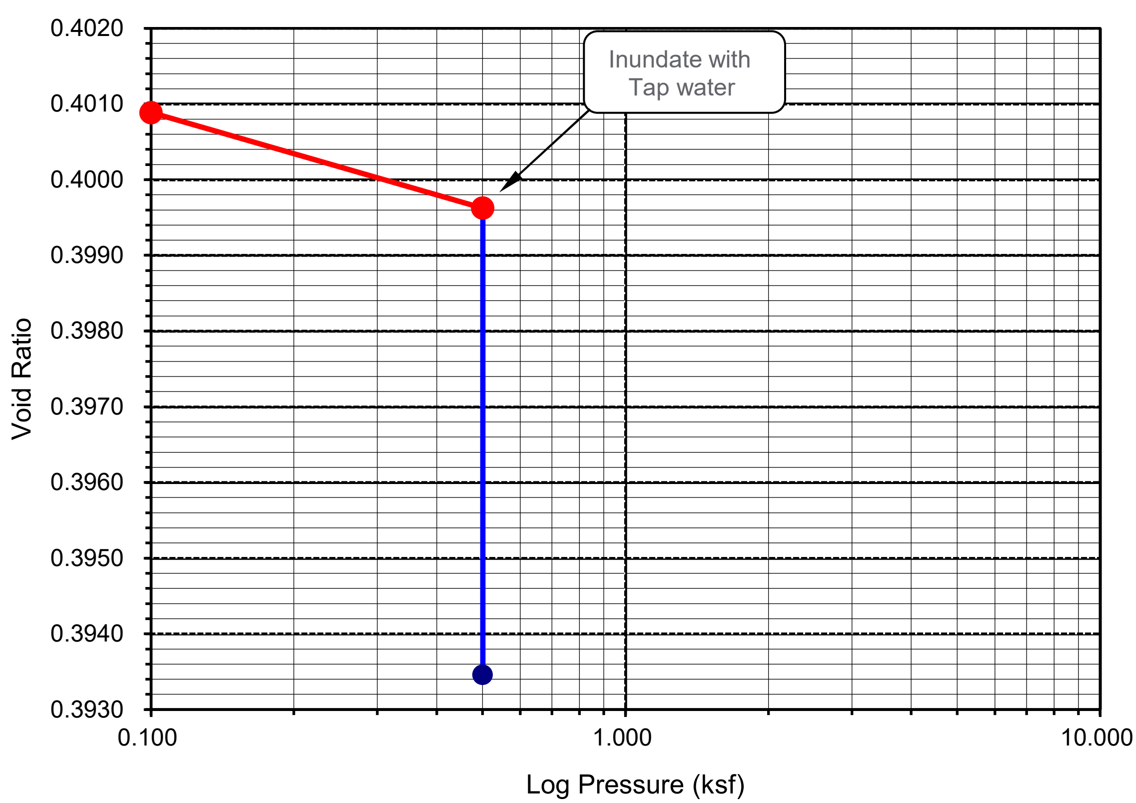
Initial Dry Density (pcf):	120.3
Initial Moisture (%):	3.36
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1339
Diameter(in):	2.415

Final Dry Density (pcf):	121.3
Final Moisture (%) :	10.8
Initial Void ratio:	0.4012
Specific Gravity(assumed):	2.70
Initial Saturation (%)	22.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1341	0.9998	0.00	-0.02	0.4009	-0.02
0.500	0.1363	0.9976	0.13	-0.24	0.3996	-0.11
H2O	0.1407	0.9932	0.13	-0.68	0.3935	-0.55

Percent Swell (+) / Settlement (-) After Inundation = -0.44

Void Ratio - Log Pressure Curve



ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS

ASTM D 4546

Project Name:	ARB 52, Bakersfield	Tested By:	G. Bathala
Date:	03/28/23		
Project No.:	22203-01	Checked By:	J. Ward
Date:	04/12/23		
Boring No.:	I-14	Sample Type:	Ring
Sample No.:	R-1	Depth (ft.)	13.5
Sample Description:	Olive yellow clayey sand (SC)		

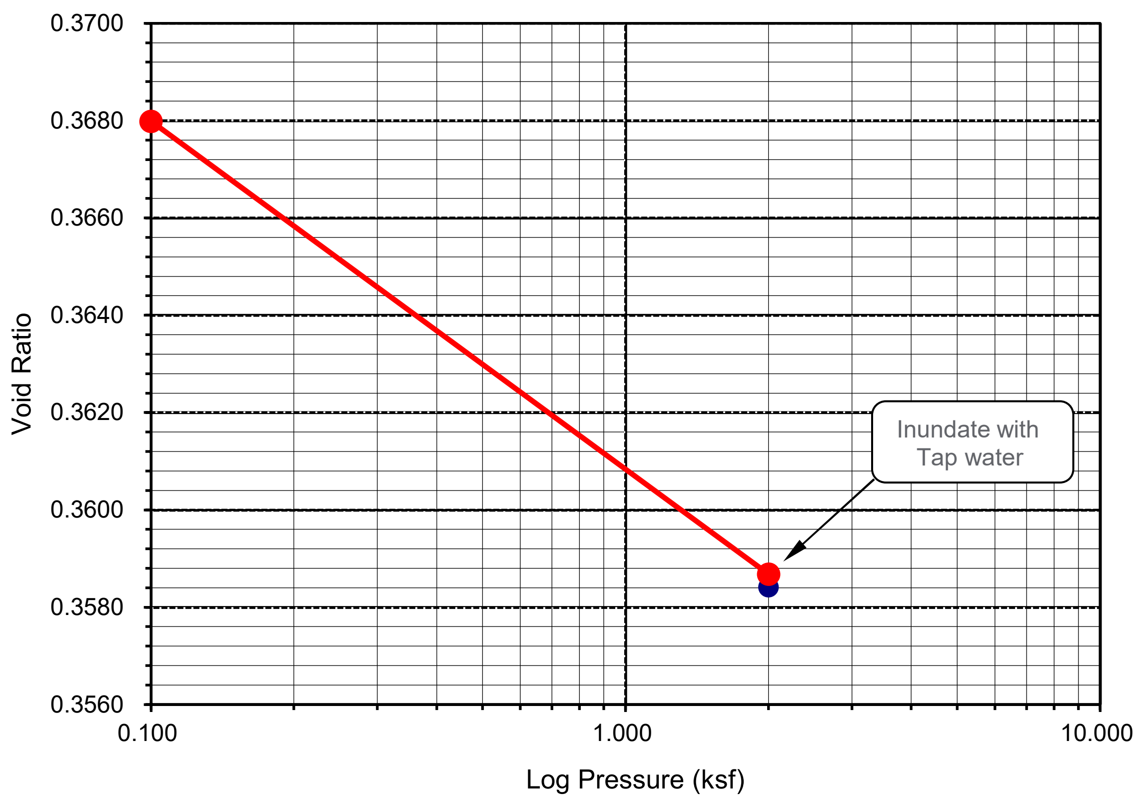
Initial Dry Density (pcf):	123.2
Initial Moisture (%):	3.54
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1258
Diameter(in):	2.415

