GEOTECHNICAL INVESTIGATION
PROPOSED CULTIVATION FACILITY
PARKING LOT AND GUARD HOUSE
APN'S 432-130-002, 008 & 009
SAN JACINTO, CALIFORNIA

-Prepared By-

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April 30, 2019
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Project No. 644-19012
19-04-030

Innovative Cultivation Group
26400 La Alameda, Suite 100
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Subject: Geotechnical Investigation

Project: Proposed Cultivation Facility
Parking Lot and Guard House
APN's 432-130-02, 008 & 009
San Jacinto, California

Sladden Engineering is pleased to present the results of the geotechnical investigation performed for the cultivation facility buildings, parking lot and guard house proposed for the project site (APN's 432-130-02, 008 & 009) located on the west side of North Sanderson Avenue north of Cottonwood Avenue in the City of San Jacinto, California. Our services were completed in accordance with our revised proposal for geotechnical engineering services dated August 3, 2018 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site in order to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out through construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the future cultivation facility parking lot and guard house proposed for the property located on the west side of North Sanderson Avenue (APN's 432-130-002, 008 & 009) in the City of San Jacinto, California. The site is located at approximately 33.7932 degrees north latitude and 117.0079 degrees west longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).

Our investigation was conducted in order to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity at and near the subject site.

PROJECT DESCRIPTION

Based on the provided site plan (Herron Rumansoff, 2019), it is our understanding that the project will consist of constructing a new parking lot and guard house for the proposed cultivation facility. Sladden anticipates that the proposed project will also include concrete flatwork, landscaped areas and various associated site improvements. For our analyses we expect that any new proposed structures will consist of relatively lightweight wood-frame or steel-frame structures supported on conventional shallow spread footings and concrete slabs on grade.

Sladden anticipates that grading will be limited to minor cuts and fills in order to accomplish the desired elevations and provide adequate gradients for site drainage. This does not include the removal and re-compaction of the primary foundation bearing soil within the building envelope. Upon completion of precise grading plans, Sladden should be retained in order to ensure that the recommendations presented within in this report are incorporated into the design of the proposed project

Structural foundation loads for any new structures were not available at the time of production of this report. Based on our experience with relatively lightweight commercial structures, we expect that isolated column loads will be less than 30 kips and continuous wall loads will be less than 3.0 kips per linear foot. If these assumed loads vary significantly from the actual loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near surface soil in order to develop foundation design criteria and recommendations for site preparation. Exploration of the site was achieved by drilling three (3) exploratory boreholes to depths of approximately 21 and 51 feet below the existing ground surface (bgs). Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- Advancing three (3) exploratory boreholes to depths of approximately 21 and 51 feet bgs in order to characterize the subsurface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- Performing laboratory testing on selected samples to evaluate their engineering characteristics.
- Reviewing geologic literature and evaluating potential geologic hazards.
- Performing engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The project site (APN's 432-130-002, 008 & 009) is located on the west side of North Sanderson Avenue north of Cottonwood Avenue in the City of San Jacinto, California. At the time of our investigation, the site was vacant and utilized for agricultural purposes. The site is bounded by an Eastern Municipal Water District (EMWD) wastewater treatment facility to the north, Cottonwood Avenue to the south, agricultural property to the west and by North Sanderson Avenue to the east.

The project site is relatively level with minimal surface gradients. According to the USGS 7.5' Lakeview Quadrangle map (2012), the site is at an approximate elevation of 1500 feet above mean sea level (MSL).

No natural ponding of water or surface seeps were observed at or near the site during our investigation conducted on April 2, 2019. Site drainage appears to be controlled via sheet flow and surface infiltration.

GEOLOGIC SETTING

The project site is located in the Peninsular Ranges Physiographic Province of California. The Peninsular Ranges are mountainous areas that extend from the western edge of the continental borderland to the Salton Trough and from the Transverse Ranges Physiographic Province in the north to the tip of Baja California in the south. The Peninsular Ranges Physiographic Province is characterized by northwest-trending topographic and structural features. The province is characterized by elongated, northwest-southeast trending mountain ranges and valleys and is truncated at its northern margin by the east-west grain of the Transverse Ranges. Mountainous areas of the Peninsular Ranges Physiographic Province generally consist of Igneous, metasedimentary and metavolcanic rocks. However, plutonic rocks of the Southern California Batholith are the dominant basement rock exposed (Jahns, 1954).

The site is situated within a Perris structural block of the northern Peninsular Ranges batholith. Generally, the Perris structural block is a northwest-southeast trending fault bound block bounded by the San Jacinto Fault Zone to the northeast and the Elsinore and Whittier Fault Zones to the southwest.

The site has been mapped by Dibblee (2003) to be immediately underlain by Quaternary-age alluvial sand and clay (Qa). The geologic setting for the site and site vicinity is illustrated on the Regional Geologic Map, Figure 2.

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling three (3) exploratory boreholes throughout the project site to depths between 21 and 51 feet below the existing ground surface (bgs). The approximate locations of the boreholes are illustrated on the Borehole Location Plan (Figure 3). The boreholes were advanced using a Mobile B-61 drill rig equipped with 8-inch outside diameter hollow-stem augers. A representative of Sladden was present to log the materials encountered and retrieve samples for laboratory testing and engineering analysis.

During our field investigation a thin mantle of fill/disturbed soil was encountered to a depth of less than approximately three (3) feet below existing grade in the area of our bores. Underlying the fill soil and extending to the maximum depth explored, native alluvium was encountered. The site soil consists primarily of sandy silt (ML) and silty sand (SM) with minor portions of clayey sand (SC) and sand (SP). Generally, the native earth materials appeared grayish brown, moist to very moist, fine-grained with soil densities generally increasing with depth. Cohesive sediments exhibited low to medium plasticity characteristics.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual and variable across the site.

Groundwater was not encountered to a maximum explored depth of 51.0 feet bgs during our field investigation. Based on groundwater depths reported in the vicinity (CDWR, 2019), it is our opinion that groundwater should not be a factor during construction of the proposed project.

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest trending dextral faults. The faults of the region are often part of complex fault systems, composed of numerous subparallel faults which splay or step from main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

We consider the most significant geologic hazard to the project to be the potential for moderate to strong seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well defined fault" that has exhibited surface displacement within the Holocene epoch (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

As previously stated, the site has been subjected to strong seismic shaking related to active faults that traverse through the region. Some of the more significant seismic events near the subject site within recent times include: M6.0 North Palm Springs (1986), M6.1 Joshua Tree (1992), M7.3 Landers (1992), M6.2 Big Bear (1992) and M7.1 Hector Mine (1999).

The project site is situated within a State of California Designated Fault Zone (Figure 4). Table 1 lists the closest known potentially active faults that was generated in part using the EQFAULT computer program (Blake, 2000), as modified using the fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any of the other faults in the region.

TABLE 1
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
San Jacinto – San Jacinto Valley	0.0*	6.9
San Jacinto – Anza	10.3	7.2
San Andreas – Southern	27.3	7.5
San Andreas – San Bernardino	27.3	7.5
Elsinore – Temecula	32.7	6.8
San Jacinto – San Bernardino	33.8	6.7
Elsinore – Glen Ivy	35.6	6.8
Pinto Mountain	39.5	7.2
Elsinore – Julian	46.3	7.1

* The project site is situated within the San Jacinto fault zone.

2016 CBC SEISMIC DESIGN PARAMETERS

Sladden has reviewed the 2016 California Building Code (CBC) and summarized the current seismic design parameters for the proposed structures. The seismic design category for a structure may be determined in accordance with Section 1613 of the 2016 CBC or ASCE7. According to the 2016 CBC, Site Class D may be used to estimate design seismic loading for the proposed structure. The 2016 CBC Seismic Design Parameters are summarized below. The project Design Map Reports are included within Appendix C (SEAC, 2019).

Risk Category (Table 1.5-1): II
Site Class (Table 1613.3.2): D
S_s (Figure 1613.3.1): 2.467g
S_1 (Figure 1613.3.1): 1.074g
F_a (Table 1613.3.3(1)): 1.0
F_v (Table 1613.5.3(2)): 1.5
S_{ms} (Equation 16-37 {F_a X S_s}): 2.467g
S_{m1} (Equation 16-38 {F_v X S_1}): 1.612g
S_{DS} (Equation 16-39 {2/3 X S_{ms}}): 1.645g
S_{D1} (Equation 16-40 {2/3 X S_{m1}}): 1.074g
Seismic Design Category: E

GEOLOGIC HAZARDS

The subject site is located in an active seismic zone and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including: the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on our review of Dibblee (2003), Jennings (1994), CDMG (1988) and RCPR (2019), the project site is situated within a State of California Designated Fault Zone (Figure 4).

