Geotechnical Engineering Report

DEPARTMENT OF GENERAL SERVICES

CALIFORNIA CONSERVATION CORPS – GREENWOOD

WKA No. 12313.01P

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Prepared for:

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CALIFORNIA CONSERVATION CORPS – GREENWOOD
4411 State Highway 193
Greenwood, El Dorado County, California
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INTRODUCTION

As authorized, we have completed a geotechnical engineering study for the proposed residential center to be constructed for the Department of General Services California Conservation Corps facility located at 4411 State Highway 193 in Greenwood, El Dorado County, California. The purpose of our study has been to explore the existing site, soil, and groundwater conditions across the site, and to provide geotechnical engineering conclusions and recommendations for design and construction of the proposed residential center. This report presents the results of our study.

Scope of Services

Our scope of services included the following tasks:

1. perform a site reconnaissance;
2. review of United States Geological Survey (USGS) geologic map, historical aerial photographs and available groundwater information;
3. perform subsurface explorations, including the drilling and sampling of 12 borings to depths ranging from approximately four to 16½ feet below the existing site grades;
4. collect representative bulk samples of near-surface soils;
5. perform laboratory testing of selected soil samples;
6. perform engineering analyses; and,
7. preparation of this report.

Figures and Attachments

This report contains a Vicinity Map as Figure 1, a Site Plan showing the locations of the borings drilled at the site as Figure 2, and Logs of Borings as Figures 3 through 14. An explanation of the symbols and classification system used on the logs is contained in Figure 15. Appendix A contains general information regarding project concepts, exploratory methods used during the field exploration phase of this study, an explanation of laboratory testing accomplished, and laboratory test results not presented on the boring logs. Appendix B contains *Guide Earthwork Specifications* that may be used in the preparation of project plans and specifications.

Project Description

We understand the proposed residential center will include the design and construction of 12 new buildings including an administration building (3,000 sf), seven dormitories (18,000 sf), an education building (6,000 sf), a recreation building (5,000 sf), a multi-purpose building (12,000 sf), a warehouse (12,000 sf), and a hazardous materials storage room (200 sf). The proposed buildings will be wood-framed or lightweight steel-framed with interior concrete slabs-on-grade floors. Structural loads for the buildings are anticipated to be relatively light based on this type of construction. Below grade basements are not planned. Associated improvements will include construction of underground utilities, landscaping, retaining walls, two freestanding solar array fields supported on drilled cast-in-place, exterior flatwork, and asphalt concrete/Portland cement concrete paved parking areas and drive aisles.

We also understand that a retention pond and an on-site septic leach field will be constructed for the project. These items are excluded from this scope of services but will be addressed in an addendum report.

Grading plans were not available at the time of this report; however, based on the existing site topography, we anticipate excavations and fills on the order of about one to eight feet will be required for development of the property.

FINDINGS

Site Description

The irregular-shaped site is located at 4411 State Highway 193 (see Figure 1). The property occupies a portion of one parcel identified as El Dorado County Assessor's Parcel Number (APN) 061-061-030-000 that encompasses a total area of about 70 acres. The site is bounded on all sides by moderate to dense forested areas with mature trees and shrubs. Topography across the site is sloping from east to west. Average surface elevation across the property is about +1800 feet to about +1820 feet relative to the National Geodetic Vertical Datum of 1988 (NAVD88), based on review of the USGS *7.5-Minute Topographic Map of the Greenwood Quadrangle, California*, dated 2018.

At the time of our field explorations on July 24, 2019, the site was a working Department of General Services California Conservation Corps campus. Mature trees and shrubs were observed throughout the site, with clearings for structures and equipment storage. The structures were constructed of lightweight wood framing with interior concrete floors. The existing dining hall was constructed on a raised wood floor. Pavement areas were paved asphalt concrete or Portland cement concrete.

Historical Aerial Photographs

We reviewed historical aerial photographs of the site available from the Google Earth website and historicaerials.com. Available photographs were taken in the years 1946, 1993, 1998 through 2016, and 2018. In the photographs from 1946, the area was moderate to dense forest land. The photographs from 1993 through 2016, the area was similar to our site visit without the storage structure at the most northwest portion of the site. The photographs from 2018, show the site similar to the condition during our site visit on July 24, 2019.

Site Geology

The site is located on the western slope the Sierra Nevada geomorphic province. The 450-mile long Sierra Nevada is a 40- to 50-mile wide west dipping fault block consisting of a series of uplifted Mesozoic granitic batholiths overlain by metamorphic and volcanic units. Elevations in the range extend from 400 feet in the western foothills up to 14,000 feet on its eastern edge where extensional block faulting of the basin and range province has produced high peaks and dramatic relief. Steep, rocky faces and glacier carved valleys feed high-energy streams descending to rolling foothills, where plutonic and metamorphosed rock abut flat-lying alluvial sediments of the province's western boundary with the Great Valley. (Norris and Webb, 1990).The Sierran block extends west beneath the Cenozoic alluvium of the Great Valley to presumably contact the Eastern Franciscan Formation of the Coast Ranges.

The complex structure of the Sierra Nevada is reflective of its equally complex geologic history. Faulting in the western Sierra Nevada mountains trends North-northwest.

According to the *Geologic map of the Sacramento quadrangle, California, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 1A,* the Paleozoic-aged Calaveras Complex (Pzcc) and Calaveras Complex volcanic rock (Pzcv) formations underlie the site. The geologic materials that comprise these formations are primarily metasedimentary rock and volcanic rock. The mapped geology was found to be generally consistent with the subsurface soil conditions encountered within our borings performed across the site.

Subsurface Soil Conditions

The surface and near-surface soil conditions encountered at the boring locations generally consisted of light brown to reddish brown, sandy silt with clay and lean clay to the maximum depth explored of 16½ feet below existing site grades. At boring locations D2, D7, and D8, olive brown to brown, metasedimentary rock was encountered as practical auger refusal occurred at various depths.

At the completion of exploration activities, the borings were backfilled with soil cuttings. The approximate locations of the borings are shown on the Site Plan, Figure 2. For specific information regarding the subsurface conditions at a specific location, please refer to the attached Logs of Soil Borings (Figures 3 through 14).

Groundwater

Permanent groundwater was not observed in the borings performed on July 24, 2019. Based on our experience in the area, groundwater is anticipated to be at depths greater than 50 feet below the ground surface.

CONCLUSIONS

Building Support

Our study indicates that the underlying native soils are considered capable of supporting the planned residential center, and pavements, provided the recommendations of this report are carefully followed. Our study also indicates new engineered fill that is properly placed and compacted in accordance with the recommendations of this report will be capable of supporting the proposed structures and pavements.

The building should not be supported upon cut/fill or fill differentials that exceed five feet in depth. Over-excavation and recompaction of the building pad would be required to limit the differential fill depths on the building pad with differential fill depths greater than five feet. Over-excavation may also be required in seasonal drainages and ponds located in the proposed development areas.

Following site clearing activities, we anticipate the upper foot of soils will become disturbed. Recommendations for moisture conditioning, ripping and cross-ripping and recompaction of the site have been provided in this report.

2016/2019 CBC/ASCE 7-10/7-16 Seismic Design Criteria

We understand that in January of 2020, the new 2019 *California Building Code* (CBC) will be adopted. The 2019 CBC references the *American Society of Civil Engineers (ASCE), Minimum Design Loads and Associated Criteria for Buildings and Other Structures 7-16*. To assist with the structural design of the project, we have provided seismic design parameters for the 2016 CBC and the 2019 CBC; both sets of design parameters have been determined based on the site location and the public domain computer program developed by the Structural Engineers Association of California (SEAOC) and the Office of Statewide Health Planning and Development (OSHPD) (https://seismicmaps.org). Since S_1 is greater than 0.2g, the 2019 CBC coefficient values F_v, S_{M1}, and S_{D1} presented in Table 1 below are valid for this project, provided the requirements in Exception Note No. 2 in Section 11.4.8 of ASCE 7-16 apply, specifically if $T \leq 1.5 \times T_S$. If not, a site-specific ground motion hazard analysis is required.

The following seismic design parameters summarized in Table 1 may be used for seismic design of the proposed development.

TABLE 1
SEISMIC DESIGN PARAMETERS

Latitude: 38.9087° N Longitude: 120.9064° W	ASCE 7-10/7-16 Table/Figure	2016/2019 CBC Figure/Section/Table	Factor/ Coefficient	2016 CBC Values	2019 CBC Values
0.2-second Period MCE	Figure 22-1	Figures: 1613.3.1(1)/1613.2.1(1)	S_S	0.501 g	0.475 g
1.0 second Period MCE_R	Figure 22-2	Figures: 1613.3.1(2)/1613.2.1(2)	S_1	0.233 g	0.215 g
Soil Class	Table 20.3-1	Sections: 1613.3.2/1613.2.2	Site Class	D	D
Site Coefficient	Table 11.4-1	Tables: 1613.3.3(1)/1613.2.3 (1)	F_a	1.399	1.420
Site Coefficient	Table 11.4-2	Tables: 1613.3.3(2)/1613.2.3(2)	F_v	1.933	2.17 *
Adjusted MCE Spectral Response Parameters	Equation 11.4-1	Equations: 16-37/16-36	S_{MS}	0.701 g	0.674 g
	Equation 11.4-2	Equations: 16-38/16-37	S_{M1}	0.451 g	0.467 g*
Design Spectral Acceleration Parameters	Equation 11.4-3	Equations: 16-39/16-38	S_{DS}	0.468 g	0.449 g
	Equation 11.4-4	Equations: 16-40/16-39	S_{D1}	0.301 g	0.311 g*

TABLE 1
SEISMIC DESIGN PARAMETERS

Latitude: 38.9087° N Longitude: 120.9064° W	ASCE 7-10/7-16 Table/Figure	2016/2019 CBC Figure/Section/Table	Factor/ Coefficient	2016 CBC Values	2019 CBC Values
Seismic Design Category	Table 11.6-1	Tables: 1613.3.5(1)/1613.2.5(1)	Risk Category I to III	C	C
			Risk Category IV	D	D
	Table 11.6-2	Tables: 1613.3.5(2)/1613.2.5(2)	Risk Category I to IV	D	D

Notes: MCE_R = Risk-Targeted Maximum Considered Earthquake;
g = gravity
* = The value is valid provided the requirements in Exception Note No. 2 in Section 11.4.8 of ASCE 7-16 are met. If not, a site-specific ground motion hazard analysis is required.

Liquefaction Potential

As noted previously the site is mapped as underlain by the Paleozoic-aged (about 251 to 542 million years old) metasedimentary rocks and volcanic rocks of the Calaveras Complex (Pzcc) and Calaveras Complex volcanic rocks (Pzcv) formations. These geologic units is composed of variably weathered bedrock (see Site Geology section of this report). Some of the borings drilled for this study encountered variably weathered rock. In addition, based on our experience in the local area, the permanent groundwater elevation at the site is not anticipated in the upper 50 feet of existing site grades. Based on the age and composition of the site geology, site seismologic condition, and available groundwater information relevant to the site, it is our opinion the potential for liquefaction beneath the site does not exist.

Soil Expansion Potential

Laboratory test results on the near-surface clays indicates these materials possess a moderate plasticity when tested in accordance with ASTM D4318 test method as shown in Figure A2. Additional laboratory tests indicate the materials possess a medium to high expansion potential when tested in accordance with American Society of Testing and Materials (ASTM) D4829 test method, as shown in Figures A3 and A4. Based on the results of the laboratory testing and our experience in the area, we conclude the near-surface clays are capable of exerting moderate expansion pressures on building foundations, interior floor slabs and exterior flatwork. Specific recommendations to reduce the effects of expansive soils are presented later in this report.