Final Dry Density (pcf):	124.8
Final Moisture (%) :	14.3
Initial Void ratio:	0.3683
Specific Gravity(assumed):	2.70
Initial Saturation (%)	26.0

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.1260	0.9998	0.00	-0.02	0.3680	-0.02
2.000	0.1358	0.9900	0.30	-1.00	0.3587	-0.70
H2O	0.1360	0.9898	0.30	-1.02	0.3584	-0.72

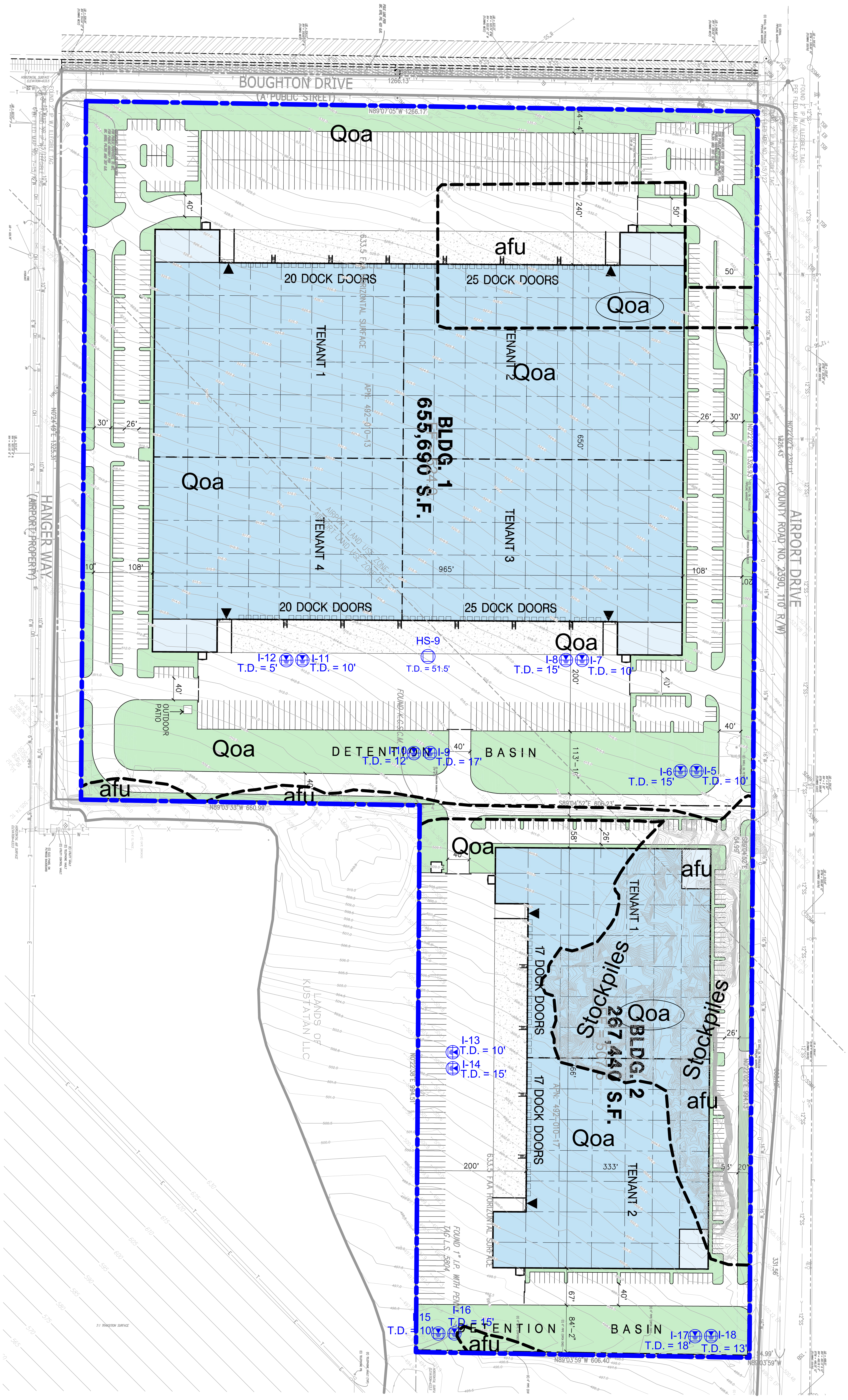
Percent Swell (+) / Settlement (-) After Inundation = -0.02

Void Ratio - Log Pressure Curve



LEGEND

afu	Artificial Fill - Undocumented
Qoa	Quaternary Old Alluvium, Circled Where Buried
	Approximate Geologic Contact
	Approximate Limits of Site
HS-9 T.D. = 51.5'	Approximate Location of Hollow Stem Auger Boring by LGC Geotechnical, With Total Depth in Feet
I-18 T.D. = 13'	Approximate Location of Hollow Stem Auger Infiltration Boring by LGC Geotechnical, With Total Depth in Feet