Previous subsurface exploration by Converse Consultants (2004) identified active faulting within three (3) of five (5) exploratory trenches. Converse provided setback recommendations from the identified fault traces. The County of Riverside Building and Safety Department reviewed and approved Converse Consultants report after County of Riverside comments were addressed (2006). Based on the project site being situated within a State of California designated fault zone, is our opinion that risks associated with primary surface ground rupture should be considered "high". All structures intended for habitable use should be located outside of established restricted use zones.

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region and the subject site. Strong seismic shaking from active faults is expected to produce strong seismic shaking during the design life of the proposed project. A probabilistic approach was employed to the estimate the peak ground acceleration (a_{max}) that could be experienced at the site. Based on the USGS Unified Hazard Tool (USGS, 2018) and shear wave velocity (Vs30) of 259 m/s, the site could be subjected to ground motions on the order of 0.615g. The peak ground acceleration at the site is judged to have a 475 year return period and a 10 percent chance of exceedance in 50 years.

III. Liquefaction. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply: liquefaction-susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking. Based on the depth to groundwater in the site vicinity (CDWR, 2019), risks associated with liquefaction are considered negligible.

IV. Tsunamis and Seiches. Because the site is situated at an elevated inland location and is not immediately adjacent to any impounded bodies of water, risk associated with tsunamis and seiches is considered negligible.

V. Slope Failure, Landsliding, Rock Falls. The site is located on relatively flat ground and not immediately adjacent to any slopes or hillsides. Therefore, it is our professional opinion that risks associated with slope instability should be considered "negligible".

VI. Expansive Soil. Generally, the surface soil consists of sandy silt (ML) overlying silty sand. Based on the results of our laboratory testing (EI=33), the sandy silt materials are considered to have a "low" expansion potential. Because the recommended remedial grading will result in significant mixing of the surface soil, the expansion potential should be re-evaluated after grading. Final foundation and slab design should be based on "post-grading" expansion test results.

VII. Static Settlement. Static settlement resulting from the anticipated foundation loads should be minimal provided that the recommendations included in this report are considered in foundation design and construction. The estimated ultimate static settlement is calculated to be approximately 1 inch when using the recommended bearing pressures. As a practical matter, differential static settlement between footings can be assumed as one-half of the total settlement.

VIII. Subsidence. Land subsidence can occur in valleys where aquifer systems have been subjected to extensive groundwater pumping, such that groundwater pumping exceeds groundwater recharge. Generally, pore water reduction can result in a rearrangement of skeletal grains and could result in elastic (recoverable) or inelastic (unrecoverable) deformation of an aquifer system.

According to the County of Riverside (RCPR, 2019), the site is situated in a "Active" Subsidence zone. No fissures or other surficial evidence of subsidence were observed at or near the subject site.

IX. Debris Flows. Debris flows are viscous flows consisting of poorly sorted mixtures of sediment and water and are generally initiated on slopes steeper than approximately six horizontal to one vertical (6H:1V) (Boggs, 2001). Based on the flat nature of the site and the composition of the surface soil, we judge that risks associated with debris flows should be considered remote.

X. Flooding and Erosion. Soil erosion was observed on the south side of the existing building during our field investigation. However, risks associated with flooding and erosion should be evaluated and mitigated by the project design Civil Engineer.

CONCLUSIONS

Based on the results of our geotechnical investigation, it is our opinion that the project should be feasible from a geotechnical perspective provided that fault setbacks previously determined by Converse Consultants and the recommendations provided in this report are incorporated into design and carried out through construction. The main geotechnical concerns are the proximity to the San Jacinto fault zone and the presence of loose and compressible near surface soil.

The near-surface soil is considered loose, potentially compressible and not suitable for support of shallow foundations or concrete slabs in the existing condition. Due to the loose and potentially compressible condition of the near-surface soil, we recommend that remedial grading within the proposed building areas include the over-excavation and re-compaction of the primary foundation bearing soil. Specific recommendations for site preparation are presented in the Earthwork and Grading section of this report.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. On the basis of our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type C. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

The following recommendations present more detailed design criteria that have been developed on the basis of our field and laboratory investigation.

EARTHWORK AND GRADING

All earthwork including excavation, backfill and preparation of the subgrade soil, should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earthwork should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing and geotechnical engineering analyses.

a. Stripping. Areas to be graded should be cleared of any existing fill soil, vegetation, associated root systems, and debris. All areas scheduled to receive fill should be cleared of any unsuitable matter. The strippings should be removed off site. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of New Building Areas: In order to provide for firm and uniform foundation bearing conditions, the primary bearing soil should be over-excavated and re-compacted. Over-excavation should extend to a minimum depth of 3 feet below existing grade or 3 feet below the bottom of the footings, whichever is deeper. Once adequate removals have been verified, the exposed native soil should be scarified, moisture-conditioned and compacted to a minimum of 90 percent relative compaction. The previously removed soil may then be replaced as engineered fill soil in accordance with the recommendations below.

c. Fill Placement and Compaction: Soil to be used as engineered fill should be free of organic material, debris, and other deleterious substances, and should not contain irreducible matter greater than three inches in maximum dimension. All fill materials should be placed in thin lifts, not exceeding six inches in a loose condition. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	3 inches

The subgrade and all fills should be compacted with acceptable compaction equipment, to at least 90 percent relative compaction. The bottom of the exposed subgrade should be observed by a representative of Sladden Engineering prior to fill placement. Compaction testing should be performed on all lifts in order to ensure proper placement of the fill materials. Table 3 provides a summary of the excavation and compaction recommendations.

Table 2
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Over-excavation and re-compaction within the building envelope and extending laterally for 5 feet beyond the building limits and to a minimum of 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in the loose condition and compact to a minimum of 90 percent relative compaction within 2 percent of the optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

d. Shrinkage and Subsidence. Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage should be between 10 and 20 percent. Subsidence of the surfaces that are scarified and compacted should be between 1 tenth and 2 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained.

CONVENTIONAL SHALLOW SPREAD FOOTINGS

Conventional spread footings are expected to provide adequate support for the proposed structure. All footings should be founded upon properly compacted engineered fill and should have a minimum embedment depth of 12 inches measured from the lowest adjacent finished grade for single-story structures and 18 inches below lowest adjacent grade for 2-story structures. Continuous and isolated pad footings should have minimum widths of 12 inches and 24 inches, respectively. Continuous and isolated footings supported upon properly compacted engineered fill soil may be designed using allowable (net) bearing pressures of 1800 and 2000 pounds per square foot (psf), respectively. Allowable increases of 250 psf for each additional 1 foot in width and 250 psf for each additional 6 inches in depth may be utilized, if desired. The maximum allowable bearing pressure should be 2500 psf. The allowable bearing pressure applies to combined dead and sustained live loads. The allowable bearing pressures may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the recommended allowable bearing pressures, the total static settlement of the shallow footings is anticipated to be less than one-inch, provided foundation preparations conform to the recommendations described in this report. Differential static settlement is anticipated to be approximately one-half of the total settlement for similarly loaded footings spaced up to approximately 50 feet apart.

Lateral load resistance for the spread footings will be developed by passive pressure against the sides of the footings below grade and by friction acting at the base of the footings. An allowable passive pressure of 250 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.40 may be used for dead and sustained live loads to compute the frictional resistance of the footing placed directly on compacted fill. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork. All footings should be reinforced in accordance with the project Structural Engineer's recommendations.

SLABS-ON-GRADE

In order to provide uniform and adequate support for any new structures, concrete slabs-on-grade must be placed on properly compacted engineered fill as outlined in the previous sections of this report. The slab subgrade should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. Slab subgrade should be firm and unyielding. Disturbed soil should be removed and replaced with engineered fill soil compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer based upon "post grading" expansion test results. We recommend a minimum slab thickness of 5.0 inches and a minimum reinforcement consisting of #4 bars at 24 inches on center in each direction. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height.

Slabs with moisture sensitive surfaces should be underlain with a moisture vapor retarder consisting of a polyvinyl chloride membrane such as 10-mil visqueen, or equivalent. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a 1-inch thick leveling course of sand across the pad surface prior to placement of the membrane.

PRELIMINARY PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with Topic 610 of the Caltrans Highway Design Manual based on R-Value and Traffic Index. On-site soil and any imported soil should be tested for R-Value prior to establishing final pavement design sections.