Excavation Conditions

The surface and near-surface soils at the site should be readily excavatable with conventional earthmoving and trenching equipment. However, subsurface remnants from existing and/or previous development of the site, if any, may be encountered, as well as variably cemented soils and/or weathered bedrock, and can be slow to excavate with a standard, rubber-tired backhoe. Experience has shown that excavators can remove these materials with moderate effort for the near-surface excavations anticipated to construct the proposed improvements.

Based on our borings, excavations associated with building foundations, shallow trenches for utilities, and other excavations less than five feet deep associated with the proposed construction, should stand vertically for short periods of time required for construction, unless cohesionless, saturated or disturbed soils are encountered. These unstable conditions may result in caving or sloughing; therefore, the contractor should be prepared to brace or shore the excavations, if necessary.

Excavations or trenches exceeding five feet in depth that will be entered by workers should be sloped, braced or shored to conform to current California Occupational Safety and Health Administration (Cal/OSHA) requirements. The contractor must provide an adequately constructed and braced shoring system in accordance with federal, state and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground.

Excavated materials should not be stockpiled directly adjacent to an open excavation to prevent surcharge loading of the excavation sidewalls. Excessive truck and equipment traffic should be avoided near excavations. If material is stored or heavy equipment is stationed and/or operated near an excavation, a shoring system must be designed to resist the additional pressure due to the superimposed loads.

Soil Suitability for Engineered Fill Construction

The existing on-site soils encountered in the borings are considered suitable for use as engineered fill construction, provided these materials do not contain significant quantities of organics, rubble and deleterious debris, and are at a proper moisture content capable of achieving the desired degree of compaction.

Pavement Subgrade Quality

Laboratory testing of the surface and near-surface soils indicates these soils exhibit relatively poor qualities for support of asphalt concrete pavements. Resistance ("R") values ranged from 5 to 9 for the near-surface soil samples tested in accordance with California Test 301 (See Figures A5 and A6). Based on this data, we have used of an R-Value of 5 for pavement design at this site.

Preliminary Soil Corrosion Potential

Four samples of near-surface soil was submitted to Sunland Analytical Lab of Rancho Cordova, California for testing to determine minimum resistivity, pH, chloride, and sulfate concentration to help evaluate the potential for corrosive attack upon reinforced concrete and buried metal. The results of the corrosivity testing are summarized in Table 2; copies of the test reports are presented in Figures A8 and A15.

TABLE 2
SOIL CORROSIVITY TESTING

Analyte	Test Method	D1 (0'-3')	D5 (0'-4')	D8 (0'-3')	D12 (0'-3')
pH	CA DOT 643 Modified*	6.75	7.48	6.79	6.87
Minimum Resistivity	CA DOT 643 Modified*	2650 Ω-cm	2950 Ω-cm	5090 Ω-cm	3480 Ω-cm
Chloride	CA DOT 422	12.3 ppm	2.7 ppm	3.7 ppm	2.0 ppm
Sulfate	CA DOT 417	15.9 ppm	1.0 ppm	3.5 ppm	12.5 ppm
	ASTM D516	15.4 ppm	0.9 ppm	3.6 ppm	11.0 ppm

Notes:
* = Small cell method
Ω-cm = Ohm-centimeters
ppm = Parts per million
CA DOT = California Department of Transportation
ASTM = American Society of Testing and Materials

The California Department of Transportation Corrosion and Structural Concrete Field Investigation Branch, Corrosion Guidelines (Version 2.1, dated January 2015), considers a site to be corrosive to foundation elements if one or more of the following conditions exists for the representative soil and/or water samples taken: has a chloride concentration greater than or equal to 500 ppm, sulfate concentration greater than or equal to 2000 ppm, or the pH is 5.5 or less. Based on this criterion, the on-site soils tested are not considered corrosive to steel reinforcement properly embedded within Portland cement concrete (PCC).

Table 19.3.1.1 – Exposure Categories and Classes, of American Concrete Institute (ACI) 318-14, Section 19.3 – Concrete Durability Requirements, as referenced in Section 1904.1 of the 2013 CBC, indicates the severity of sulfate exposure for the sample tested is Exposure Class S0. Exposure Class S0 is assigned for conditions where the water-soluble sulfate concentration in contact with concrete is low and injurious sulfate attack is not a concern. The project structural engineer should review the requirements of ACI 318 and determine their applicability to the site.

Wallace-Kuhl & Associates are not corrosion engineers. Therefore, if it is desired to further define the soil corrosion potential at the site a corrosion engineer should be consulted.

Naturally Occurring Asbestos (NOA)

During the drilling operations, serpentine rock was discovered in Boring D5 at a depth of about 10 feet below existing site grades, a sample was submitted to California Laboratory Services of Rancho Cordova, California for analysis for the presence of NOA. The sample was analyzed by the Air Resources Board's Method 435, Determination of Asbestos Content of Serpentine Aggregate. The results of the NOA testing are provided in Appendix C.

Based on the results of the laboratory testing, <0.25% of asbestiform minerals were observed in the sample obtained from Boring D5. Therefore, the results of the NOA screening survey indicate that earth moving operations at the site are not subject to the requirements specified in the California Air Resources Board's Asbestos Airborne Toxic Control Measure for Construction Grading and Surface Mining Operations which would be required for results greater than 0.25% of asbestiform materials.

Groundwater

Based upon the absence of groundwater during our field exploration and the underlying bedrock in the vicinity, permanent groundwater level should not to be a significant factor, although perched groundwater could be present in the winter and spring after significant rainfall events and may need to be considered in the construction of the proposed structures and shallow utilities.

Seasonal Water

During the wet season, infiltrating surface runoff water can create saturated surface conditions. Grading operations attempted following the onset of winter rains and prior to prolonged drying periods will be hampered by high soil moisture contents. Soils located beneath existing pavements and slabs will likely be at elevated moisture contents regardless of the time of year of construction and also will require drying. Wet soils should be anticipated and considered in the construction schedule for this project. Such soils, intended for use as engineered fill, will require considerable aeration and/or drying to reach a moisture content that will permit the soils to be properly compacted.

RECOMMENDATIONS

General

The recommendations presented below are appropriate for typical construction in the late spring through fall months. The on-site soils likely will be saturated by rainfall in the winter and early spring months, and will not be compactable without drying by aeration or chemical treatment. Should the construction schedule require work to begin during the wet months, additional recommendations can be provided, as conditions dictate.

Site preparation should be accomplished in accordance with the provisions of this report. A representative of the Geotechnical Engineer should be present during all earthwork operations to evaluate compliance with the recommendations included in this report. The Geotechnical Engineer of Record referenced herein should be considered the Geotechnical Engineer that is retained to provide geotechnical engineering observation and testing services during construction.

Site Clearing

Prior to site grading, construction areas should be cleared of any existing structures designated for removal, including but not limited to, asphalt concrete pavements, vegetation, and utilities to be relocated or abandoned to expose firm and stable soils. All debris should be removed from the site. Where practical, the clearing should extend a minimum of five feet beyond the limits of the proposed structural areas of the site. Existing underground utilities, if any, need to be removed or relocated and should include the removal of all trench backfill.

Underground utilities within the proposed construction areas should be completely removed, rerouted, or properly abandoned (i.e., fully grouted provided the abandoned utility is situated at least 2½ feet below the final subgrade level to reduce the potential for localized “hard spots”). Depressions resulting from removal of underground utilities should be cleaned of loose soil and properly backfilled in accordance with the recommendations of this report.

Shrubs and/or trees designated for removal should include the entire rootball and all roots larger than ½-inch in diameter. Adequate removal of debris and roots may require laborers and handpicking to clear the subgrade soils to the satisfaction of the Geotechnical Engineer's representative. Although not encountered or observed at the site, on-site wells and septic systems, if present, should be abandoned in accordance with El Dorado County Environmental Management Department requirements.

Existing pavements and flatwork (asphalt concrete and concrete) that are not incorporated into the new design should be broken up and removed from the site. Alternatively, pulverized asphalt and Portland cement concrete rubble may be used as fill provided it is processed into fragments less than three inches in largest dimension, is mixed with soil to form a compactable mixture, and approved by the District.

Depressions resulting from site clearing operations, as well as any loose, soft, disturbed, saturated, or organically contaminated soils, as identified by the Geotechnical Engineer's representative, should be cleaned out to firm, undisturbed soils and backfilled with engineered fill in accordance with the recommendations of this report. Our representative be present during site clearing activities to verify the adequate removal of surface and subsurface structures.

Subgrade Preparation

Following site clearing activities, the exposed soils, as well as other areas outside of the buildings to receive fill or to remain at-grade that will support structures (i.e., pavements, flatwork, etc.), should be thoroughly ripped and cross-ripped to a depth of at least 12 inches for a distance of five feet beyond the building perimeter and at least two feet beyond pavements and flatwork. The intent of this recommendation is to expose any buried remnants from previous construction. The exposed grade should be thoroughly moisture conditioned to at least the optimum moisture content, and uniformly compacted to not less than 90 percent of the ASTM D1557 maximum dry density.

Sloping ground steeper than four horizontal to one vertical (4H:1V) should be benched prior to receiving engineered fill. A level terrace excavated horizontally at least two feet into the sloping ground should be done progressively up the side of the sloping ground at vertical increments not exceeding two feet. Fill placed on slopes that are steeper than four horizontal to one vertical (4H:1V), should be keyed into the natural ground at the toe of the fill slope. The toe key should be at least five feet wide, but should be widened as necessary to allow complete compaction of the entire base of the key by the compaction equipment used, centered along the toe of the fill slope, and extend at least two feet into undisturbed soil *as verified by the Geotechnical*

Engineer. The bottom of the keyway should slope downwards toward the slope on which fill is to be placed.

Once the depth of the key is approved, the bottom should be scarified to a depth of at least 12 inches, moisture conditioned and uniformly compacted to at least 90 percent of maximum dry density. Each lift should be benched at least 12 inches horizontally into the side of the slope. For every five feet of vertical height of fill, a larger bench should be constructed, extending at least five feet into the adjacent slope.

Compaction of the existing grade must be performed in the presence of our representative who will evaluate the performance of the subgrade under compactive loads and identify any loose or unstable soil conditions that could require additional excavation. The resulting excavations should be backfilled with engineered fill as described in the <u>Engineered Fill Construction</u> section of this report. Compaction should be achieved using a heavy, self-propelled sheepsfoot compactor.

<u>Engineered Fill Construction</u>

Engineered fill consisting of on-site or import materials should be placed in lifts not exceeding six inches in compacted thickness, with each lift being thoroughly moisture conditioned to at least two percent above the optimum moisture content for clay soils and to the optimum moisture content for granular soils (import fill materials), maintained in that condition, and uniformly compacted to at least 90 percent relative compaction.

Imported fill materials, where required, should be similar to but less expansive than native soils, and should not contain particles greater than three inches in maximum dimension. In addition, the contractor should provide certification for any imported fill materials that designates the fill materials do not contain known contaminants per Department of Toxic Substances Control’s guidelines for clean fill, and have corrosion characteristics within acceptable limits. Imported soils should be approved by the Geotechnical Engineer <u>prior</u> to being transported to the site.

The upper 12 inches of final building pad subgrades should be thoroughly moisture conditioned to at least two percent above the optimum moisture content and uniformly compacted to at least 90 percent relative compaction, regardless of whether final subgrade elevations is completed by excavation, filling, or left at existing grade.