LGC Geotechnical, Inc.
131 Calle Iglesia, Ste. 200
San Clemente, CA 92672
TEL (949) 369-6141 FAX (949) 369-6142

Geotechnical Map

PROJECT NAME	IPG- ARB 52
PROJECT NO.	22203-01
ENG. / GEOL.	BTZ / KBC
SCALE	1" = 100'
DATE	April 2023

SHEET 1 of 1

PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

ASSESSOR'S PARCEL NUMBERS 492-010-13 AND-17

Near the City of Bakersfield
Kern County, California

For Submittal to:

Planning Department, Kern County
Public Services Building
2700 "M" Street, Suite 100
Bakersfield, CA 93301

Prepared for:

Industrial Property Group, Inc.
10515 20th Street Southeast
Lake Stevens, WA 98258

Prepared by:

Ron Schmidtling, Principal Paleontologist
Deirdre Encarnación, Paleontologist/Report Writer
CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

November 5, 2023

CRM TECH Project No. 4020P
USGS Oildale, Calif., 7.5' (1:24,000) quadrangle
Section 13, T29S R23E, Mount Diablo Baseline and Meridian

EXECUTIVE SUMMARY

Between May and November 2023, at the request of Industrial Property Group, Inc., CRM TECH performed a paleontological resource assessment on approximately 52 acres of vacant land near the City of Bakersfield, Kern County, California. The subject property of the study consists of Assessor's Parcel Numbers 492-010-13 and -17, located on the west side of Airport Drive and between Boughton Drive and Skyway Drive, in the southeast quarter of Section 2, Township 29 South, Range 27 East, Mount Diablo Baseline and Meridian, as depicted in the United States Geological Survey Oildale, California, 7.5' quadrangle.

The study is part of the environmental review process for the proposed development of an industrial warehouse facility on the property, including 908,130 square feet of high cube storage, 15,000 square feet of ancillary office functions, and associated utilities and infrastructure improvements. The County of Kern, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the County with the necessary information and analysis to determine whether the proposed project would adversely affect any significant, nonrenewable paleontological resources, as required by CEQA, and to design a paleontological mitigation program if necessary.

In order to identify any paleontological resource localities that may exist in or near the project area and to assess the probability for such resources to be encountered during the project, CRM TECH initiated a records search at the appropriate repository, conducted a literature review, and carried out a systematic field survey of the project area. Throughout the course of the study, no paleontological localities were identified within or adjacent to the project area. However, the results of the background research suggest that the proposed project's potential to impact significant, nonrenewable paleontological resources appears to be low in the previously disturbed surface and near-surface soils but high in the subsurface deposits of Pleistocene alluvial sediments. Therefore, CRM TECH recommends that a paleontological resource impact mitigation program be developed and implemented during the project to prevent impacts on such resources or reduce them to a level less than significant.

As the primary component of the mitigation program, all earth-moving operations impacting relatively undisturbed subsurface soils in the project area, generally beyond the depth of five feet, should be monitored periodically by a qualified paleontological monitor to identify potentially fossil-bearing sediments when they are encountered, at which time continuous monitoring will become necessary. Samples of sediment should be collected and processed to recover small fossils, and all fossil remains should be identified and curated at a repository with permanent retrievable storage. Under these conditions, CRM TECH further recommends that the project may be cleared to proceed in compliance with CEQA provisions on paleontological resources.

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INTRODUCTION

Between May and November 2023, at the request of Industrial Property Group, Inc., CRM TECH performed a paleontological resource assessment on approximately 52 acres of vacant land near the City of Bakersfield, Kern County, California (Fig. 1). The subject property of the study consists of Assessor's Parcel Numbers 492-010-13 and -17, located on the west side of Airport Drive and between Boughton Drive and Skyway Drive, in the southeast quarter of Section 2, Township 29 South, Range 27 East, Mount Diablo Baseline and Meridian, as depicted in the United States Geological Survey (USGS) Oildale, California, 7.5' quadrangle (Figs. 2, 3).

The study is part of the environmental review process for the proposed development of an industrial warehouse facility on the property, including 908,130 square feet of high cube storage, 15,000 square feet of ancillary office functions, and associated utilities and infrastructure improvements. The County of Kern, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the County with the necessary information and analysis to determine whether the proposed project would adversely affect any significant, nonrenewable paleontological resources, as required by CEQA, and to design a paleontological mitigation program if necessary.

In order to identify any paleontological resource localities that may exist in or near the project area and to assess the probability for such resources to be encountered during the project, CRM TECH initiated a records search at the appropriate repository, conducted a literature review, and carried out a systematic field survey of the project area. The following report is a complete account of the methods, results, and conclusion of this study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