For preliminary pavement design, an assumed R-Value of 40 and Traffic Indices (TI) of 4.5 and 6.0 were used for the light duty and heavy duty pavements, respectively. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). Final pavement sections should be based on R-Value testing of the subgrade soil performed after grading. The preliminary flexible pavement layer thickness is as follows:

RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS		
Pavement Material	**Recommended Thickness**	
	TI=5.0	**TI=6.5**
Asphalt Concrete Surface Course	3.0 inches	4.0 inches
Class II Aggregate Base Course	6.0 inches	8.0 inches
Compacted Subgrade Soil	12 inches	12 inches

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction (Caltrans or Greenbook). Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook, latest edition. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 220 parts per million (ppm). The soil is considered to have a "negligible" corrosion potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes may be necessary.

The pH level of the surface soil was 9.1. Based on soluble chloride concentration testing (180 ppm) the soil is considered to have a "low" corrosion potential with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 900 ohm-cm, which suggests that the site soil is considered to have a "severe" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures for corrosion sensitive installations.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum relative compaction of 90 percent. Trench backfill materials should be placed in lifts no greater than six inches in a loose condition, moisture conditioned (or air-dried) as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project soil engineer should test the backfill to verify adequate compaction.

EXTERIOR CONCRETE FLATWORK

To minimize cracking of concrete flatwork, the subgrade soil below concrete flatwork areas should first be compacted to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soil prior to concrete placement.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. In order to reduce water infiltration into the subgrade soil, surface water should be directed away from building foundations to an adequate discharge point. Subgrade drainage should be evaluated upon completion of the precise grading plans and in the field during grading.

LIMITATIONS

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between the exploratory bore locations and extrapolation of these conditions throughout the proposed building areas. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by use prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or penetrate into the recommended soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for engineered fil soil and 95 percent for Class II aggregate base as obtained by ASTM Test Method D1557. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

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United States Geological Survey (USGS), 2019, Unified Hazard Tool; available at: https://geohazards.usgs.gov/hazards/interactive/

FIGURES

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
BOREHOLE LOCATION PLAN
FAULT ZONE MAP