The upper six inches of untreated pavement subgrade soils should be compacted to at least 95 percent relative compaction at the optimum moisture content, regardless of whether final subgrade is completed by excavation, filling, or left at existing grade. Final subgrade preparation and compaction should be performed just prior to placement of aggregate base, after underground construction is complete.

Subgrades for support of concrete foundation slabs and exterior flatwork should be maintained in a moist condition (at least two percent above the optimum moisture content) and protected from disturbance or desiccation until covered by capillary break material or aggregate base. Disturbed subgrade soils may require additional moisture conditioning, scarification and recompaction, depending on the level of disturbance.

Permanent excavation and fill slopes should be constructed no steeper than two horizontal to one vertical (2H:1V) and should be vegetated as soon as practical following grading to minimize erosion. As a minimum, the following erosion control measures should be considered: placement of straw bale sediment barriers or construction of silt filter fences in areas where surface run-off may be concentrated. Slopes should be over-built and cutback to design grades and inclinations. The final decision of erosion control measures should be made by the Project Stormwater Pollution Prevention Plan Engineer.

All earthwork operations should be accomplished in accordance with the recommendations contained within this report and the *Guide Earthwork Specifications* provided in Appendix B. We recommend the Geotechnical Engineer's representative be present on a regular basis during <u>all</u> earthwork operations to observe and test the engineered fill and to verify compliance with the recommendations of this report and the project plans and specifications.

<u>Utility Trench Backfill</u>

Utility trench backfill should be mechanically compacted as engineered fill in accordance with the following recommendations. Bedding and initial backfill around and over the pipe should conform to the pipe manufacturers recommendations for the pipe materials selected and applicable sections of the governing agency standards.

We recommend that native, on-site soil be used as trench backfill. Utility trench backfill should be placed in thin lifts, thoroughly moisture conditioned to at least two percent above the optimum moisture content, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557. The lift thickness will depend on the type of compaction equipment used to backfill utility trenches.

We recommend that all underground utility trenches aligned nearly parallel with new foundations be at least three feet from the outer edge of foundations, wherever possible. As a general rule, trenches should not encroach into the zone extending outward at a one horizontal to one vertical (1H:1V) inclination below the bottom of foundations. The intent of these recommendations is to prevent loss of both lateral and vertical support of foundations, resulting in possible settlement.

Foundation Design

Residential Center Structures

The proposed structures may be supported on a conventional continuous perimeter foundations and/or isolated interior spread foundations embedded at least 18 inches below lowest adjacent soil grade bearing in recompacted native soils, engineered fill, or a combination of those materials. Lowest adjacent soil grade is defined as the soil surface on which capillary break gravel is placed or exterior soil grade, whichever is lower. A continuous, reinforced foundation should be utilized for the perimeter of the structure to act as a “cut-off” to help minimize moisture infiltration and variations beneath the interior slab-on-grade areas of the structure. Continuous foundations should be at least 12 inches wide; isolated spread foundations should be at least 24 inches in any plan dimension. Foundations may be sized based upon an allowable “net” bearing capacity of 3000 pounds per square foot (psf) for dead load plus live loads, with a 1/3 increase for short-term loading caused from seismic or wind forces. The weight of foundation concrete extending below lowest adjacent soil grade may be disregarded in sizing computations.

Foundation excavations on sloping ground should be relatively flat on the bottom and should be stepped down the slope at regular intervals, with maximum step elevation differential of 12 inches (the minimum embedment below soil grade should be maintained for each step).

All foundations should be adequately reinforced to provide structural continuity, mitigate cracking and permit spanning of local soil irregularities. The structural engineer should determine final foundation reinforcing requirements.

Resistance to lateral foundation displacement may be computed using an allowable friction factor of 0.30, which may be multiplied by the effective vertical load on each foundation. Additional lateral resistance may be computed using an allowable passive earth pressure equivalent to a fluid pressure of 300 psf per foot of depth, acting against the vertical projection of the foundation. These two modes of resistance should not be added unless the frictional component is reduced by 50 percent since full mobilization of the passive resistance requires some horizontal movement, effectively reducing the frictional resistance. The uppermost 12 inches of passive resistance should be neglected if areas adjacent to the footings are not paved or covered with flatwork.

Solar Arrays and Minor Structures

Solar arrays and minor structures may be supported on drilled cast-in-place reinforced concrete piers. The piers should be at least 30 inches in diameter and extend at least five feet below final subgrade elevation. We anticipate that lateral loads and uplift loads on the piers are the governing design parameters; however, a skin friction of 300 psf for dead plus live loads may be used to size the pier foundations for support of vertical loads. This value may be increased by one-third to include short-term effects of wind or seismic forces. Piers should be constructed no closer than three pier diameters, as measured between the centers of the piers.

Uplift resistance of pier foundations may be computed assuming the following resisting forces, where applicable: 1) the unit weight of foundation concrete (150 pounds per cubic foot); and, 2) shearing resistance of 300 psf applied over the shaft area of the pier. Increased uplift resistance can be achieved by increasing the diameter of the pier rather than increasing the pier depth.

Lateral resistance of the piers may be evaluated by applying passive earth pressure equivalent to a fluid pressure of 300 psf per foot of depth applied over an area equal to 1½ pier diameters times the depth of the pier. If concrete pavements will completely surround the piers, a "constrained" condition may be assumed for design.

Our borings indicate that the subsurface soils consist of silt, and clay, and groundwater was not encountered to a maximum explored depth of approximately 16½ feet below site grades. We do not anticipate significant sidewall sloughing to occur during pier construction; however, we recommend a maximum elapsed time of two hours between completion of the pier drilling and the start of concrete placement. We recommend that our representative be present during construction to verify soil conditions within the depth of the drilled piers.

Interior Floor Slab Support

The interior concrete slab-on-grade floor can be supported upon the soil subgrade prepared in accordance with the recommendations in this report provided the subgrade is maintained in that condition (at least the optimum moisture content) and is protected from disturbance.

The interior concrete slab-on-grade floor for the residential buildings should be at least four inches thick and should include crack control reinforcement located at mid-slab depth. The slab thickness should be increased to five inches in maintenance buildings or slabs subjected to heavy wheel loads. Final reinforcement and joint spacing should be determined by the project structural engineer. Proper and consistent location of the reinforcement near mid-slab is essential to its performance. The risk of uncontrolled shrinkage cracking is increased if the reinforcement is not properly located within the slab. Temporary loads exerted during construction from vehicle traffic, construction equipment, storage of palletized construction materials, etc. should be considered in the design of the thickness and reinforcement of the interior slab-on-grade floor.

Floor slabs that will receive moisture sensitive floor coverings (e.g. vinyl covering, wood laminate, etc.) should be underlain by a layer of free-draining gravel/crushed rock, serving as a deterrent to migration of capillary moisture. The gravel/crushed rock layer should be at least four inches thick and graded such that 100 percent passes a one-inch sieve and no appreciable amount passes a No. 4 sieve. Additional moisture protection may be provided by placing a vapor retarder membrane (at least 10-mils thick) directly over the gravel/crushed rock. The water vapor retarder membrane should meet or exceed the minimum specifications as outlined in ASTM E1745 and be installed in strict conformance with the manufacturer's recommendations.

Floor slab areas that will be subjected to any vehicle traffic, as well as floor slab areas to support palletized construction materials and/or any other relatively heavy construction equipment or machinery, should be supported by at least six inches of Class 2 aggregate base compacted to at least 95 percent relative compaction to provide increased support capacity.

Floor slab construction practice over the past 30 years or more has included placement of a thin layer of sand or pea gravel over the vapor retarder membrane. The intent of the sand/pea gravel is to aid in the proper curing of the slab concrete. However, recent debate over excessive moisture vapor emissions from floor slabs includes concern for water trapped within the sand/pea gravel. As a consequence, we consider the use of the sand/pea gravel layer as optional. The concrete curing benefits should be weighed against efforts to reduce slab moisture vapor transmission.

The recommendations presented above should reduce significant soil-related cracking of the slab-on-grade floors. Also important to the performance and appearance of a Portland cement concrete slab is the quality of the concrete, the workmanship of the concrete contractor, the curing techniques utilized, and the spacing of control joints.

<u>Floor Slab Moisture Penetration Resistance</u>

It is likely that floor slab subgrade soils will become saturated at some time during the life of the structures, especially when the slab is constructed during the wet seasons, or when constantly wet ground or poor drainage conditions exist adjacent to the structures. For this reason, it should be assumed that the interior slab intended for moisture-sensitive floor coverings or materials, require protection against moisture or moisture vapor penetration. Standard practice includes placing a layer of gravel/crushed rock and a vapor retarder membrane (and possibly a layer of sand) as discussed above. Recommendations contained in this report concerning foundation and floor slab design are presented as minimum requirements only from the geotechnical engineering standpoint.

It is emphasized that the use of gravel/crushed rock and membrane below the slab will not "moisture proof" the slab, nor will it assure that slab moisture transmission levels will be low enough to prevent damage to floor coverings or other building components. It is emphasized that we are not slab moisture proofing or moisture protection experts. The sub-slab gravel/crushed rock and vapor retarder membrane simply offers a first line of defense against soil-related moisture. If increased protection against moisture vapor penetration of the slab is desired, a concrete moisture protection specialist should be consulted. The design team should consider all available measures for slab moisture protection. It is commonly accepted that maintaining the lowest practical water-cement ratio in the slab concrete is one of the most effective ways to reduce future moisture vapor penetration of the completed slabs.

Retaining Walls

Retaining walls capable of slight rotation about their base (unrestrained at the top or sides) should be capable of resisting an "active" lateral earth pressure equal to an equivalent fluid pressure of 40 psf per foot of wall backfill for horizontal granular backfill conditions and fully drained conditions. Retaining walls or basement walls that are fixed at the top should be capable of resisting an "at-rest" lateral earth pressure equal to an equivalent fluid pressure of 60 psf per foot for horizontal granular backfill conditions. For retaining walls with backfill sloped at a gradient no steeper than two horizontal to one vertical (2H:1V), add 20 psf per foot of depth to the values provided above. Retaining wall foundations should extend at least 18 inches below soil grade and may be designed in accordance with the appropriate parameters contained in the Foundation Design section of this report.

For retaining walls constructed on sloping ground or at the top of a soil berm, the passive resistance should be computed below a depth at which at least five feet of engineered fill or undisturbed native soil is present in front of the foundation, as measured from the exterior edge of the foundation to the face of the nearest slope. This will require deepening of the foundation excavations based on specific circumstances.

For the purposes of providing soil design criteria for Keystone® walls or similar walls, we have assumed that the soils at the wall locations will consist of a mixture of native silts and sands. For these soils, it is our opinion that an angle of internal friction (i.e. ϕ angle) of 32 degrees and a moist unit weight of about 110 pounds per cubic foot (pcf) would be appropriate for design.

Retaining walls should be fully drained to prevent the build-up of hydrostatic pressure behind the wall. Retaining walls should be provided with a drainage blanket (Class 2 permeable material, Caltrans Specification Section 68-2.02F (3)) at least one foot wide extending from the base of wall to within one foot of the top of the wall. The top foot above the drainage layer should consist of compacted on-site materials. Weep holes or perforated rigid pipe should be provided near the base of the wall to allow drainage of accumulated water. Drainpipes, if used, should slope to discharge at no less than a one percent fall to suitable drainage facilities. Open-graded ½- to ¾-inch diameter crushed rock may be used in lieu of the Class 2 permeable material, if the rock and drain pipe are completely enveloped in an approved non-woven geotextile filter fabric.