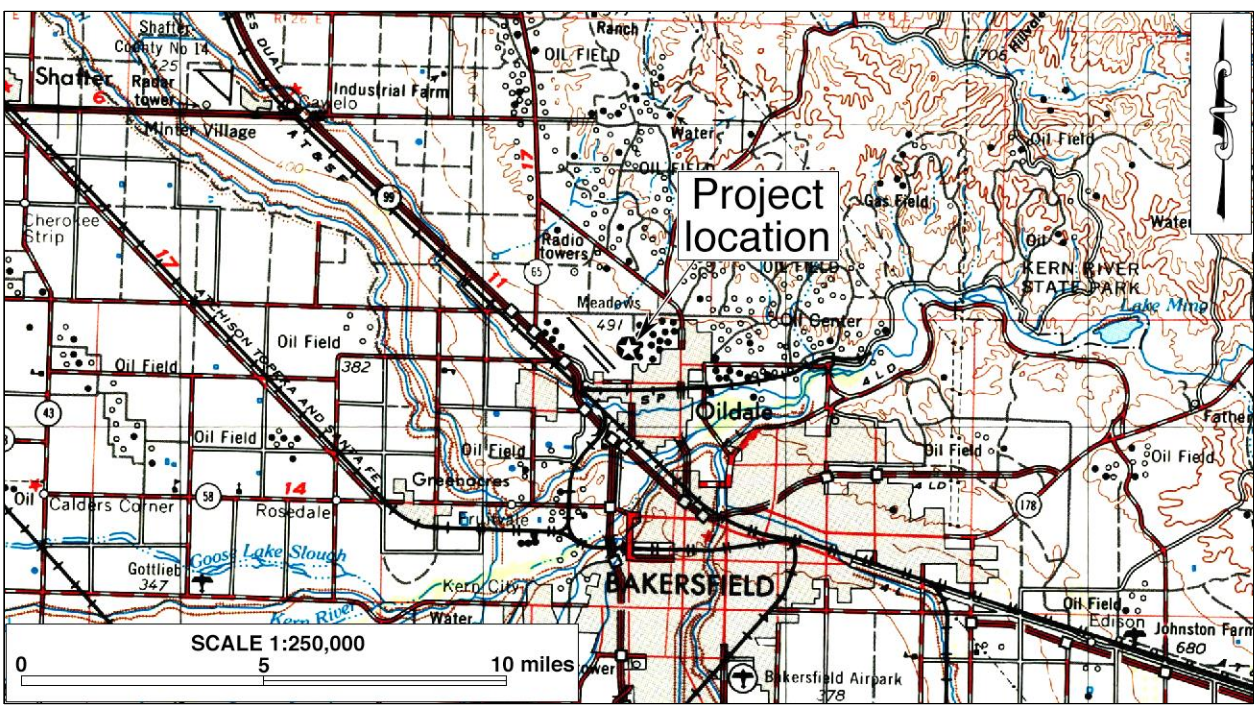

Figure 1. Project vicinity. (Based on USGS Bakersfield, Calif., 120'x60' quadrangle, 1971 edition)

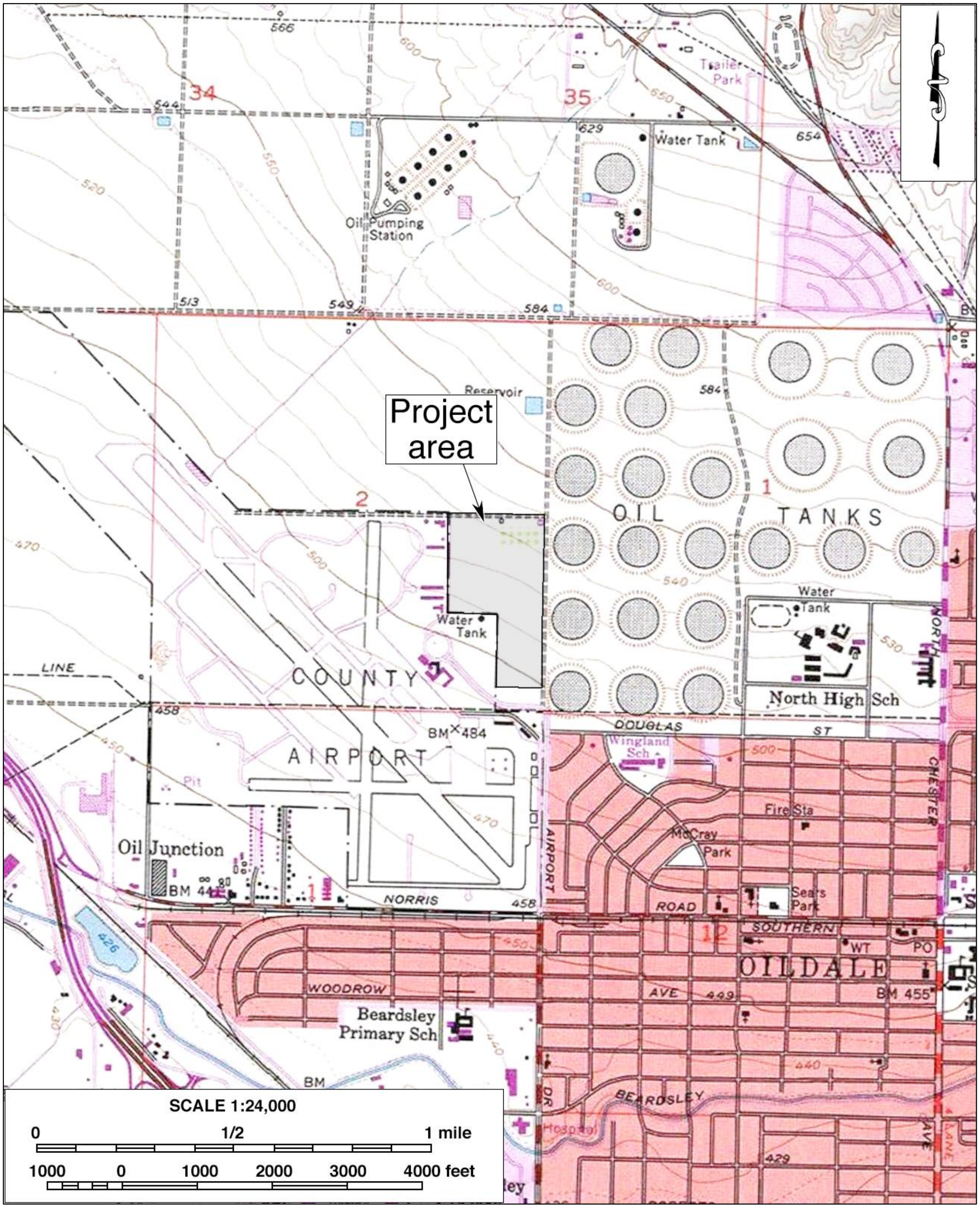

Figure 2. Project location. (Based on USGS Oildale, Calif., 7.5' quadrangle, 1973 edition)

Figure 3. Recent satellite image of the project area. (Based on Google Earth imagery)

PALEONTOLOGICAL RESOURCES

DEFINITION

Paleontological resources represent the remains of prehistoric life, exclusive of any human remains, and include the localities where fossils were collected as well as the sedimentary rock formations in which they were found. The defining character of fossils or fossil deposits is their geologic age, typically older than recorded human history and/or older than the middle Holocene Epoch, which dates to circa 5,000 radiocarbon years (Society of Vertebrate Paleontology 2010:11).