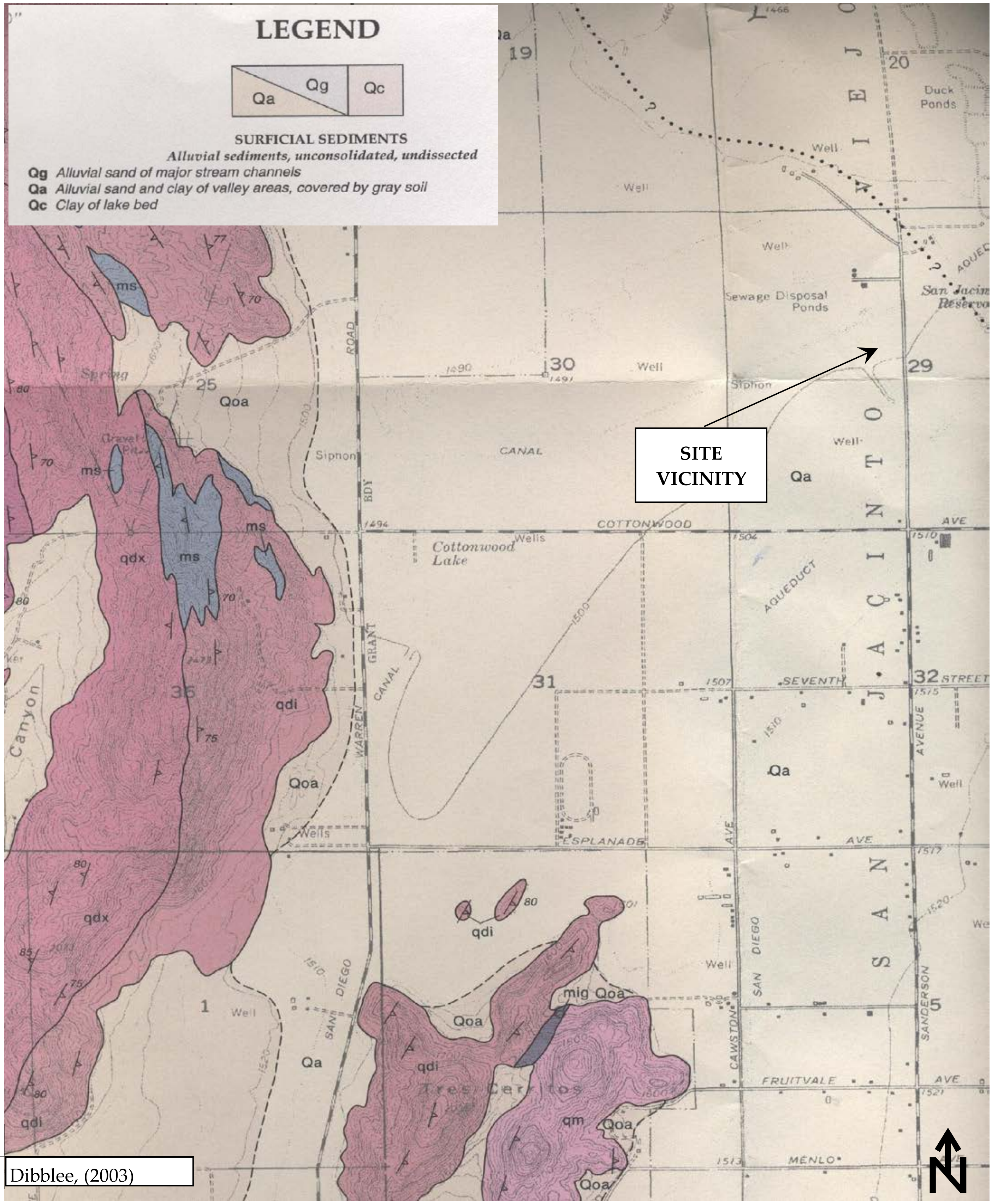
Sladden Engineering

SITE LOCATION MAP

Project Number:	644-19012
Report Number:	19-04-030
Date:	April 30, 2019

FIGURE

1



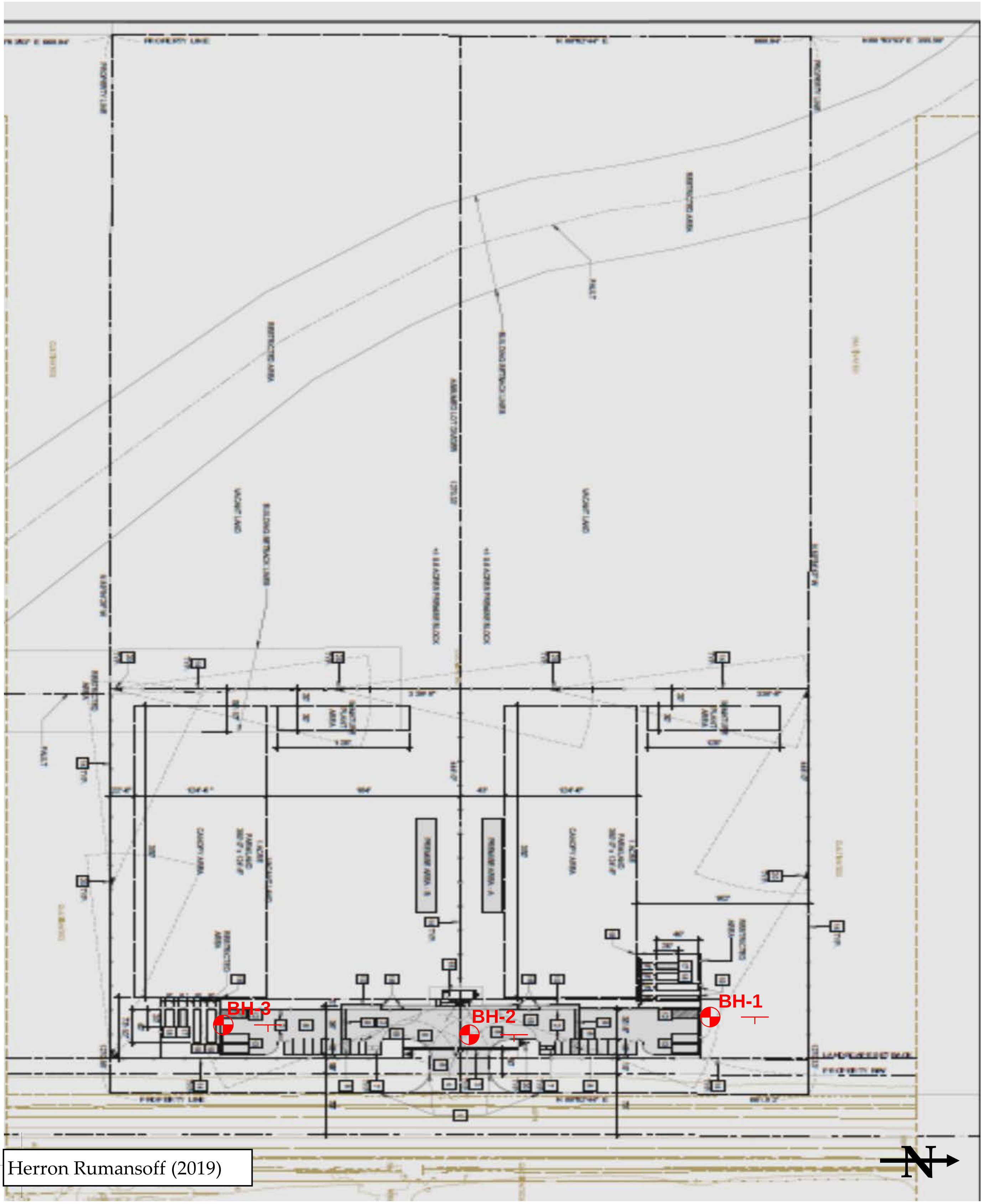
Sladden Engineering

REGIONAL GEOLOGIC MAP

FIGURE

2

Project Number:	644-19012
Report Number:	19-04-030
Date:	April 30, 2019



Sladden Engineering

BOREHOLE LOCATION PLAN

Project Number:	644-19012
Report Number:	19-04-030
Date:	April 30, 2019

FIGURE

3

MAP EXPLANATION

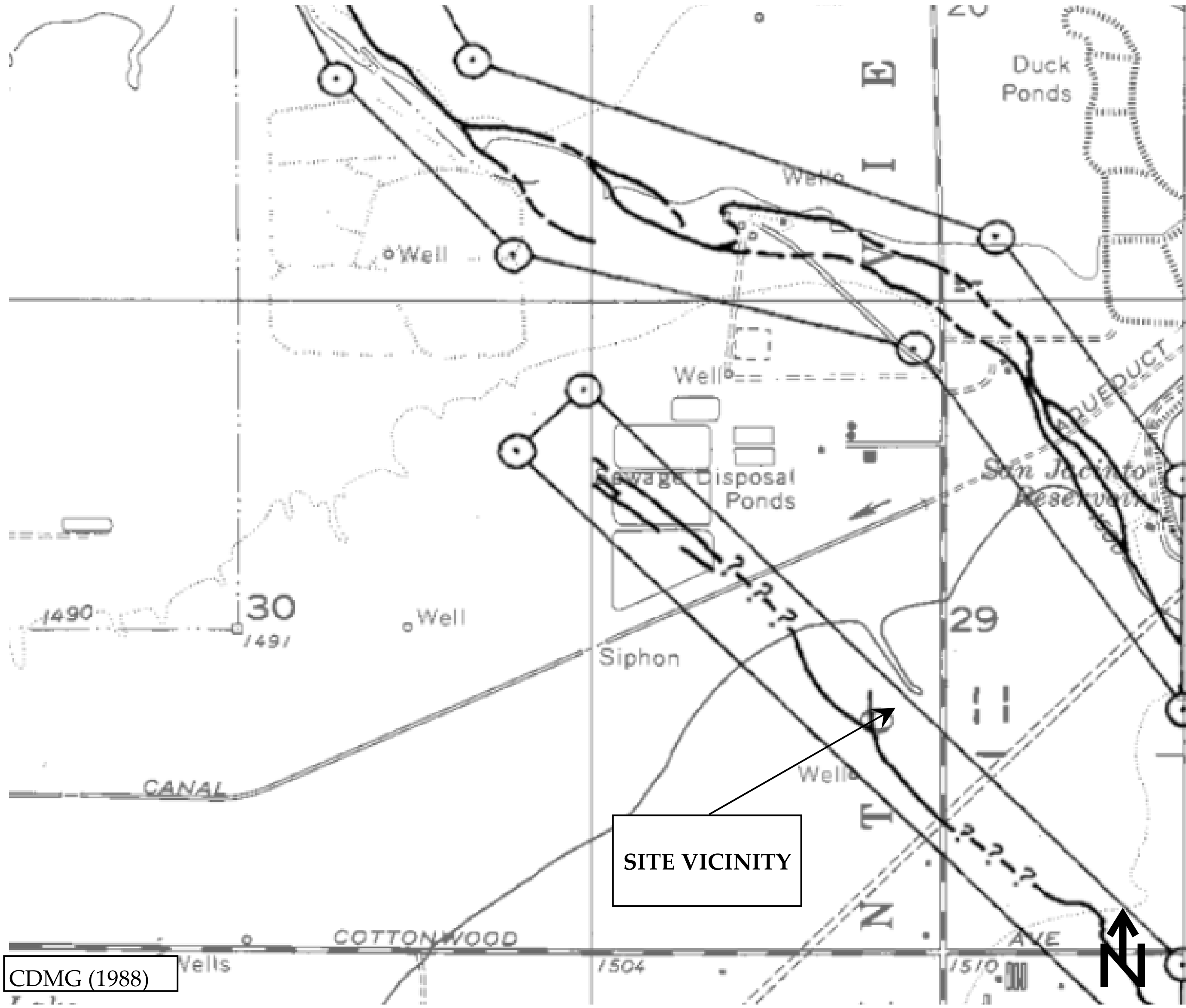
Potentially Active Faults

Faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

Seaward projection of zone boundary.



Sladden Engineering	SITE LOCATION MAP		FIGURE
	Project Number:	644-19012	4
	Report Number:	19-04-030	
	Date:	April 30, 2019	

APPENDIX A

FIELD EXPLORATION

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	4/2/2019
Elevation:	1503 Feet (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
	4/7/9	1	33	64.8	20.8	103.1	2		Sandy Silt (ML); grayish brown, moist, stiff, low to medium plasticity with clay (Fill/Disturbed).
	4/7/9			45.7	12.9	98.6	4–6		Clayey Sand (SC); grayish brown, moist, loose, fine-grained (Qa).
	5/6/7			45.0	12.5		10		Clayey Sand (SC); grayish brown, moist, medium dense, fine-grained (Qa).
	7/11/14			72.2	24.9	101.9	15		Sandy Silt (ML); grayish brown, moist, very stiff, low to medium plasticity with clay (Qa).
	9/12/18			4.5	2.9		20		Sand (SP); grayish brown, slightly moist, medium dense, fine-grained (Qa).
	10/14/10			3.8	1.9	97.7	25		Sand (SP); grayish brown, slightly moist, medium dense, fine-grained (Qa).
	10/11/13			49.3	13.5		30		Silty Sand (SM); grayish brown, moist, medium dense, fine- grained with clay (Qa).
	10/15/17			34.1	13.9	108.3	35		Silty Sand (SM); grayish brown, moist, medium dense, fine- grained with clay (Qa).
	14/15/15			46.7	11.9		40		Clayey Sand (SM); grayish brown, moist, medium dense, fine-grained (Qa).
	10/15/17			77.7	25.8	100.6	45		Sandy Silt (ML); grayish brown, moist, very stiff, low to medium plasticity with clay (Qa).
	8/12/12			62.4	17.9		50		Sandy Silt (ML); grayish brown, moist, stiff, low to medium plasticity with clay (Qa).

Completion Notes:
Terminated at ~51.5 Feet bgs.
No Bedrock Encountered.
No Groundwater or Seepage Encountered.

PROPOSED CULTIVATION FACILITY
APNS 432-130-002, 008 & 009

Project No: 644-19012
Report No: 19-04-030

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	4/2/2019
Elevation:	1503 Feet (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							0–4		Sandy Silt (ML); grayish brown, moist, low to medium plasticity with clay (Fill/Disturbed).
■	7/9/11			58.4	16.6	106.6	4–10		Sandy Silt (ML); grayish brown, moist, stiff, low to medium plasticity with clay (Qa).
■	5/5/8			31.4	8.5		10–15		Clayey Sand (SC); grayish brown, moist, medium dense, fine-grained (Qa).
■	9/12/14			7.6	3.8	103.8	15–20		Sand (SP); grayish brown, slightly moist, medium dense, fine-grained (Qa).
■	5/7/9			59.0	16.7		20–21.5		Sandy Silt (ML); grayish brown, moist, stiff, low to medium plasticity with clay (Qa).
									Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.