Structural backfill materials for retaining walls (other than the drainage layer) should consist of non-expansive (Expansion Index less than 20), compactable granular material that does not contain significant quantities of rubbish, rubble, organics and rock over six inches in size. Clays, pea gravel and/or crushed rock are not considered suitable backfill materials for retaining walls. Structural backfill should be placed in level lifts not exceeding 12 inches in compacted thickness, moisture conditioned to at least the optimum moisture content, and should be mechanically compacted to at least 90 percent relative compaction using relatively smaller compacting equipment. Over-compacting should be avoided. Backfilling should not begin until the wall concrete has reached a minimum strength as determined by the project structural engineer.

Exterior Flatwork (Non-Pavement Areas)

Soil subgrade areas to support exterior concrete flatwork (i.e., sidewalks, patios, etc.) should be prepared in accordance with the Subgrade Preparation and Engineered Fill Construction recommendations included in this report. Proper moisture conditioning of the subgrade soils is considered essential to the performance of the exterior flatwork. A six-inch layer of aggregate base should be used as a leveling course beneath the exterior flatwork and compacted to at least 95 percent relative compaction.

Exterior flatwork concrete should be at least four inches thick. Consideration should be given to thickening the edge of the slab to at least twice the slab thickness where wheel traffic is expected over the slabs. Expansion joints should be provided to allow for minor vertical movement of the flatwork. Exterior flatwork should be constructed independent of perimeter building foundations by the placement of a layer of felt material between the flatwork and the foundation. The slab designer should determine the final thickness, strength and joint spacing of exterior slab-on-grade concrete. The slab designer should also determine if slab reinforcement for crack control is required and determine final slab reinforcing requirements.

Areas adjacent to new exterior flatwork should be landscaped to maintain more uniform soil moisture conditions adjacent to and under flatwork. We recommend final landscaping plans not allow fallow ground adjacent to exterior concrete flatwork.

Practices recommended by the Portland Cement Association (PCA) for proper placement, curing, joint depth and spacing, construction, and placement of concrete should be followed during exterior concrete flatwork construction.

Pavement Design

The following pavement sections have been calculated based on the results of R-value testing. The procedures used for design are in general conformance with Chapters 600 to 670 of the 2018 California Highway Design Manual, 6th edition, and Section 15. An R-value of 5 was used for the design of on-site pavements. The project civil engineer should determine the appropriate traffic index based on anticipated traffic conditions. We can provide alternate pavement sections based on different traffic indices, upon request.

TABLE 2
PAVEMENT DESIGN ALTERNATIVES
R-Value = 5

Traffic Index (TI)	Traffic Condition	Type B Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
4.5	Automobile Parking Areas Only	2½*	10
6.5	Driveways, Fire Lanes, Drive Aisles, etc.	3	16
		4*	14

Note: * Asphalt concrete thickness contains the Caltrans safety factor.

We emphasize that the performance of the pavement is dependent upon uniform and adequate compaction of the soil subgrade, as well as all engineered fill and utility trench backfill within the limits of the pavements. Pavement subgrade preparation (i.e. scarification, moisture conditioning and compaction) should be performed after underground utility construction is complete, and just prior to aggregate base placement. The upper six inches of pavement subgrade soils should be compacted to at least 95 percent of the ASTM D1557 maximum dry density at an optimum moisture content. Aggregate base also should be compacted to at least 95 percent of the ASTM D1557 maximum dry density at the optimum moisture content or above. Materials quality and construction of the structural section of the pavements should conform to the applicable provisions of the latest edition of the Caltrans Standard Specifications.

Final pavement subgrades should be stable under construction traffic prior to aggregate base placement, and be protected from disturbance or desiccation until covered by aggregate base. To help identify unstable pavement subgrades, a proof-roll test should be performed on the exposed subgrades prior to placement of aggregate base with a fully-loaded, water truck. The proof-roll test should be observed by the Geotechnical Engineer’s representative.

We suggest that concrete slabs be constructed with thickened edges at least two inches plus the slab thickness and 36 inches wide in accordance with ACI design standards and reinforced for crack control, if desired. Reinforcement must be located at mid-slab depth to be effective. Portland cement concrete should achieve a minimum compressive strength of 3500 pounds per square inch (psi) at 28 days. Concrete curing and joint spacing and details should conform to current PCA and ACI guidelines.

We suggest considering the use of full depth curbs where pavements abut landscaping. The curbs should extend to at least the surface of the soil subgrade. Weep holes also could be provided at storm drain drop inlets, located at the subgrade-base interface, to allow water to drain from beneath the pavements.

Site Drainage

Final site grading should be accomplished to provide positive drainage of surface water away from the structures and prevent ponding of water adjacent to foundations, slabs or pavements. The grade adjacent to the structures should be sloped away from foundations at a minimum two percent slope for a distance of at least five feet, where possible. Roof gutter downspouts and surface drains should drain onto flatwork or be connected to rigid, non-perforated piping directed to an appropriate drainage point away from the structure. Ponding of surface water should not be allowed adjacent to the building or pavements. Landscape berms, if planned, should not be constructed in such a manner as to promote drainage toward the structure.

Geotechnical Engineering Observation and Testing During Earthwork

Site preparation should be accomplished in accordance with the recommendations of this report. Geotechnical testing and observation during construction is considered a continuation of our geotechnical engineering study. Wallace-Kuhl & Associates should be retained to provide testing and observation services during site preparation, earthwork, and foundation construction at the project to verify compliance with this geotechnical report and the project plans and specifications and to provide consultation as required during construction. These services are beyond the scope of work authorized for this investigation. We would be pleased to submit a proposal to provide these services upon request.

Section 1803.5.8 "Compacted Fill Material" of the 2016 CBC requires that the geotechnical engineering report provide a number and frequency of field compaction tests to determine compliance with the recommended minimum compaction. Many factors can affect the number of tests that should be performed during the course of construction, such as soil type, soil moisture, season of the year and contractor operations/performance. Therefore, it is crucial that the actual number and frequency of testing be determined by the Geotechnical Engineer during construction based on their observations, site conditions, and difficulties encountered.
In the event that Wallace-Kuhl & Associates is not retained to provide geotechnical engineering observation and testing services during construction, the Geotechnical Engineer retained to provide these services should indicate in writing that they agree with the recommendations of this report, or prepare supplemental recommendations as necessary. A final report by the "Geotechnical Engineer" should be prepared upon completion of the project.

Future Services

We recommend that Wallace-Kuhl & Associates be retained to review the final plans and specifications to determine if the intent of our recommendations has been implemented in those documents. We would be pleased to submit a proposal to provide these services upon request.

LIMITATIONS

Our recommendations are based upon the information provided regarding the proposed project, combined with our analysis of site conditions revealed by the field exploration and laboratory testing programs. We have used our engineering judgment based upon the information provided and the data generated from our study. This report has been prepared in substantial compliance with generally accepted geotechnical engineering practices that exist in the area of the project at the time the report was prepared. No warranty, either express or implied, is provided.

If the proposed construction is modified or re-sited; or, if it is found during construction that subsurface conditions differ from those we encountered at the boring locations, we should be afforded the opportunity to review the new information or changed conditions to determine if our conclusions and recommendations must be modified.

We emphasize that this report is applicable only to the proposed construction and the investigated site, and should not be utilized for construction on any other site. The conclusions and recommendations of this report are considered valid for a period of two years. If design is not completed and construction has not started within two years of the date of this report, the report must be reviewed and updated, if necessary.

Wallace - Kuhl & Associates

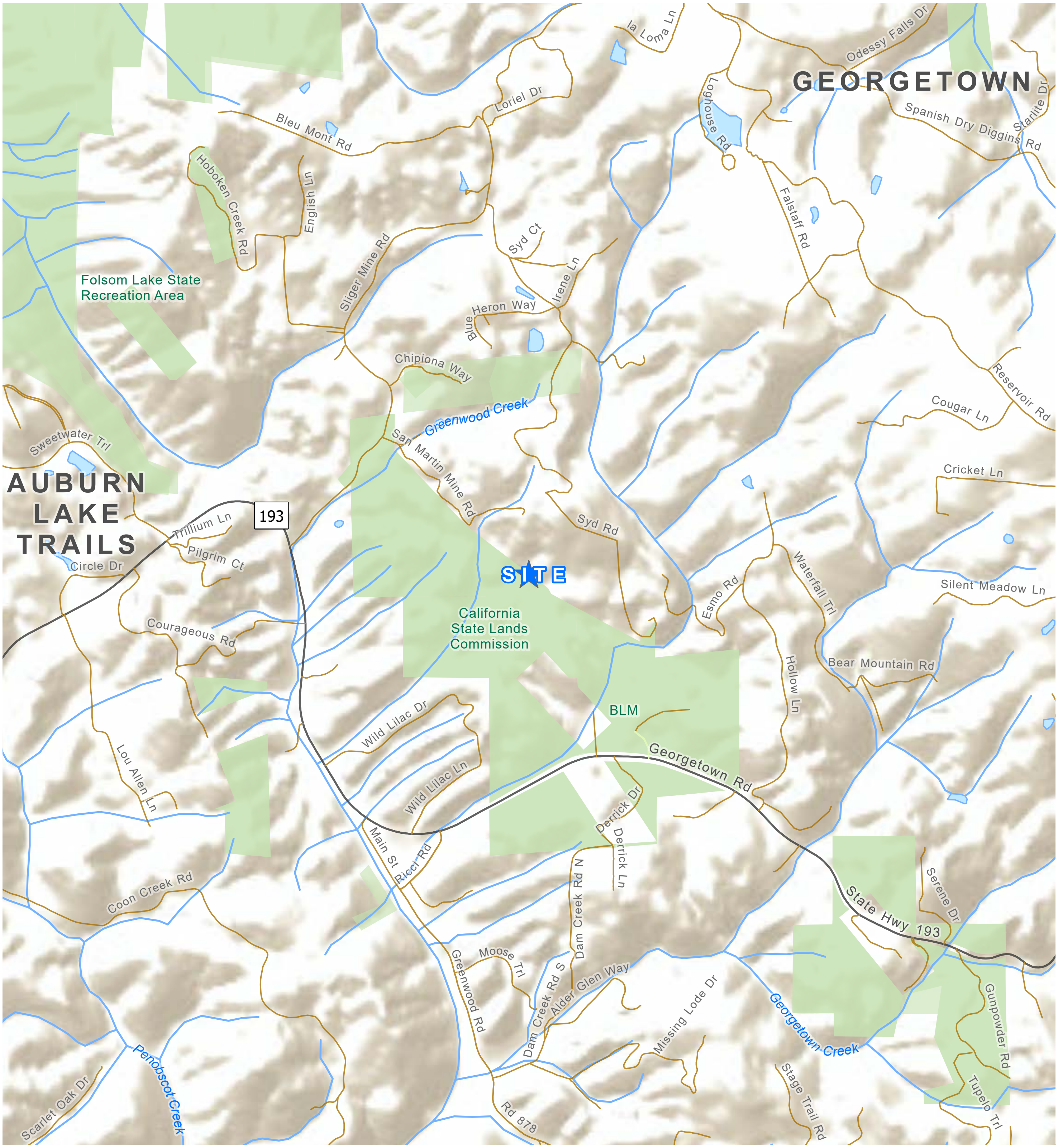
REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. WATARI
NO. 2675
Exp. 12-31-19
GEOTECHNICAL
STATE OF CALIFORNIA

9/10/19

Joseph R. Ybarra
Staff Geologist

Michael M. Watari
Senior Engineer

JRY:MMW/jry



Spatial Data provided by Esri, NOAA, and USGS
Projection: NAD 83, California State Plane, Zone II

WallaceKuhl & ASSOCIATES

VICINITY MAP

DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD

Greenwood, California

FIGURE	1
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	08/19

WKA NO. 12313.01P

Approximate Boring Location

N

0 75 150
Feet

Aerial imagery provided by Esri
Projection: NAD 83, California State Plane, Zone II

WallaceKuhl & ASSOCIATES	**SITE PLAN** DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD Greenwood, California	FIGURE	2
		DRAWN BY	JBV
		CHECKED BY	JRY
		PROJECT MGR	MMW
		DATE	08/19
		WKA NO.	12313.01P

Project: Department of General Services - CCC - Greenwood
Project Location: Greenwood, California
WKA Number: 12313.01P

LOG OF SOIL BORING D1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**15.0 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3")**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
				SAMPLE DATA			**TEST DATA**		
	0		Light brown to reddish brown, moist, medium dense, variably cemented, sandy, SILT (ML)						
									CR
					D1-1I	14			
	5		white and black mottling, very dense		D1-2I	60	16.3	104	
	10				D1-3I	50/3"			
						50/0"			
	15		Boring was terminated at about 15 feet below existing ground surface. Groundwater not observed.						