Common fossil remains include marine and freshwater mollusk shells; the bones and teeth of fish, amphibians, reptiles, and mammals; leaf imprint assemblages; and petrified wood. Fossil traces, another type of paleontological resource, include internal and external molds (impressions) and casts created by these organisms. These items can serve as important guides to the age of the rocks and sediments in which they are contained, and may prove useful in determining the temporal relationships between rock deposits from one area and those from another as well as the timing of geologic events. They can also provide information regarding evolutionary relationships, development trends, and environmental conditions.

Fossil resources generally occur only in areas of sedimentary rock (e.g., sandstone, siltstone, mudstone, claystone, or shale). Because of the infrequency of fossil preservation, fossils, particularly vertebrate fossils, are considered nonrenewable paleontological resources. Occasionally fossils may be exposed at the surface through the process of natural erosion or because of human disturbances; however, they generally lay buried beneath the surficial soils. Thus, the absence of fossils on the surface does not preclude the possibility of their being present within subsurface deposits, while the presence of fossils at the surface is often a good indication that more remains may be found in the subsurface.

SIGNIFICANCE CRITERIA

According to guidelines proposed by Scott and Springer (2003), paleontological resources can be considered to be of significant scientific interest if they meet one or more of the following criteria:

1. The fossils provide information on the evolutionary relationships and developmental trends exhibited among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or the interactions between paleobotanical and paleozoological biota;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

PALEONTOLOGICAL SENSITIVITY

The fossil record is unpredictable, and the preservation of organic remains is rare, requiring a particular sequence of events involving physical and biological factors. Skeletal tissue with a high percentage of mineral matter is the most readily preserved within the fossil record; soft tissues not intimately connected with the skeletal parts, however, are the least likely to be preserved (Raup and Stanley 1978). For this reason, the fossil record contains a biased selection not only of the types of organisms preserved but also of certain parts of the organisms themselves. As a consequence, paleontologists are unable to know with certainty, the quantity of fossils or the quality of their preservation that might be present within any given geologic unit.

Sedimentary units that are paleontologically sensitive are those geologic units (mappable rock formations) with a high potential to contain significant nonrenewable paleontological resources. More specifically, these are geologic units within which vertebrate fossils or significant invertebrate fossils have been determined by previous studies to be present or are likely to be present. These units include, but are not limited to, sedimentary formations that contain significant paleontological resources anywhere within their geographical extent as well as sedimentary rock units temporally or lithologically amenable to the preservation of fossils.

A geologic formation is defined as a stratigraphic unit identified by its lithic characteristics (e.g., grain size, texture, color, and mineral content) and stratigraphic position. There is a direct relationship between fossils and the geologic formations within which they are enclosed and, with sufficient knowledge of the geology and stratigraphy of a particular area, it is possible for paleontologists to reasonably determine the formation's potential to contain significant nonrenewable vertebrate, invertebrate, marine, or plant fossil remains.

The paleontological sensitivity for a geologic formation is determined by the potential for that formation to produce significant nonrenewable fossils. This determination is based on what fossil resources the particular geologic formation has produced in the past at other nearby locations. Determinations of paleontologic sensitivity must consider not only the potential for yielding vertebrate fossils but also the potential of yielding a few significant fossils that may provide new and significant taxonomic, phylogenetic, and/or stratigraphic data.

The Society of Vertebrate Paleontology issued a set of standard guidelines intended to assist paleontologists to assess and mitigate any adverse effects/impacts to nonrenewable paleontological resources. The guidelines defined four categories of paleontological sensitivity for geologic units that might be impacted by a proposed project, as listed below (Society of Vertebrate Paleontology 2010:1-2):

- **High Potential**: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered.
- **Undetermined Potential**: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment.
- **Low Potential**: Rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances.
- **No Potential**: Rock units that have no potential to contain significant paleontological resources, such as high-grade metamorphic rocks and plutonic igneous rocks.

SETTING

Kern County covers a total of 8,172 square miles, measuring 66 miles from north to south and 130 miles from east to west. The county overlaps five of California's 13 geomorphic provinces, the three most prominent ones being the Great Valley, the southern Sierra Nevada, and the western portion of the Mojave Desert. The City of Bakersfield lies in the Great Valley Province, which is bound on the north by the Klamath Mountains, on the east by the Cascade Range and Sierra Nevada Provinces, on the west by the Coast Ranges Province, and on the south by the Transverse Range (San Emigdio Mountains; Jenkins 1980:40-41).

Approximately 50 miles wide by 400 miles long, the Great Valley Province is a narrow, asymmetric alluvial plain that is essentially a trough that has experienced almost continuous deposition of sediments since the Jurassic (Jenkins 1980). It is divided into the Sacramento Valley in the north and the larger San Joaquin Valley in the south, drained by the San Joaquin River (Bartow 1991). During its early history, the San Joaquin Valley was an inland sea situated between two mountain ranges, a "composite of a late Mesozoic and early Cenozoic forearc basin that was largely open to the Pacific Ocean on the west" (*ibid*.:2).

The southeastern San Joaquin Valley also contains nonmarine sedimentary deposits sitting on top of the marine strata (Bartow and Pittman 1983). These deposits crop out in a crescent-shaped belt measuring roughly 50 miles long by up to 12 miles wide and are known as the Kern River Group (*ibid*.). Among the unique geologic features of the Kern River Group are two oil-producing zones found along anticlinal uplifts in the southwest margin of the San Joaquin Valley, as well as elsewhere in the southernmost portion of the Valley (Jenkins 1980; Bartow and Pittman 1983). The Kern River Group is known to sit at least five feet below older Pleistocene-age surface alluvium in places (Bartow and Pittman 1983).