Depth scale: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50

Completion Notes:

PROPOSED CULTIVATION FACILITY
APNS 432-130-002, 008 & 009

Project No: 644-19012

Report No: 19-04-030

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. Graphic representations of the results of this testing are presented in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: One (1) bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Testing: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

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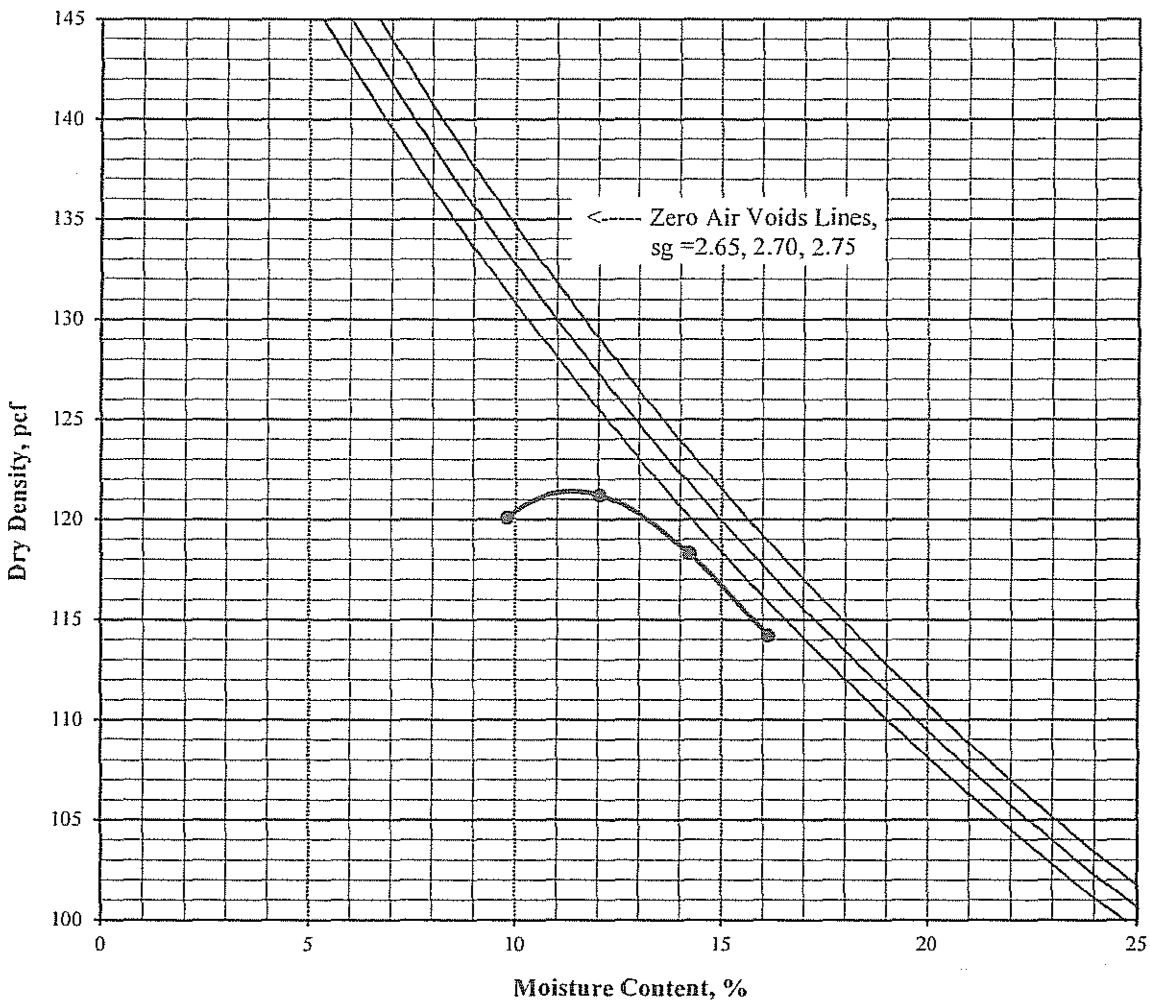
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	644-19012	April 25, 2019
Project Name:	Cultivation Facility	
Lab ID Number:	LN6-19177	ASTM D-1557 A
Sample Location:	BH-1 Bulk 1 @ 0-5'	Rammer Type: Machine
Description:	Olive Brown Sandy Silt (ML)	

Maximum Density: **121.5 pcf**
Optimum Moisture: **12.5%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	1.0



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Expansion Index

ASTM D 4829

Job Number: 644-19012 April 25, 2019

Job Name: Cultivation Facility

Lab ID Number: LN6-19177

Sample ID: BH-1 Bulk 1 @ 0-5'

Soil Description: Olive Brown Sandy Silt (ML)

Wt of Soil + Ring:	552.9
Weight of Ring:	192.1
Wt of Wet Soil:	360.8
Percent Moisture:	11.5%
Sample Height, in	0.95
Wet Density, pcf:	115.1
Dry Denstiy, pcf:	103.2

% Saturation:	49.1

Expansion **Rack # 1**

Date/Time	4/22/2019	4:32 PM
Initial Reading	0.0000	
Final Reading	0.0325	

Expansion Index 33

(Final - Initial) x 1000

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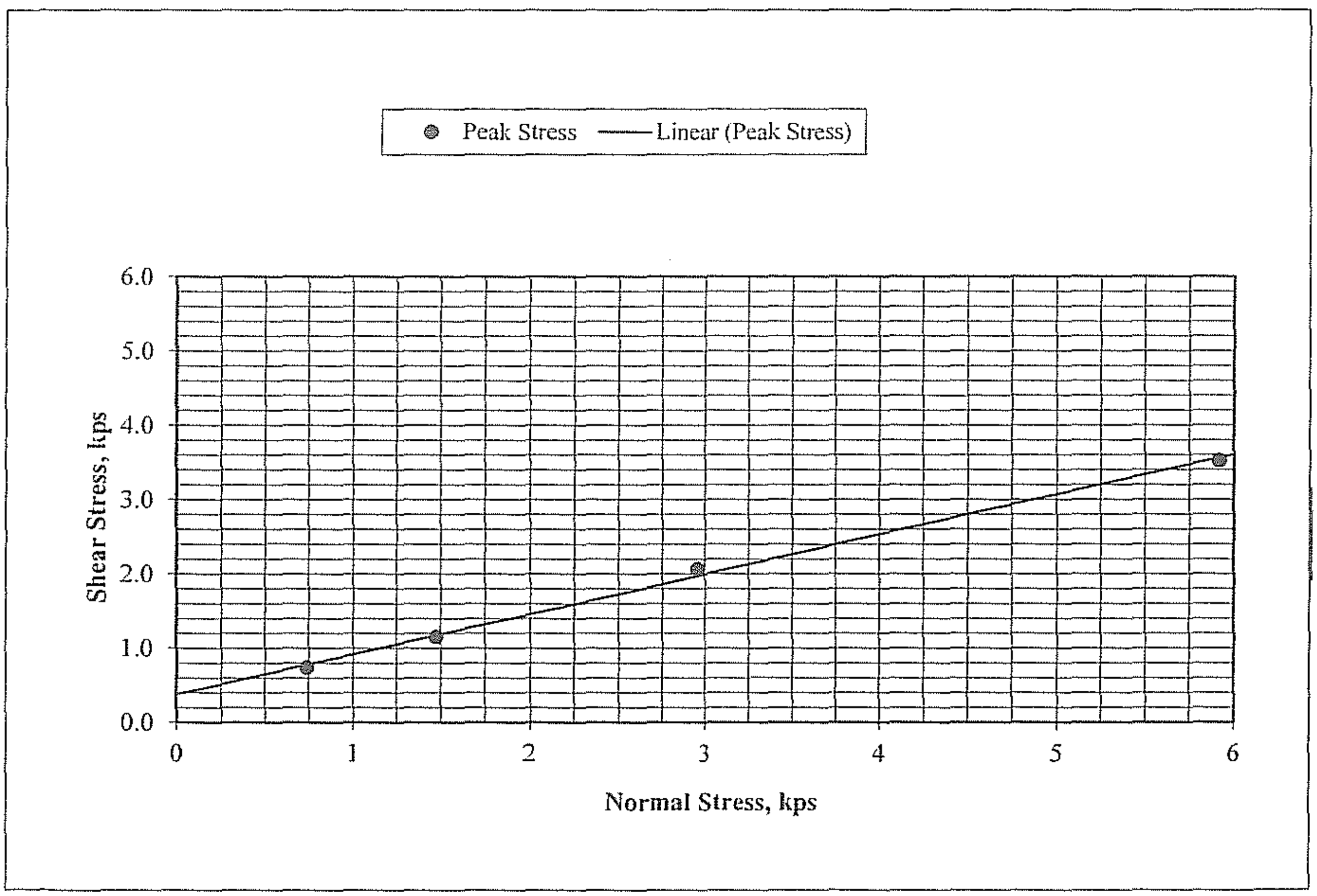
Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	644-19012	April 25, 2019
Job Name	Cultivation Facility	Initial Dry Density: 109.7 pcf
Lab ID No.	LN6-19177	Initial Mosture Content: 12.2 %
Sample ID	BH-1 Bulk 1 @ 0-5'	Peak Friction Angle (Ø): 28°
Classification	Olive Brown Sandy Silt (ML)	Cohesion (c): 380 psf
Sample Type	Remolded @ 90% of Maximum Density	