BORING LOG 12313.01P - DGS GREENWOOD CCC.GPJ WKA.GDT 9/10/19 7:45 AM

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FIGURE 3

Project: Department of General Services - CCC - Greenwood **Project Location: Greenwood, California** **WKA Number: 12313.01P**	**LOG OF SOIL BORING D2** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**4.0 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to brown with white and black mottling, moist, very dense, variably cemented, SILT (ML)						
				■	D2-1I	50/4"	6.9	115	
			olive brown to brown, metasedimentary rock encountered						
			Boring was terminated at about 4 feet below existing ground surface due to practical auger refusal. Groundwater not observed.						

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D3** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**13.5 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to reddish brown, moist, medium dense, SILT (ML)						
					D3-1I	16	9.5	103	TC
			variably cemented						
					D3-2I	20	15.7	n/a	
	5								
					D3-3I	50/6"			
	10								
						50/0"			
			Boring was terminated at about 13 1/2 feet below existing ground surface. Groundwater not observed.						

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WallaceKuhl & ASSOCIATES

FIGURE 5

Project: Department of General Services - CCC - Greenwood		**LOG OF SOIL BORING D4**	
Project Location: Greenwood, California		Sheet 1 of 1	
WKA Number: 12313.01P			

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**10.3 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to reddish brown, moist, loose, SILT (ML)						
				■	D4-1I	11	11.2	96	
	5		medium dense	■	D4-2I	24	18.4	102	
	10		variably cemeted, very dense	■	D4-3I	50/4"			
			Boring was terminated at about 10 1/2 below existing ground surface.						
			Groundwater not observed.						

BORING LOG 12313.01P - DGS GREENWOOD CCC.GPJ WKA.GDT 9/10/19 7:45 AM

Wallace Kuhl & ASSOCIATES

FIGURE 6

Project: Department of General Services - CCC - Greenwood
Project Location: Greenwood, California
WKA Number: 12313.01P

LOG OF SOIL BORING D5

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**15.5 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3"), EI**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			SAMPLE DATA				**TEST DATA**		
	0		Light brown to reddish brown, moist, stiff, silty, lean CLAY (CL) trace gravel						CR
					D5-1I	13			PI
	5		Light brown to brown, moist, medium dense, variably cemented, SILT (ML)		D5-2I	13	20.8	97	
	10		light brown to olive brown, serpentine rock present		D5-3I	50/3"			
	15				D5-4I	50/5"			

Boring was terminated at about 15 1/2 feet below existing ground surface.

Groundwater not observed.

Wallace Kuhl & ASSOCIATES

FIGURE 7

Project: Department of General Services - CCC - Greenwood
Project Location: Greenwood, California
WKA Number: 12313.01P

LOG OF SOIL BORING D6

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**16.3 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		Light brown to reddish brown, moist, very loose, sandy, SILT (ML)						
				■	D6-1I	4	16.9	110	
	5		light brown to olive brown, medium dense	■	D6-2I	13	20.7	109	
	10		variably cemented, very dense	■	D6-3I	50/4"			
	15			■	D6-4I	64/10"			
			Boring was terminated at about 16 1/2 feet below existing ground surface.						
			Groundwater not observed.						

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FIGURE 8

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D7** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**10.5 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to reddish brown, moist, dense, variably cemented, sandy, SILT (ML)						
					D7-1I	58			GR
					D7-2I	60	11.1	117	
	5								
					D7-3I	71/9"			
	10								
			olive brown to brown, metasedimentary rock encountered						
			Boring was terminated at about 10 1/2 feet below existing ground surface due to practical auger refusal. Groundwater not observed.						

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FIGURE 9

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D8** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**12.5 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3"), EI**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown with black mottling, moist, very dense, variably cemented, SILT (ML)						
					D8-1I	50/3"	4.1	100	
	5				D8-2I	50/3"	6.0	125	
	10				D8-3I	63			
			olive brown to brown, metasedimentary rock encountered						
			Boring was terminated at about 12 1/2 feet below existing ground surface due to practical auger refusal. Groundwater not observed.						

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FIGURE 10

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D9** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**14.3 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Reddish brown, moist, loose, SILT (ML)						
				■	D9-1I	10			PI
			reddish brown to olive brown, medium dense, variably cemented	■	D9-2I	29	11.7	109	
	5								
			very dense	■	D9-3I	50/6"			
	10								
				■	D9-4I	50/3"			
			Boring was terminated at about 14 1/4 feet below existing ground surface. Groundwater not observed.						

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D10** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**10.2 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Brown, moist, loose, silty SAND (SM-Fill)						
			Light brown, moist, loose, SILT (ML)		D10-1I	11			
	5		Light brown, to brown with black mottling, very dense		D10-2I	86	14.2	114	
	10					50/2"			

Boring was terminated at about 10 1/4 feet below existing ground surface.

Groundwater not observed.

BORING LOG 12313.01P - DGS GREENWOOD CCC.GPJ WKA.GDT 9/10/19 7:45 AM

Wallace Kuhl & ASSOCIATES

FIGURE 12

Project: Department of General Services - CCC - Greenwood **Project Location:** Greenwood, California **WKA Number:** 12313.01P	**LOG OF SOIL BORING D11** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**11.5 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks				Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to brown with black mottling, moist, dense, variably cemented, sandy SILT (ML)						
					D11-1I	50/6"			GR
	5		dense		D11-2I	53	14.1	119	
	10		light brown to olive brown, medium dense		D11-3I	39			
			Boring was terminated at about 11 1/2 feet below existing ground surface. Groundwater not observed.						

BORING LOG 12313.01P - DGS GREENWOOD CCC.GPJ WKA.GDT 9/10/19 7:45 AM

Wallace Kuhl & ASSOCIATES

FIGURE 13

Project: Department of General Services - CCC - Greenwood Project Location: Greenwood, California WKA Number: 12313.01P	**LOG OF SOIL BORING D12** Sheet 1 of 1

Date(s) Drilled	**7/24/19**	Logged By	**JRY**	Checked By	**MMW**
Drilling Method	**Solid Flight Auger**	Drilling Contractor	**V&W Drilling**	Total Depth of Drill Hole	**15.0 feet**
Drill Rig Type	**CME 55 HT**	Diameter(s) of Hole, inches	**6"**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**2.0" Modified California with 6-inch sleeve**	Drill Hole Backfill	**Soil Cuttings**
Remarks	**Bulk (0-3")**			Driving Method and Drop	**140lb auto. hammer with 30" drop**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	SAMPLE NUMBER	NUMBER OF BLOWS	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			Light brown to brown, moist, very dense, sandy, SILT (ML)						
					D12-1I	86/9"	12.6	116	CR
			with black mottling, variably cemented		D12-2I	50/6"	12.1	120	
	5								
			light brown to olive brown, with black mottling, medium dense		D12-3I	39			
	10								
			very dense		D12-4I	73			
	15		Boring was terminated at about 15 feet below existing ground surface. Groundwater not observed.						

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)

MAJOR DIVISIONS		USCS[4]	CODE	CHARACTERISTICS
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS[1] (More than 50% of coarse fraction > no. 4 sieve size)	GW		Well-graded gravels or gravel - sand mixtures, trace or no fines
		GP		Poorly graded gravels or gravel - sand mixtures, trace or no fines
		GM		Silty gravels, gravel - sand - silt mixtures, containing little to some fines[2]
		GC		Clayey gravels, gravel - sand - clay mixtures, containing little to some fines[2]
	SANDS[1] (50% or more of coarse fraction < no. 4 sieve size)	SW		Well-graded sands or sand - gravel mixtures, trace or no fines
		SP		Poorly graded sands or sand - gravel mixtures, trace or no fines
		SM		Silty sands, sand - gravel - silt mixtures, containing little to some fines[2]
		SC		Clayey sands, sand - gravel - clay mixtures, containing little to some fines[2]
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML		Inorganic silts, gravely silts, and sandy silts that are non-plastic or with low plasticity
		CL		Inorganic lean clays, gravelly lean clays, sandy lean clays of low to medium plasticity[3]
		OL		Organic silts, organic lean clays, and organic silty clays
	SILTS & CLAYS LL ≥ 50	MH		Inorganic elastic silts, gravelly elastic silts, and sandy elastic silts
		CH		Inorganic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
		OH		Organic fat clays, gravelly fat clays, sandy fat clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT		Peat
ROCK		RX		Rocks, weathered to fresh
FILL		FILL		Artificially placed fill material

OTHER SYMBOLS

= Drive Sample: 2-1/2" O.D. Modified California sampler

= Drive Sampler: no recovery

= SPT Sampler

= Initial Water Level

= Final Water Level

— — — = Estimated or gradational material change line

———— = Observed material change line

Laboratory Tests

CR = Corrosion
PI = Plasticity Index
EI = Expansion Index
UCC = Unconfined Compression Test (TSF)
TR = Triaxial Compression Test
GR = Gradational Analysis (Sieve/Hydro)
FC = Wash (Fines Content)
PP = Pocket Penetrometer Test (TSF)
PID = Photo Ionization Detector Test (PPM)
RV = Resistance ("R") Value

REF = Refusal (>50 blows in 6 inches)

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS (b)	Above 12"	Above 300
COBBLES (c)	12" to 3"	300 to 75
GRAVEL (g) coarse fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	75 to 4.75 75 to 19 19 to 4.75
SAND coarse medium fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.75 to 0.075 4.75 to 2.00 2.00 to 0.425 0.425 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

Trace - Less than 5 percent
Few - 5 to 10 percent
Little - 15 to 25 percent
Some - 35 to 45 percent
Mostly - 50 to 100 percent

* Percents as given in ASTM D2488

NOTES:

1. Coarse grained soils containing 5% to 12% fines, use dual classification symbol (ex. SP-SM).
2. If fines classify as CL-ML (4<PI<7), use dual symbol (ex. SC-SM).
3. Silty Clays, use dual symbol (CL-ML).
4. Borderline soils with uncertain classification list both classifications (ex. CL/ML).

WallaceKuhl & ASSOCIATES

UNIFIED SOIL CLASSIFICATION SYSTEM
DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	15
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

APPENDICES

APPENDIX A
General Project Information, Laboratory Testing and Results

APPENDIX A
WKA No. 12313.01P

A. GENERAL INFORMATION

The performance of a geotechnical engineering study for the proposed residential center to be constructed at 4411 Highway 193 in Greenwood, California, was authorized by Mr. Brandon Rachac on March 27, 2019. Authorization was for an investigation as described in our proposal letter dated December 19, 2018, sent to Mr. Brandon Rachac of Lionakis whose mailing address is 1919 Nineteenth Street in Sacramento, California 95811; telephone (916) 588-1900.