The project area is surrounded by the Meadows Field Airport to the west, several apartment complexes and a self-storage facility to the east, and fallow agricultural land to the north and the south (Fig. 3). One large soil stockpile and several smaller ones are located along the eastern side of the southern half of the property. Currently there are no standing structures or groves within the project area, but broken irrigation pipes and standpipes were observed along with a concrete structural foundation. The surface soils are composed of light brown fine- and medium-grained alluvial sands with small granitic cobbles. The ground surface project area has been recently disked, and the scattered vegetation remaining includes wild mustard, string meadows, foxtails, and other small shrubs and grasses (Fig. 4).

METHODS AND PROCEDURES

RECORDS SEARCH

The records search for this study was conducted through the University of California Museum of Paleontology (UCMP), which is one of the institutions that maintain files on regional paleontological localities as well as supporting maps and documents. The records search results were used to identify previously completed paleontological resource assessments as well as known paleontological localities in the vicinity of the project location.

Figure 4. Current condition of the project area, view to the north near the western project boundary after recent vegetation removal. (Photograph taken on August 2, 2023)

LITERATURE REVIEW

In conjunction with the records searches, CRM TECH paleontologist Deirdre Encarnación pursued a literature review on the project area under the direction of principal paleontologist Ron Schmidtling. Sources consulted during the review include primarily topographic, geologic, and soil maps of the Bakersfield/Oildale area, published geologic literature pertaining to the project location, aerial and satellite images available at the Nationwide Environmental Title Research (NETR) Online website and through the Google Earth software, and other materials in the CRM TECH library, including unpublished reports produced during similar surveys in the vicinity.

FIELD SURVEY

The initial field inspection of the project area was carried out on July 17, 2023, by CRM TECH field director Daniel Ballester and paleontological surveyor Alondra Garcia. At that time, the dense vegetation cover throughout the project area created impassible conditions and extremely poor ground visibility. As a result, vegetation removal was performed prior to a second field survey attempt.

On August 2, 2023, Ron Schmidtling and Daniel Ballester conducted the intensive-level field survey of the project area by walking a series of parallel transects oriented north-south and spaced 15 meters (approximately 50 feet) apart. In this way, the ground surface in the entire study area was systematically and carefully examined to determine soil types, verify the geological formations, and search for indications of paleontological remains. Visibility of the native ground surface was generally good (80%) after the recent vegetation removal but remained poor (roughly 25%) in the portion of the southern half where stockpiles of soil were present.

RESULTS AND FINDINGS

RECORDS SEARCH

A search of the UCMP online paleontological database yielded negative results for fossil localities within the USGS Oildale 7.5'quadrangle but revealed at least one Pleistocene fossil locality in the general vicinity (UCMP 2023). According to UCMP records, Locality No. V65247 produced a specimen of Rancholabrean *Equus occidentalis*, fossil horse. The soils within the project area consist primarily of Pleistocene-age alluvial sediments, which are known to be fossiliferous at depth (Smith 1964; Bartow 1984; see below). Based on this assessment, the presence of fossil material in near-surface soils is unlikely but any fossil specimen discovered at depth in the project vicinity would be considered scientifically significant.

LITERATURE REVIEW

The surface geology within the project area was mapped by Smith (1964) as *Qc*, described as Pleistocene nonmarine sediments. Haydon and Hayhurst (2011) identified the surface sediments in and near the project area as *Qyf*, namely Holocene to late Pleistocene-aged alluvial fan deposits, which consist of boulder, cobble, gravel, sand, and silt deposits. *Qyf* is further described as "unconsolidated to slightly consolidated, undissected to slightly dissected, issued from a confined valley or canyon" (*ibid*.). Bartow (1984) mapped the surface geology within the project area as Qoa_2, older alluvium of Pleistocene age, which is described as "sand, gravel, silt, and clay underlying terraces removed from modern streams, and in dissected alluvial fans."

FIELD SURVEY

Throughout the course of the field survey, no notable surface manifestation of any paleontological remains was observed within or immediately adjacent to the project boundaries. The project area was covered by dark brown-purple soil, with occasional rounded cobbles and pebbles of quartzite and granite. The surface area was generally uniform, but the southern portion contained more cobbles and pebbles, which may be due in part to less agricultural activity in that area. In light of past agricultural operations on the property (NETR Online 1952-1984), recent clearing of the land, and the resulting ground disturbance, no intact fossil remains had been anticipated on the surface or in shallow deposits prior to the survey.

DISCUSSION

The results of the records search and the literature review indicate that the project area is situated upon exposures of Pleistocene-age alluvium, which has a high potential to contain significant, nonrenewable fossil remains, especially in undisturbed subsurface sediments. Similar sediments are known to have yielded significant fossils elsewhere in Southern California. Past agricultural activities and earth-moving operations in the project area have left the surface sediments extensively disturbed, but further earth-moving operation at depth may potentially disrupt paleontological remains.