Test Results	1	2	3	4	Average
Moisture Content, %	21.4	21.4	21.4	21.4	21.4
Saturation, %	107.7	107.7	107.7	107.7	107.7
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.740	1.153	2.066	3.524	



Job Number:	644-19012
Job Name:	Cultivation Facility
Date:	4/25/2019

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	121.5
Moist As Is:	7.8	Optimum Moisture:	12.5
Moist Wanted:	12.5		
ml of Water to Add:	43.6	Wt Soil per Ring, g:	147.9

UBC

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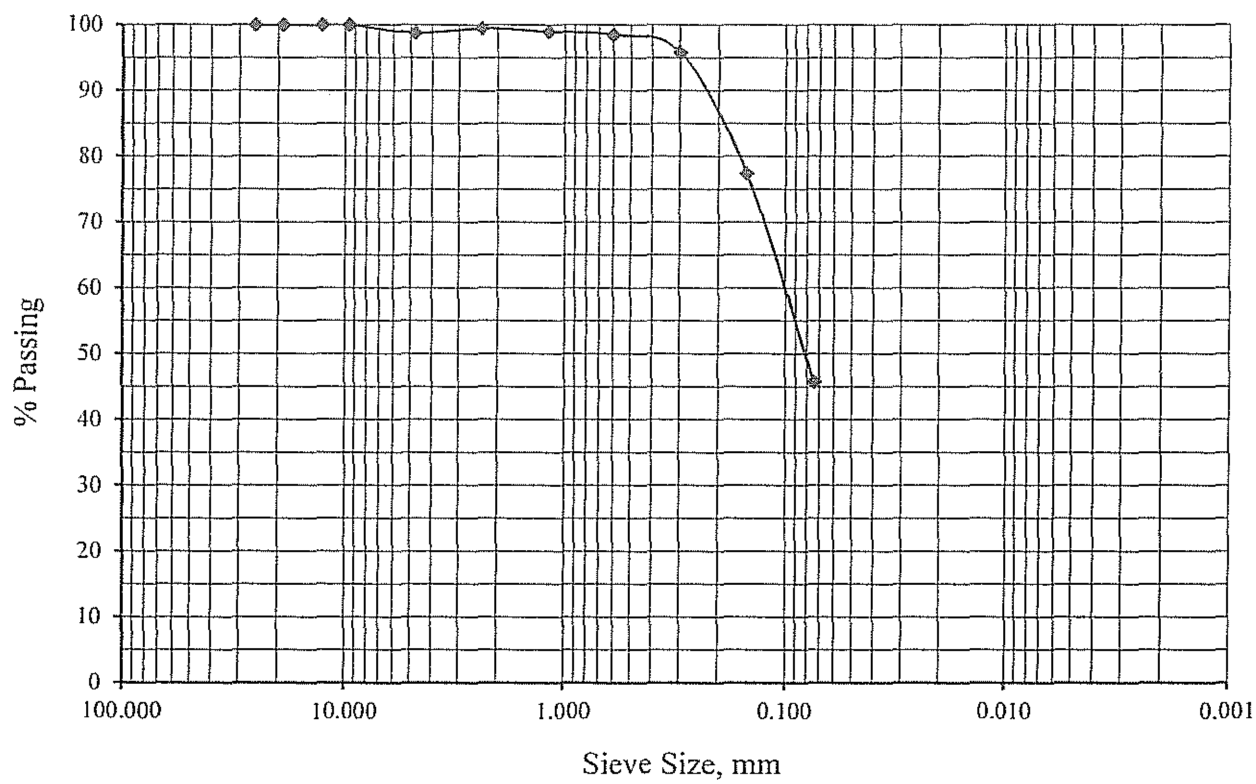
Gradation

ASTM C117 & C136

Project Number: 644-19012 April 25, 2019
Project Name: Cultivation Facility
Lab ID Number: LN6-19177
Sample ID: BH-1 R-2 @ 5' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.8
#8	2.36	99.5
#16	1.18	99.0
#30	0.60	98.5
#50	0.30	95.8
#100	0.15	77.5
#200	0.074	45.7



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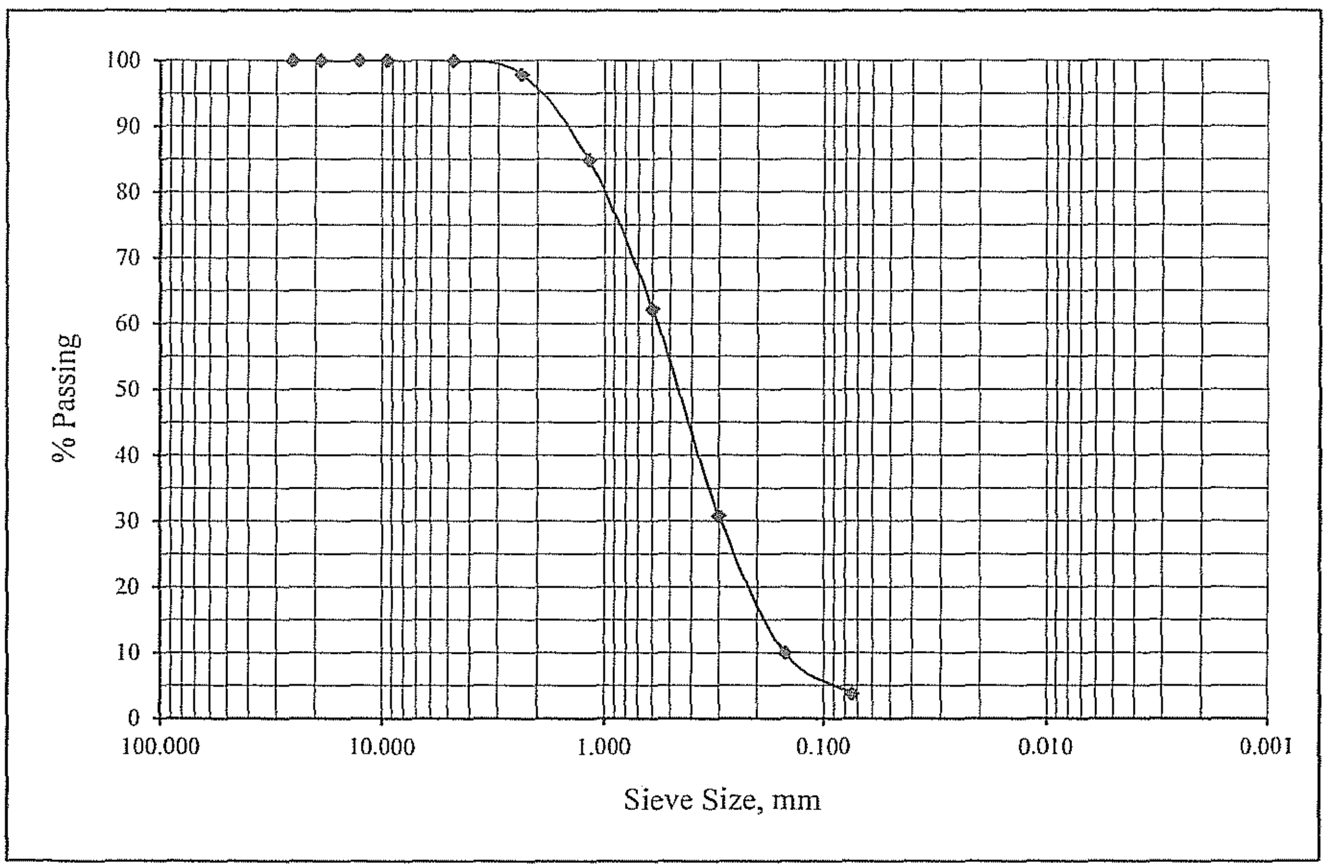
Gradation