In preparing this report we referenced the *Demolition Large Scale Views - Site* Plan, dated May 13, 2019, prepared by Lionakis.

B. FIELD EXPLORATION

As part of our study for the proposed residential center, our field exploration included the drilling and sampling of 12 borings (D1 through D12) at the approximate locations shown in Figure 2.

The borings were drilled on July 24, 2019, utilizing a CME-55 HT truck-mounted, drill rig equipped with six-inch-diameter, solid flight augers. The borings were drilled to depths ranging from about 4 to 16½ feet below existing site grades. At various intervals soil samples were recovered with a 2½-inch outside diameter (O.D.), 2-inch inside diameter (I.D.), modified California split-spoon sampler. The sampler was driven by an automatic 140-pound hammer freely falling 30 inches. The number of blows of the hammer required to drive the 18-inch-long sampler each 6-inch interval was recorded. The sum of the blows required to drive the sampler the lower 12-inch interval, or portion thereof, is designated the penetration resistance or "blow count" for that particular drive. The modified California samples were retained in 2-inch-diameter by 6-inch-long, thin walled brass tubes contained within the sampler. After recovery, the field representative visually classified the soil recovered in the tubes. After the samples were classified, the ends of the tubes were sealed to preserve the natural moisture contents.

In addition to the drive samples from the borings, representative bulk samples of near-surface soil were collected and retained in plastic bags at the locations, shown in Figure 2. All samples were taken to our laboratory for additional soil classification and selection of samples for testing.

The Logs of Soil Borings containing descriptions of the soils encountered in each boring are presented as Figures 3 through 14. A Legend explaining the Unified Soil Classification System and the symbols used on the logs is contained in Figure 15.

C. LABORATORY TESTING

Selected undisturbed soil samples were tested to determine dry unit weight (ASTM D2937) and natural moisture content (ASTM D2216). The results of these tests are included on the boring logs at the depth each tested sample was obtained.

An representative soil sample was subjected to triaxial compression testing (ASTM D4767) to determine the shear strength of the soil. The result of this test is presented in Figure A1.

Two representative soil samples of the near-surface soils were tested to determine the Atterberg Limits (ASTM D4318). The results of these tests are contained in Figure A2.

Two representative soil samples of the near-surface soils were subjected to an Expansion Index test (ASTM D4829). The results of these tests are presented in Figures A3 and A4.

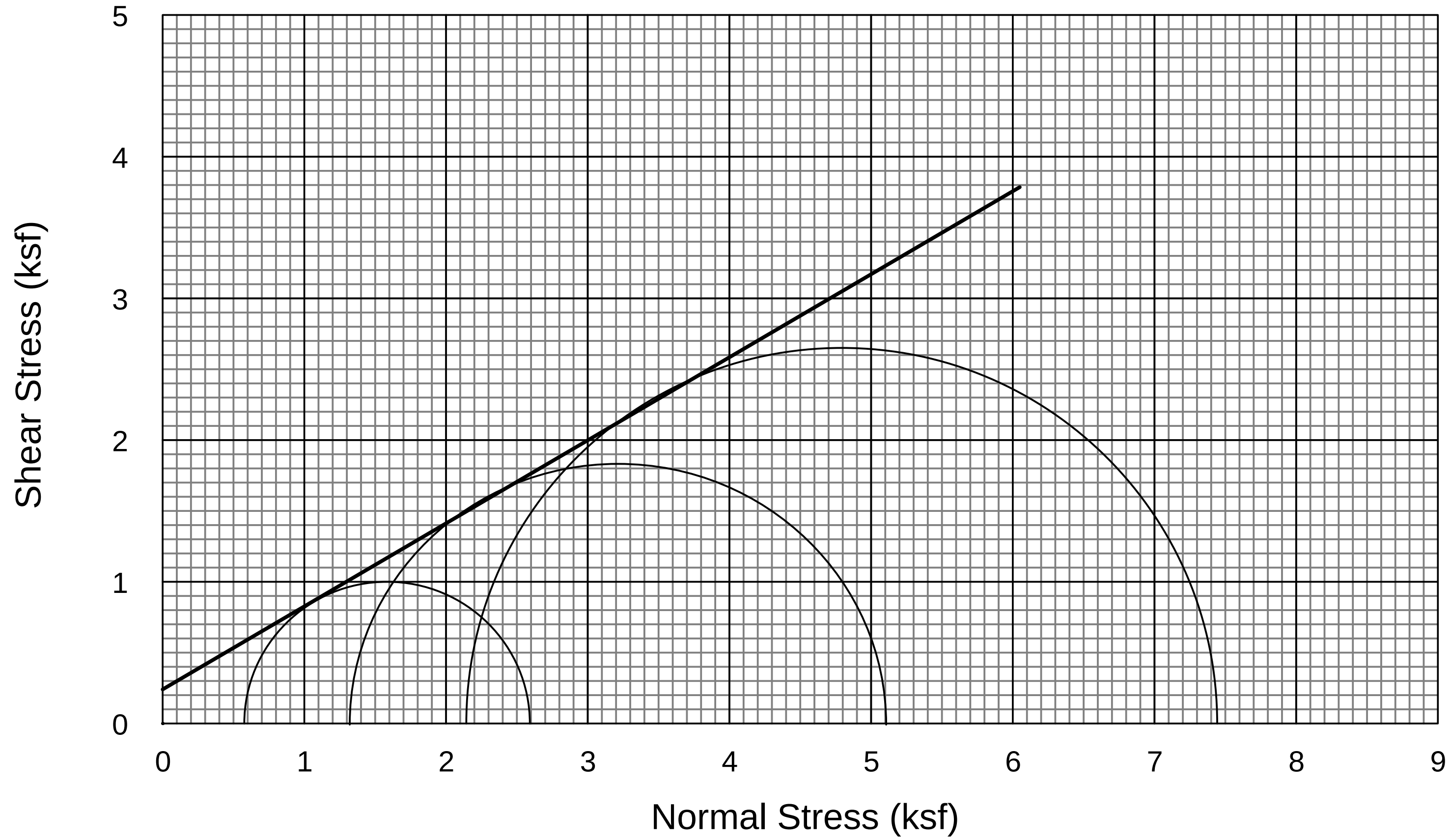
Four bulk samples of near-surface soils were subjected to Resistance-value ("R") testing in accordance with California Test 301. The results of the R-value tests, which were used in the pavement design, are presented in Figures A5 and A6.

Two representative samples of near-surface soil were tested for grain-size distribution via hydrometer analysis (ASTM D7928). The results of these tests are presented in Figure A7.

A sample of representative near-surface soil was submitted to Sunland Analytical to determine the soil pH and minimum resistivity (California Test 643), Sulfate concentration (California Test 417 and ASTM D516) and Chloride concentration (California Test 422). The test results are presented in Figures A8 through A15.

TRIAXIAL COMPRESSION TEST

ASTM D4767



SAMPLE NO. : D3-1I

SAMPLE CONDITION : Undisturbed

SAMPLE DESCRIPTION : Light brown to reddish brown, Silt

DRY DENSITY (PCF) : 103
INITIAL MOISTURE (%) : 9.7
FINAL MOISTURE (%) : 23.8

ANGLE OF INTERNAL FRICTION (ø) : 30.8°
COHESION (PSF) : 252

WallaceKuhl & ASSOCIATES

TRIAXIAL COMPRESSION TEST RESULTS

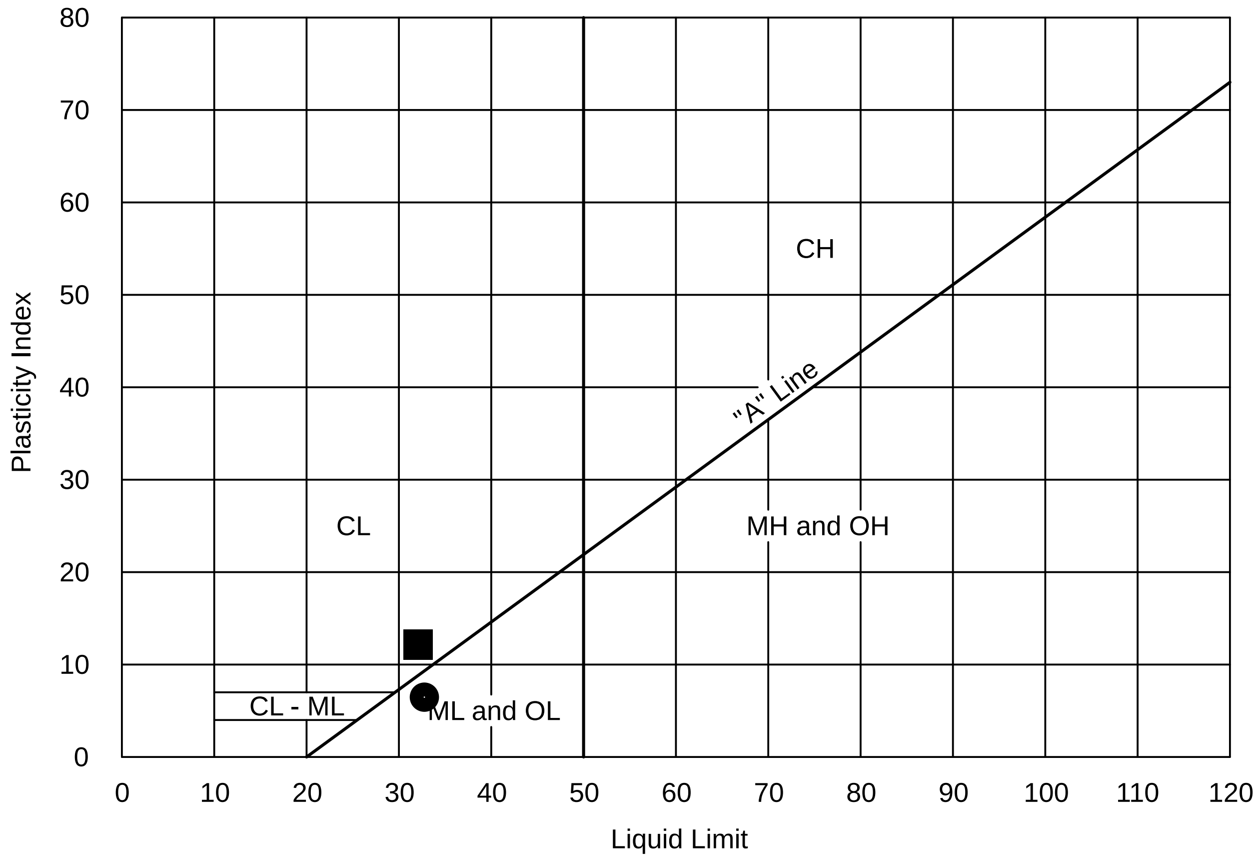
DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD

Greenwood, California

FIGURE	A1
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO	12313.01P

ATTERBERG LIMITS

ASTM D4318



KEY SYMBOL	LOCATION	SAMPLE DEPTH	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	PASSING No. 200 SIEVE (%)	UNIFIED SOIL CLASSIFI-CATION SYMBOL
■	D5-1I	3'-3.5'	---	32	12	---	CL
●	D9-1I	5'-5.5'	---	33	6	---	ML

Wallace Kuhl & ASSOCIATES

ATTERBERG LIMITS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A2
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

EXPANSION INDEX TEST RESULTS

ASTM D4829

MATERIAL DESCRIPTION: Light brown to reddish brown, silty, lean Clay

LOCATION: D5 (0' - 4')