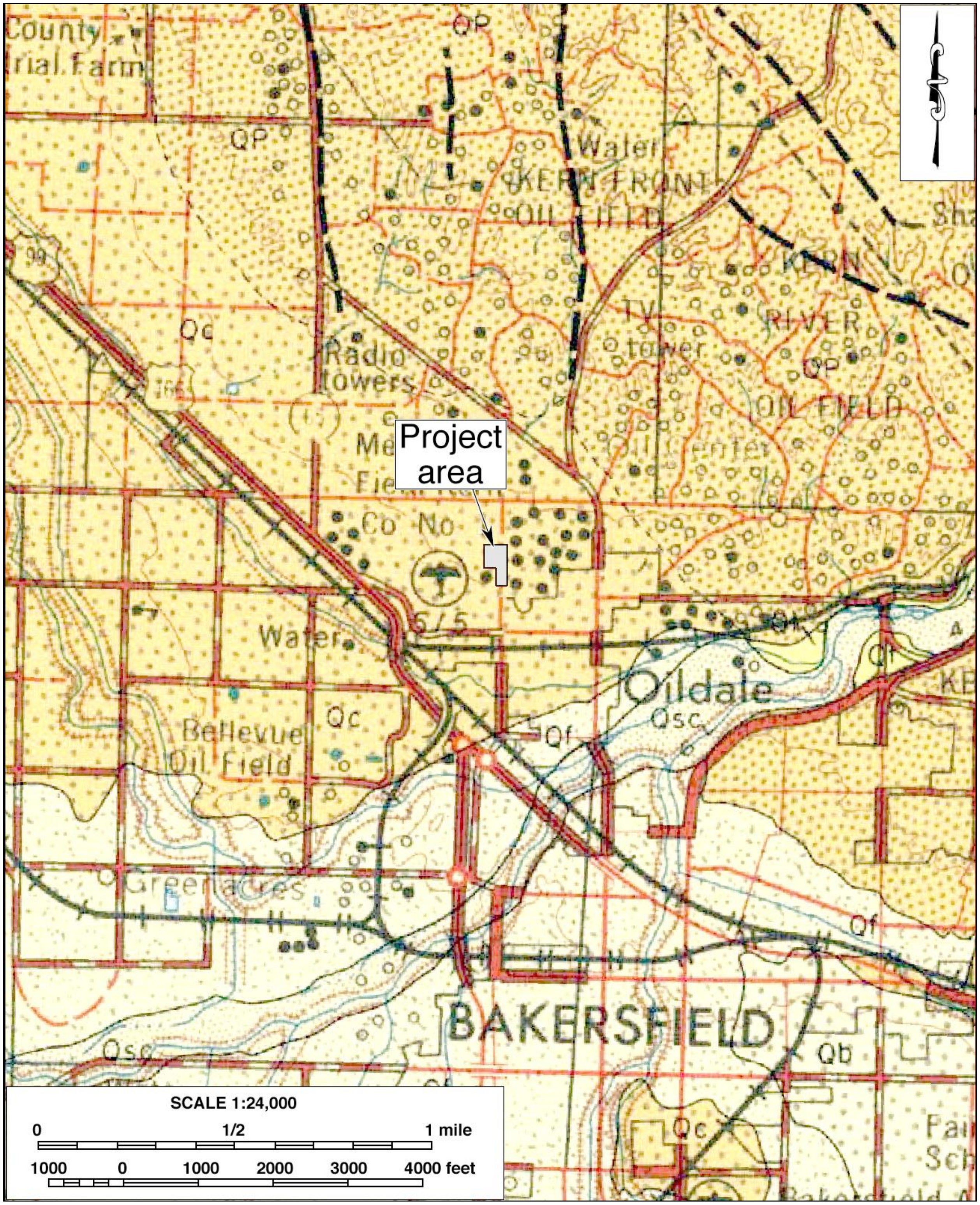

Figure 5. Geologic map of the project vicinity. (Source: Smith 1964)

CONCLUSION AND RECOMMENDATIONS

CEQA guidelines (Title 14 CCR App. G, Sec. V(c)) require that public agencies in the State of California determine whether a proposed project would "directly or indirectly destroy a unique paleontological resource" during the environmental review process. The present study, conducted in compliance with this provision, is designed to identify any significant, non-renewable paleontological resources that may exist within or adjacent to the project area, and to assess the possibility for such resources to be encountered in future excavation and construction activities.

Based on the research results presented above, the proposed project's potential to impact significant, nonrenewable paleontological resources appears to be low in the previously disturbed surface and near-surface soils but high in the subsurface deposits of Pleistocene alluvial sediments. Therefore, CRM TECH recommends that a paleontological resource impact mitigation program be developed and implemented during the project to prevent impacts on such resources or reduce them to a level less than significant. The mitigation program should be formulated in accordance with the provisions of CEQA (Scott and Springer 2003) as well as the proposed guidelines of the Society of Vertebrate Paleontology (2010), and should include but not be limited to the following components:

- All earth-moving operations within the project area reaching beyond the depth of five feet below the current ground surface should be monitored periodically by a qualified paleontological monitor to identify potentially fossil-bearing sediments when they are encountered, at which time continuous monitoring will become necessary. The monitor should be prepared to quickly salvage fossils as they are unearthed to avoid construction delays and should collect samples of sediments that are likely to contain fossil remains of small vertebrates or in vertebrates. However, the monitor must have the power to temporarily halt or divert grading equipment to allow for the removal of abundant or large specimens.
- Samples of sediment should be collected and processed to recover small fossils, and all fossil remains should be identified and curated at a repository with permanent retrievable storage.
- A report of findings, including an itemized inventory of recovered specimens, should be prepared upon completion of the procedures outlined above. The report should include a discussion of the significance of the paleontological findings, if any. The report and the inventory, when submitted to the Kern County, would signify completion of the program to mitigate potential impacts on paleontological resources.

Under these conditions, CRM TECH further recommends that the proposed project may be cleared to proceed in compliance with CEQA provisions on paleontological resources.

REFERENCES

Bartow, J. Alan
1984 Geologic Map of the southeastern margin of the San Joaquin Valley, California (1:250,000). Miscellaneous Investigations Series, Map I-1496. U.S. Geological Survey, Washington, D.C.
1991 *The Cenozoic Evolution of the San Joaquin Valley, California*. U.S. Geological Survey Professional Paper 1501. Washington, D.C.