ASTM C117 & C136

Project Number: 644-19012 April 25, 2019
Project Name: Cultivation Facility
Lab ID Number: LN6-19177
Sample ID: BH-1 R-6 @ 25' Soil Classification: SP

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	97.9
#16	1.18	84.9
#30	0.60	62.2
#50	0.30	30.8
#100	0.15	10.0
#200	0.074	3.8



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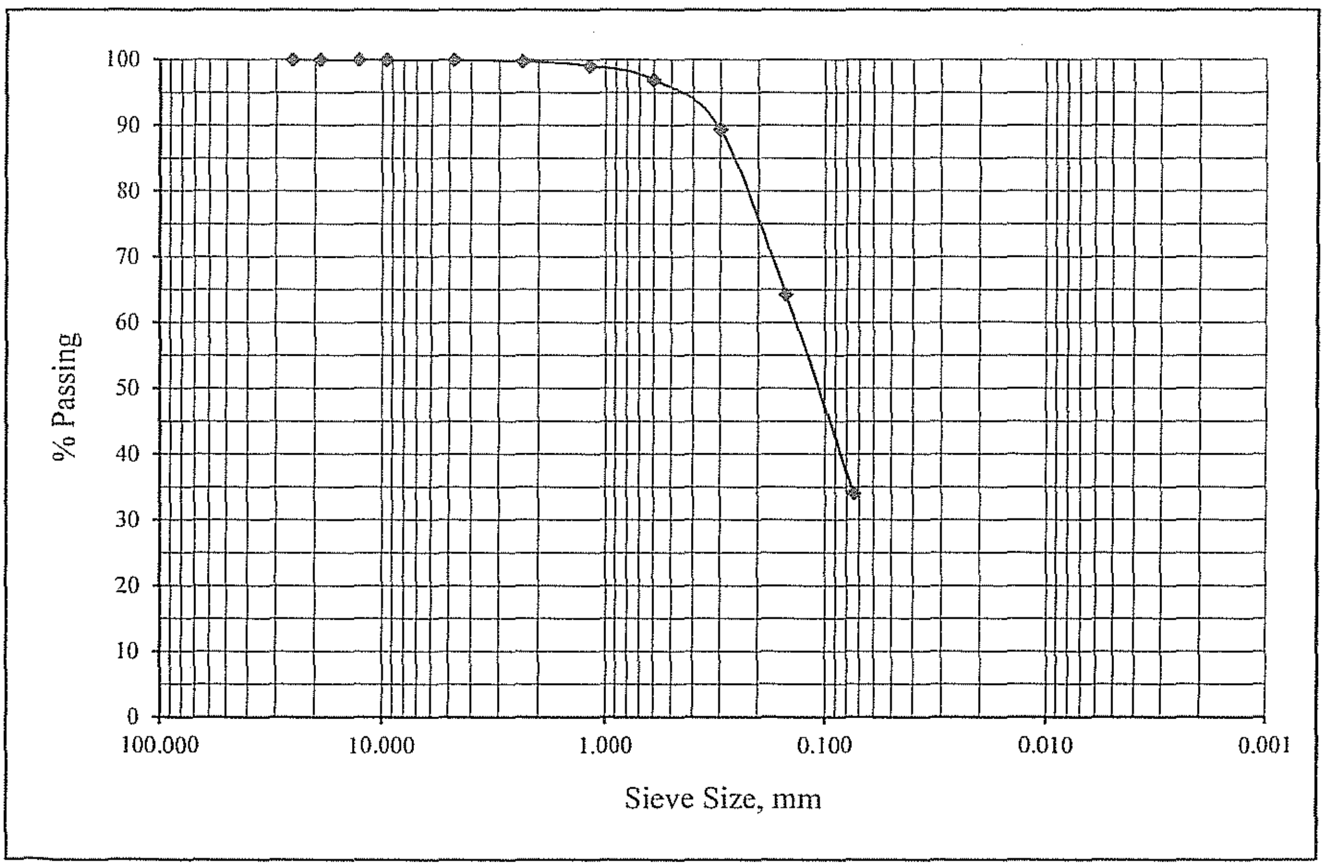
Gradation

ASTM C117 & C136

Project Number: 644-19012 April 25, 2019
Project Name: Cultivation Facility
Lab ID Number: LN6-19177
Sample ID: BH-1 R-8 @ 35' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	99.8
#16	1.18	99.1
#30	0.60	96.9
#50	0.30	89.4
#100	0.15	64.3
#200	0.074	34.1



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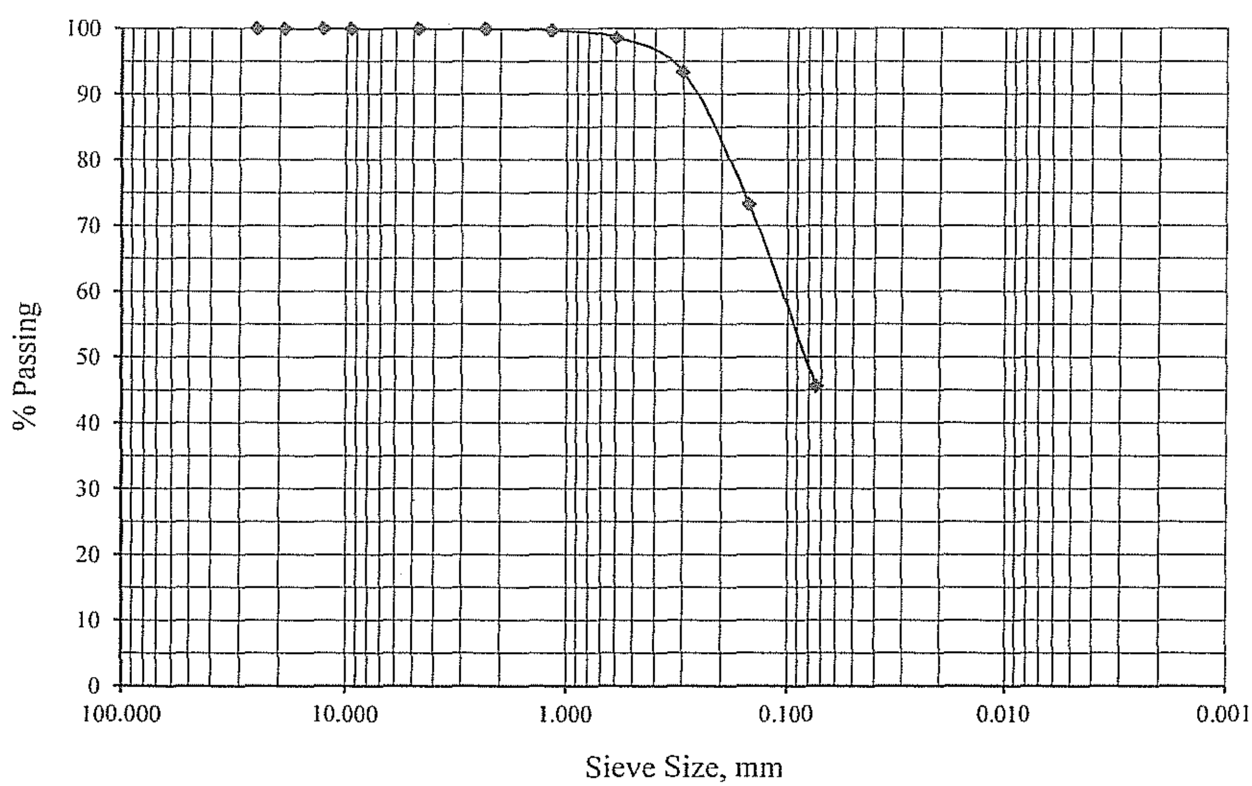
Gradation

ASTM C117 & C136

Project Number: 644-19012 April 25, 2019
Project Name: Cultivation Facility
Lab ID Number: LN6-19177
Sample ID: BH-2 R-2 @ 10' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	99.9
#16	1.18	99.7
#30	0.60	98.6
#50	0.30	93.4
#100	0.15	73.3
#200	0.074	45.6