Sample Depth	Pre-Test Moisture (%)	Post-Test Moisture (%)	Dry Density (pcf)	Expansion Index
0' - 4'	10.6	25.9	90	**78**

CLASSIFICATION OF EXPANSIVE SOIL *

EXPANSION INDEX	POTENTIAL EXPANSION
0 - 20	Very Low
21 - 50	Low
51 - 90	**Medium**
91 - 130	High
Above 130	Very High

* From ASTM D4829, Table 1

Wallace Kuhl & ASSOCIATES

EXPANSION INDEX
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A3
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO.	12313.01P

EXPANSION INDEX TEST RESULTS

ASTM D4829

MATERIAL DESCRIPTION: Light brown, Silt

LOCATION: D8 (0' - 3')

Sample Depth	Pre-Test Moisture (%)	Post-Test Moisture (%)	Dry Density (pcf)	Expansion Index
0' - 4'	8.9	22.8	87	**94**

CLASSIFICATION OF EXPANSIVE SOIL *

EXPANSION INDEX	POTENTIAL EXPANSION
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	**High**
Above 130	Very High

* From ASTM D4829, Table 1

Wallace Kuhl & ASSOCIATES

EXPANSION INDEX
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A4
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19

WKA NO. 12313.01P

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Light brown to reddish brown, sandy, Silt

LOCATION: D1 (0-3')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
10	108	18.5	236	119	515	8
11	110	17.6	353	201	870	13
12	110	17.2	427	184	797	14

* Equilibrium R-Value at design Traffic Index of 4.5 = **5**

MATERIAL DESCRIPTION: Light brown to reddish brown, silty, lean Clay

LOCATION: D5 (0-4')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
G	123	13.0	492	140	606	38
I	121	13.6	299	106	459	25
20	119	14.2	229	43	186	11

* Equilibrium R-Value at design Traffic Index of 4.5 = **9**

WallaceKuhl & ASSOCIATES

RESISTANCE VALUE TEST RESULTS

DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD

Greenwood, California

FIGURE	A5
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Light brown, Silt

LOCATION: D8 (0-3')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
10	129	11.1	575	190	823	51
11	128	12.0	404	146	632	40
12	125	12.9	194	96	416	14

* Equilibrium R-Value at design Traffic Index of 4.5 = **5**

MATERIAL DESCRIPTION: Light brown to brown, sandy, Silt

LOCATION: D12 (0-3')

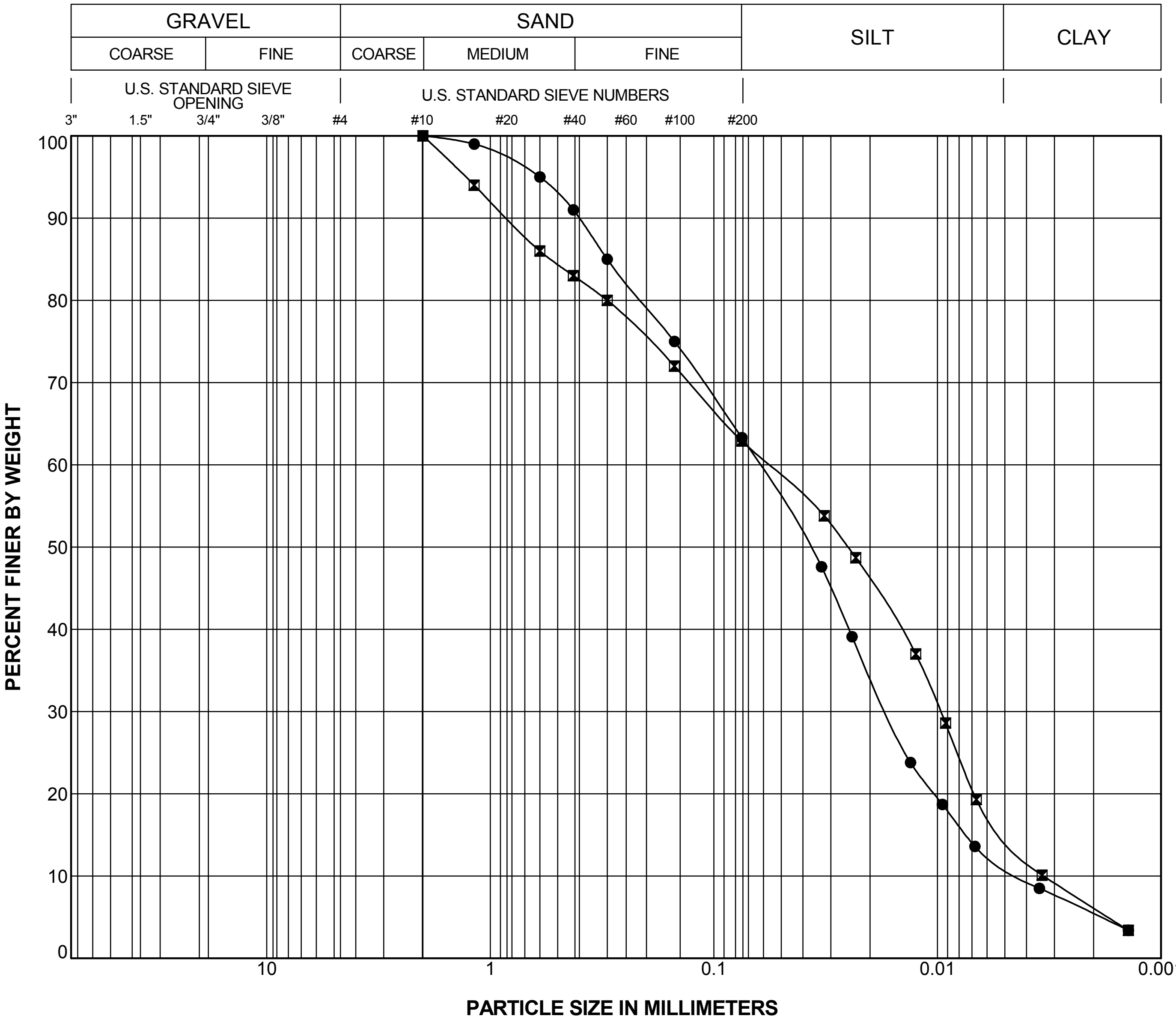
Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
G	126	13.3	703	245	1061	39
I	122	14.1	351	163	706	34
20	120	15.0	244	114	494	29

* Equilibrium R-Value at design Traffic Index of 4.5 = **8**

WallaceKuhl & ASSOCIATES

RESISTANCE VALUE TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A6
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	



Boring Number	Sample Number	USCS	Depth (feet)	Symbol	LL	PI	Classification
D11	D11-1I	ML	2.5-3.0	●			Light brown to brown with black mottling, sandy SILT
D7	D7-1I	ML	2.0-2.5	⊠			Light brown to reddish brown, sandy, SILT

PARTICLE SIZE DISTRIBUTION

Project: Department of General Services - California Conservation Corps - Greenwood
WKA No. 12313.01P

FIGURE A7

Wallace Kuhl & Associates

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D1@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167743.

EVALUATION FOR SOIL CORROSION

Soil pH	6.75		
Minimum Resistivity	2.65 ohm-cm (x1000)		
Chloride	12.3 ppm	00.00123	%
Sulfate	15.9 ppm	00.00159	%

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

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D1@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167744.

Extractable Sulfate in Water

Type of TEST	Result	Units
Sulfate-SO4	15.4	mg/kg

METHODS
ASTM D-516m from sat.paste extract-reported based on dry wt.

WallaceKuhl & ASSOCIATES	**CORROSION TEST RESULTS** DEPARTMENT OF GENERAL SERVICES CALIFORNIA CONSERVATION CORPS - GREENWOOD Greenwood, California	FIGURE A9
		DRAWN BY JBV
		CHECKED BY JRY
		PROJECT MGR MMW
		DATE 09/19
		WKA NO. 12313.01P

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D5@0-4.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167745.

EVALUATION FOR SOIL CORROSION

Soil pH	7.48	
Minimum Resistivity	2.95 ohm-cm (x1000)	
Chloride	2.7 ppm	00.00027 %
Sulfate	1.0 ppm	00.00010 %

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

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A10
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D5@0-4.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167746.

Extractable Sulfate in Water

Type of TEST	Result	Units
Sulfate-SO4	0.9	mg/kg

METHODS
ASTM D-516m from sat.paste extract-reported based on dry wt.

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A11
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D8@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167747.

EVALUATION FOR SOIL CORROSION

Soil pH	6.79		
Minimum Resistivity	5.09	ohm-cm (x1000)	
Chloride	3.7 ppm	00.00037	%
Sulfate	3.5 ppm	00.00035	%

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

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A12
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

Sunland Analytical

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D8@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167748.

Extractable Sulfate in Water

Type of TEST	Result	Units
Sulfate-SO4	3.6	mg/kg

METHODS
ASTM D-516m from sat.paste extract-reported based on dry wt.

CORROSION TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

WallaceKuhl & ASSOCIATES

FIGURE	A13
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D12@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167749.

EVALUATION FOR SOIL CORROSION

Soil pH	6.87	
Minimum Resistivity	3.48 ohm-cm (x1000)	
Chloride	2.0 ppm	00.00020 %
Sulfate	12.5 ppm	00.00125 %

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

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS
DEPARTMENT OF GENERAL SERVICES CALIFORNIA
CONSERVATION CORPS - GREENWOOD
Greenwood, California

FIGURE	A14
DRAWN BY	JBV
CHECKED BY	JRY
PROJECT MGR	MMW
DATE	09/19
WKA NO. 12313.01P	

Sunland Analytical

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

Date Reported 08/07/2019
Date Submitted 08/02/2019

To: Joey Ybarra
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

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

The reported analysis was requested for the following location:
Location : 12313.01P Site ID : D12@0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 80270-167750.

Extractable Sulfate in Water

Type of TEST	Result	Units
Sulfate-SO4	11.0	mg/kg

METHODS
ASTM D-516m from sat.paste extract-reported based on dry wt.

APPENDIX B
Guide Earthwork Specifications

APPENDIX B

GUIDE EARTHWORK SPECIFICATIONS

DEPARTMENT OF GENERAL SERVICES

CALIFORNIA CONSERVATION CORPS – GREENWOOD

WKA No. 12313.01P

PART 1: GENERAL

1.1 SCOPE

A. General Description

This item shall include clearing of all surface and subsurface structures, if encountered, surface debris, bushes and associated items; preparation of surfaces to be filled, filling, spreading, compaction, observation and testing of the fill; and all subsidiary work necessary to complete the grading to conform with the lines, grades and slopes as shown on the accepted Drawings.

B. Related Work Specified Elsewhere

1. Trenching and backfilling for sanitary sewer system: Section ______.
2. Trenching and backfilling for storm drain system: Section ______.
3. Trenching and backfilling for underground water, natural gas, and electric supplies: Section ______.

C. Geotechnical Engineer

Where specific reference is made to "Geotechnical Engineer" this designation shall be understood to include either him or his representative.

1.2 PROTECTION

A. Adequate protection measures shall be provided to protect workers and passers-by at the site. Streets and adjacent property shall be fully protected throughout the operations.

B. In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal working hours.

C. Any construction review of the Contractor's performance conducted by the Geotechnical Engineer is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site.

D. Adjacent streets and sidewalks shall be kept free of mud, dirt or similar nuisances resulting from earthwork operations.

E. Surface drainage provisions shall be made during the period of construction in a manner to avoid creating a nuisance to adjacent areas.