Bartow, J. Alan, and Gardner M. Pittman
1983 The Kern River Formation, Southeastern San Joaquin Valley, California. U.S. Geological Survey Bulletin 1529-D. Washington, D.C.
English, W.A.
1926 *Geology and Oil Resources of the Puente Hills Region, Southern California*. U.S. Geological Survey Bulletin 146. Washington, D.C.
Haydon, Wayne D., and Cheryl A. Hayhurst
2011 Geologic Map of the Surficial Deposits in Southern California, East Half of the Taft 30'x60' Quadrangle. California Geological Survey Special Report 217, Plate 19. http://www.conservation.ca.gov/cgs/documents/.../sr_217/plate19_taft.pdf.
Jenkins, Olaf P.
1980 Geomorphic Provinces Map of California. *California Geology* 32(2):40-41.
NETR (Nationwide Environmental Title Research) Online
1952-1984 Aerial photographs of the project vicinity; taken in 1952, 1956, 1968, and 1984. http://www.historicaerials. com.
Raup, David M., and Steven M. Stanley
1978 *Principle of Paleontology*. W.H. Freeman and Company, San Francisco.
Scott, Eric, and Kathleen Springer
2003 CEQA and Fossil Preservation in California. *Environmental Monitor* Fall:4-10. Association of Environmental Professionals, Sacramento, California.
Smith, Arthur R.
1964 Geologic Map of the Bakersfield Quadrangle (1:250,000). California Regional Map Series, Map 3A. California Division of Mines and Geology, Sacramento.
Society of Vertebrate Paleontology
2010 Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. http://vertpaleo.org/Membership/Member-Resources/SVP_ Impact_Mitigation_Guidelines.aspx.
UCMP (University of California Museum of Paleontology)
n.d. UC Museum of Paleontology Specimens. https://ucmpdb.berkeley.edu/cgi/ ucmp_query2?admin=&table=ucmp2&where-loc_ID_num=V65247.

APPENDIX 1

PERSONNEL QUALIFICATIONS

PRINCIPAL PALEONTOLOGIST
Ron Schmidtling, M.S.

Education

1995	M.S., Geology, University of California, Los Angeles.
1991	Pasadena City College, Pasadena, California.
1985	B.A., Archaeology, Paleontology, Ancient Folklore, and Art History, University of Southern Mississippi, Hattiesburg.

Professional Experience:

2020-	Principal Paleontologist/Archaeological Surveyor, CRM TECH, Colton, California.
2014-	Instructor of Earth Science, History of Life, Ecology, and Evolutionary Biology, Columbia College Hollywood, Reseda, California.
2013, 2015	Volunteer, excavation of a camarasaur and a diplodocid in southern Utah, Natural History Museum of Los Angeles County, California.
1993-2014	Consultant, Getty Conservation Institute, Brentwood, California. • Geological Consultant on the Renaissance Bronze Project, characterizing constituents of bronze core material; • Paleontological Consultant for Antiquities/Conservation, identifying the foraminifera and mineral constituents of a limestone torso of Aphrodite; • Scientific Consultant on the Brentwood Site Building Project, testing building materials for their suitability in the museum galleries.
1999-2001	Archaeological and Paleontological Monitor, Michael Brandman Associates, Irvine, California.
1997	Department of Archaeology, University of California, Los Angeles.
1994	Scientific Illustrator and Teaching Assistant, Department of Earth and Space Sciences and Department of Biological Sciences, University of California, Los Angeles.

Memberships

AAPS (Association of Applied Paleontological Sciences), USA; CSEOL (Center for the Study of Evolution and the Origin of Life), Department of Earth Sciences, University of California, Los Angeles.

Publications and Reports

Author, co-author, and contributor on numerous paleontological publications and paleontological resource management reports.

PALEONTOLOGICAL SURVEYOR/FIELD DIRECTOR
Daniel Ballester, M.S., RPA (Registered Professional Archaeologist)

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.
2007	Certificate in Geographic Information Systems (GIS), California State University, San Bernardino.

- Cross-trained in paleontological field procedures and identifications by CRM TECH Geologist/Paleontologist Harry M. Quinn.

Professional Experience

2002-	Field Director/GIS Specialist, CRM TECH, Riverside/Colton, California.
2011-2012	GIS Specialist for Caltrans District 8 Project, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew Chief, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew, ECorp, Redlands.
1999-2002	Project Paleontologist/Archaeologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

Cultural Resources Management Reports

Co-author and contributor to numerous cultural and paleontological resources management reports since 2002.

PROJECT PALEONTOLOGIST/REPORT WRITER
Deirdre Encarnación, M.A.

Education

2003	M.A., Anthropology, San Diego State University, California.
2000	B.A., Anthropology, minor in Biology, with honors; San Diego State University, California.
2021	Certificate of Specialization, Kumeyaay Studies, Cuyamaca College/KCC.
2001	Archaeological Field School, San Diego State University.
2000	Archaeological Field School, San Diego State University.

Professional Experience

2004-	Project Archaeologist/Report Writer, CRM TECH, Riverside/Colton, California.
2001-2003	Part-time Lecturer, San Diego State University, California.
2001	Research Assistant for Dr. Lynn Gamble, San Diego State University.
2001	Archaeological Collection Catalog, SDSU Foundation.

PALEONTOLOGICAL SURVEYOR
Alondra Garcia, M.S.

Education

2020	M.S., Geographic Information Sciences, California State University, Long Beach.
2019	B.A., Anthropology, California State University, Long Beach.
2019	Certificate in American Indian Studies; California State University, Long Beach.

Professional Experience

2023-	Archaeologist, CRM TECH, Colton, California.
2022	Cartographic GIS Technician, City and County of Honolulu, Hawaii.
2022	GIS Consultant, Maui, Hawaii.
2021-2022	Archaeologist/GIS Technician, Scientific Consultant Services, Inc.
2020-2021	GIS Research Associate, The Center for International Trade and Transportation.
2020-2021	Archaeologist, Mckeehan Environmental Consultants.
2020-2021	Archaeologist, Cogstone Resource Management.
2019-2021	Archaeologist, PNA CRM.
2019-2021	Archaeologist, Rincon Consultants, Inc.