F. The site and adjacent influenced areas shall be watered as required to suppress dust nuisance.

1.3 GEOTECHNICAL REPORT

A. A Geotechnical Engineering Report (WKA No. 12313.01P; dated September 10, 2019) has been prepared for this site by Wallace - Kuhl & Associates, Geotechnical Engineers of West Sacramento, California; telephone (916) 372-1434. A copy is available for review at the office of Wallace - Kuhl & Associates.

B. The information contained in this report was obtained for design purposes only. The Contractor is responsible for any conclusions they may draw from this report. Should the Contractor prefer not to assume such risk, they shall employ their own experts to analyze available information and/or to make additional borings upon which to base their conclusions, all at no cost to the Owner.

1.4 EXISTING SITE CONDITIONS

The Contractor shall be acquainted with all site conditions. If unshown active utilities are encountered during the work, the Architect shall be promptly notified for instructions. Failure to notify will make the Contractor liable for damage to these utilities arising from Contractor's operations subsequent to the discovery of such unshown utilities.

1.5 SEASONAL LIMITS

Fill material shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until field tests indicate that the moisture contents of the subgrade and fill materials are satisfactory.

PART 2: PRODUCTS

2.1 MATERIALS

A. On-site soils will be suitable for engineered fill construction in structural areas provided these materials do not contain rubbish, rubble greater than three inches (3"), and significant organic concentrations. Imported fill materials, if required, shall be similar to but less expansive than native soils, and shall not contain particles greater than three inches (3”) in maximum dimension. Imported soils shall be approved by our office prior to being transported to the site. Also, if import fills are required (other than aggregate base), the contractor shall provide appropriate documentation that the import is clean of known contamination and within acceptable corrosion limits.

B. Capillary barrier material under floor slabs shall be provided to the thickness shown on the Drawings. This material shall be clean gravel or crushed rock of one-inch (1") maximum size, with no material passing a Number four (#4) sieve.

C. Asphalt concrete, aggregate base, aggregate subbase, and other paving products shall comply with the appropriate provisions of the *State of California (Caltrans) Standard Specifications* and El Dorado County’s *Development Standards and Design Guidelines*, latest editions.

PART 3: EXECUTION

3.1 LAYOUT AND PREPARATION

Lay out all work, establish grades, locate existing underground utilities, set markers and stakes, set up and maintain barricades and protection of utilities--all prior to beginning actual earthwork operations.

3.2 CLEARING, GRUBBING AND PREPARING BUILDING PADS AND PAVEMENT AREAS

A. The site shall be cleared of existing structures designated for removal, including but not limited to, asphalt concrete, concrete slabs, and any utilities to be relocated or abandoned. Excavations resulting from removal of the above items, as well as any loose, soft or saturated soils shall be cleaned out to firm native soil and backfilled with engineered fill in accordance with the recommendations in this report.

B. Following site clearing, the exposed soils, as well as other areas outside of the building to receive fill or to remain at-grade, and for a distance of five feet (5’) beyond the building perimeter, shall be thoroughly ripped and cross-ripped to a depth of at least twelve inches (12”). This applies to the subgrades to receive fill, left at-grade or achieved by excavation. Deeper scarification may be needed based on the exposed soil conditions. The processed soil shall then be uniformly moisture conditioned to at least two percent (2%) above the optimum moisture content and uniformly compacted to ninety percent (90%) the ASTM D1557 maximum dry density.

C. Compaction of the existing grade must be performed in the presence of our representative who will evaluate the performance of the subgrade under compactive loads and identify any loose or unstable soil conditions that could require additional excavation. Compaction shall be achieved using a heavy, self-propelled, sheepsfoot compactor.

D. Horizontal and vertical control of the limits of over-excavation, scarification and compaction shall be responsibility of the Contractor and/or Project Civil Engineer.

E. The Contractors bid shall include a cost per cubic yard for removal of unsuitable materials from building or pavement areas, and replacement with engineered fill as required.

3.3 PLACING, SPREADING AND COMPACTING FILL MATERIAL

A. Engineered fill composed of native or imported materials shall be placed in horizontal lifts not exceeding six inches (6”) in compacted thickness. Each layer shall be uniformly moisture conditioned to at least two percent (2%) above the optimum moisture content for clayey soils and optimum for granular soils; and uniformly compacted to at least ninety percent (90%) of the ASTM D1557 maximum dry density.

B. Fill placed on slopes steeper than four horizontal to one vertical (4H:1V) shall be keyed into the natural ground at the toe. The key shall be at least five feet (5’) wide, shall be excavated into undisturbed soil to a depth of at least two feet (2’) as verified by the Geotechnical Engineer. The keyway shall be sloped into the hillside.

C. When the moisture content of the fill material is below that required to achieve the specified density, water shall be added until the proper moisture content is achieved. Soils shall be thoroughly moisture conditioned to at least the optimum moisture content.

D. When the moisture content of the fill material is too high to permit the specified degree of compaction to be achieved, the fill material shall be aerated by blading or other methods until the moisture content is satisfactory.

E. The filling operations shall be continued until the fills have been brought to the finished slopes and grades as shown on the accepted Drawings.

3.4 FINAL SUBGRADE PREPARATION

A. The upper twelve inches (12”) of final building pad subgrades shall be thoroughly moisture conditioned to at least two percent (2%) above the optimum moisture content and uniformly compacted to at least ninety percent (90%) percent of the maximum dry density, regardless of whether final grade is left at the existing grade or is completed by excavation or filling.

B. The upper six inches (6”) of pavement subgrade soils should be compacted to at least ninety-five percent (95%) relative compaction at no less than the optimum moisture content, regardless of whether final subgrade is completed by excavation, filling, or left at existing grade. Final subgrade preparation and compaction shall be performed just prior to placement of aggregate base, after underground construction is complete.

3.5 TESTING AND OBSERVATION

A. Grading operations shall be observed by the Geotechnical Engineer, serving as the representative of the Owner.

B. Field density tests shall be made by the Geotechnical Engineer after compaction of each layer of fill. Additional layers of fill shall not be spread until the field density tests indicate that the minimum specified density has been obtained.

C. Earthwork shall not be performed without the notification or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least two (2) working days prior to commencement of any aspect of the site earthwork.

D. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, the Contractor shall make the necessary readjustments until all work is deemed satisfactory, as determined by the Geotechnical Engineer and the Architect/Engineer. No deviation from the specifications shall be made except upon written approval of the Geotechnical Engineer or Architect/Engineer.

//

APPENDIX C
Naturally Occurring Asbestos Test Results

Wallace Kuhl
3050 Industrial Blvd.
West Sacramento, CA 95691
Tel: 916.372.1434
Fax: 916.372.2565

Lab No. 19H0028

Chain-of-Custody Record and Analysis Request

WKA Carbon Copy addresses
jybarra@wallace-kuhl.com

California EDF Report? ☐ Yes ☒ No

Project Manager (Hardcopy or PDF To): Derek Bays
WKA Email Address:

Company / Address: see above

Recommended but not mandatory to complete this section:
Sampling Company Log Code:
Global ID:
EDF Deliverable To (Email Address):

Phone No.:	Fax No.:
see above	see above

Project Number:	P.O. No.:
12313.01P	

Project Name: DGS GREENWOOD CCC
Sampler Signature:
Project Address:

Sample Designation	Sampling Date	Sampling Time	Container: Poly Sleeve	250-mL Poly*	4-oz Glass Jar	500ml POLY	~~AMBER~~ BAGGY	Preservative: HNO3	H2SO4	ICE		Matrix: WATER	SOIL	Rock	Analysis Request: Asbestos by CARB 435	TAT	For Lab Use Only
DS @ 10'	7/24/19	1:05 pm					X							X	X		

TAT: ○ 12Hr ○ 24 Hr ○ 48Hr ○ 72 Hr ◉ 1 WK ○ 2WK

Relinquished by:	Date	Time	Received by:
[signature]	8/1/19	1412	
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:
			[signature] 8/1/19 1412

Remarks:

Bill to: Wallace-Kuhl & Associates c/o
WKA Contact and swilliams@wallace-kuhl.com

EMSL Analytical, Inc.

464 McCormick Street San Leandro, CA 94577

Phone/Fax: (510) 895-3675 / (510) 895-3680

http://www.EMSL.com / sanleandrolab@emsl.com

EMSL Order: 091918201
Customer ID: CALI52
Customer PO: 19H0028
Project ID:

Attention: Mark Smith
California Laboratory Services
3249 Fitzgerald Road
Rancho Cordova, CA 95742

Phone: (916) 638-7301
Fax: (916) 638-4510
Received: 08/02/2019 11:15 AM
Analysis Date: 08/08/2019
Collected: 07/24/2019

Project: 19H0028

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
19H0028-01 *091918201-0001*	D5 @ 10'	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	**<0.25% Chrysotile**

Analyst(s)

Adam C. Fink (1)

Matthew Batongbacal
or other approved signatory

Initial report from: 08/09/2019 00:42:02

OrderID: 091918201

SUBCONTRACT ORDER

19H0028

№ 091918201

SENDING LABORATORY:

CLS Labs
3249 Fitzgerald Rd.
Rancho Cordova, CA 95742
Phone: 916-638-7301
Fax: 916-638-4510
Project Manager: Mark Smith
[redacted]

RECEIVING LABORATORY:

EMSL Analytical
464 McCormick Street
San Leandro, CA 94577
Phone :(510) 895-3675
Fax: (510) 895-3680

RUSH

Analysis	TAT	Due	Expires	Laboratory ID	Sample Date	Received	Matrix
Asbestos-Soil SUB	5	08/09/19 12:00	01/20/20 13:05	19H0028-01	07/24/19 13:05	08/01/19 14:12	[redacted] ROCK

Client sample ID: D5 @ 10'
Laboratory sample ID: 19H0028-01
Please use client sample ID on all reports

[redacted]
CARB 435A

Containers Supplied:
Plastic Baggie (A)

Relinquished By	Date	Received By	Date
GK	8.2.19		8/2/19 0710
	8/2/19 NOON	Chr Cam	8/2/19 11:15

Shipped By: CLS
Airbill Number

Page 1 of 1

Subcontract Sample Receipt Checklist

№ 0 9 1 9 1 8 2 0 1

CLS Work Order Number: 19H0028

Chain of Custody (COC) Information

Carrier Name CLS	Yes	☐	☐	No
Chain of custody present?	Yes	☐	☐	No
Chain of custody signed when relinquished and received?	Yes	☐	☐	No
Chain of custody agrees with sample labels?	Yes	☐	☐	Non-Compliant

Sample Receipt Information

Shipping container/cooler in good condition?	Yes	☐	☐	No	Not Present	☐
Samples in proper container/bottle?	Yes	☐	☐	Non-Compliant		
Sample containers intact?	Yes	☐	☐	No		
Sufficient sample volume for indicated test?	Yes	☐	☐	No		

Sample Preservation and Hold Time (HT) Information

All samples received within holding time?	Yes	☐	☐	No
Temperature upon receipt: ________ C				
Wet Ice present in Cooler?	Yes	☐	☐	No
Blue Ice present in Cooler?	Yes	☐	☐	No

Analytical Requirement Information

Are non-Standard of Modified methods requested?	Yes	☐	☐	No
Subcontract Lab CERTIFIED for the various methods requested?	Yes	☐	☐	No
Will Subcontract Lab be able to meet the turn-around time (TAT) requirements?	Yes	☐	☐	No

Subcontract Lab Information

Work Order Number assigned by Subcontract Lab ____________________

Date received at Subcontract Lab ____________________

If any items are check marked NO or are non-compliant, a phone call back to California Laboratory Services is required immediately. If all items are acceptable, a faxed copy of the signed sub chain of custody (COC) and the completed sample receipt check list is required within 24 hours of sample receipt.