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Gradation

ASTM C117 & C136

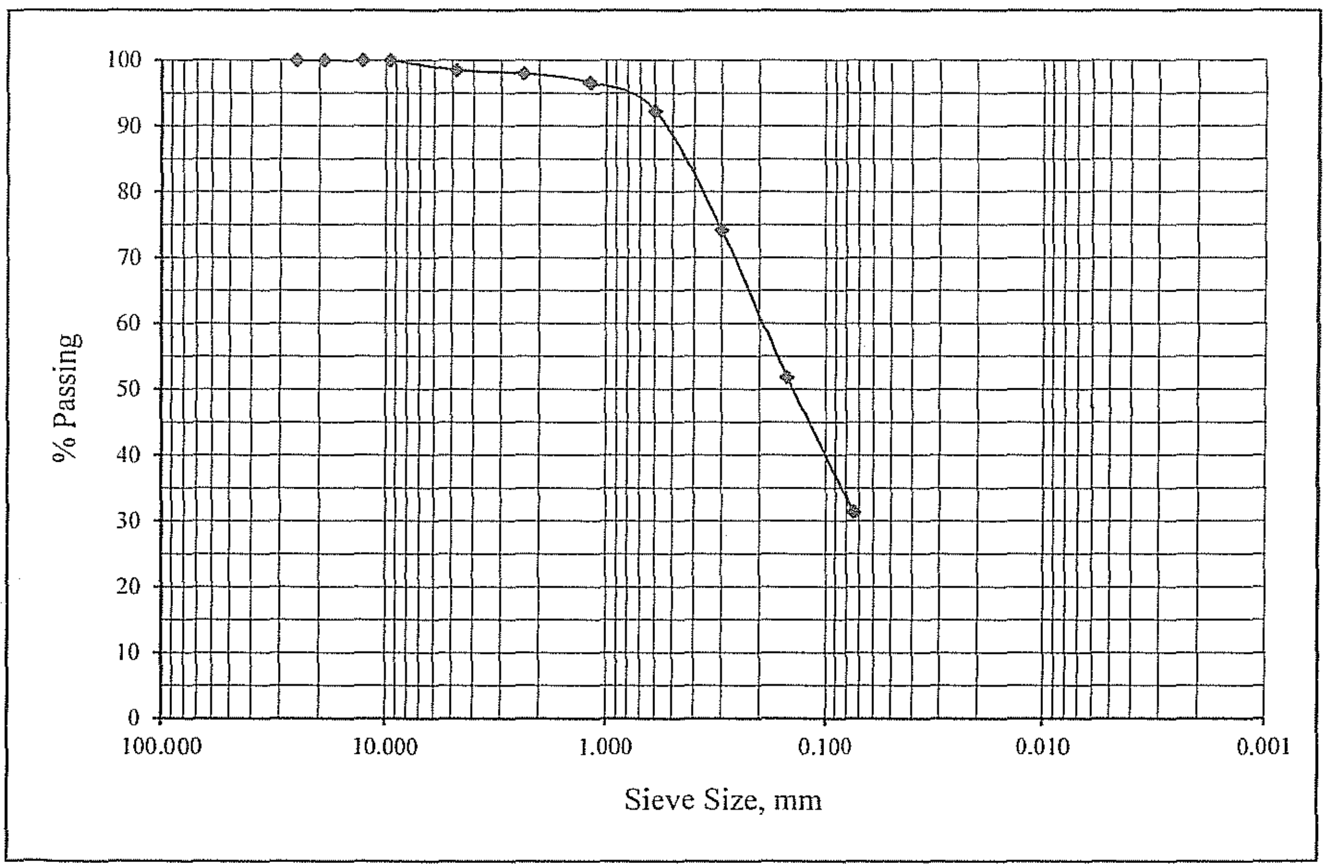
Project Number: 644-19012 April 25, 2019

Project Name: Cultivation Facility

Lab ID Number: LN6-19177

Sample ID: BH-3 S-2 @ 10' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.5
#8	2.36	98.0
#16	1.18	96.6
#30	0.60	92.3
#50	0.30	74.2
#100	0.15	51.9
#200	0.074	31.4



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One Dimensional Consolidation

ASTM D2435 & D5333

Job Number: 644-19012

April 25, 2019

Job Name: Cultivation Facility

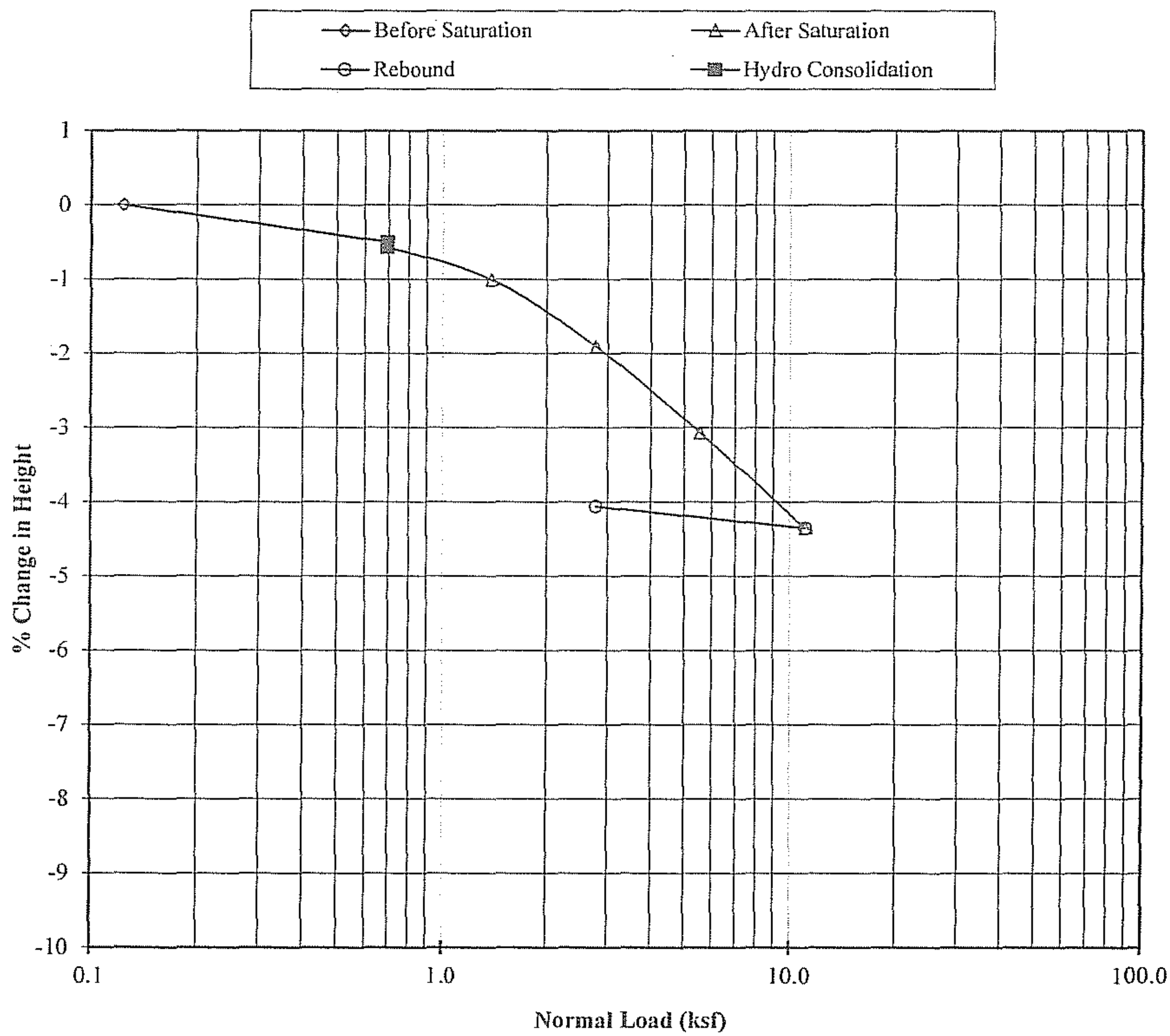
Lab ID Number: LN6-19177

Sample ID: BH-1 R-2 @ 5'

Soil Description: Olive Clayey Sand (SC)

Initial Dry Density, pcf:	98.0
Initial Moisture, %:	12.9
Initial Void Ratio:	0.701
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



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One Dimensional Consolidation

ASTM D2435 & D5333

Job Number: 644-19012
Job Name: Cultivation Facility

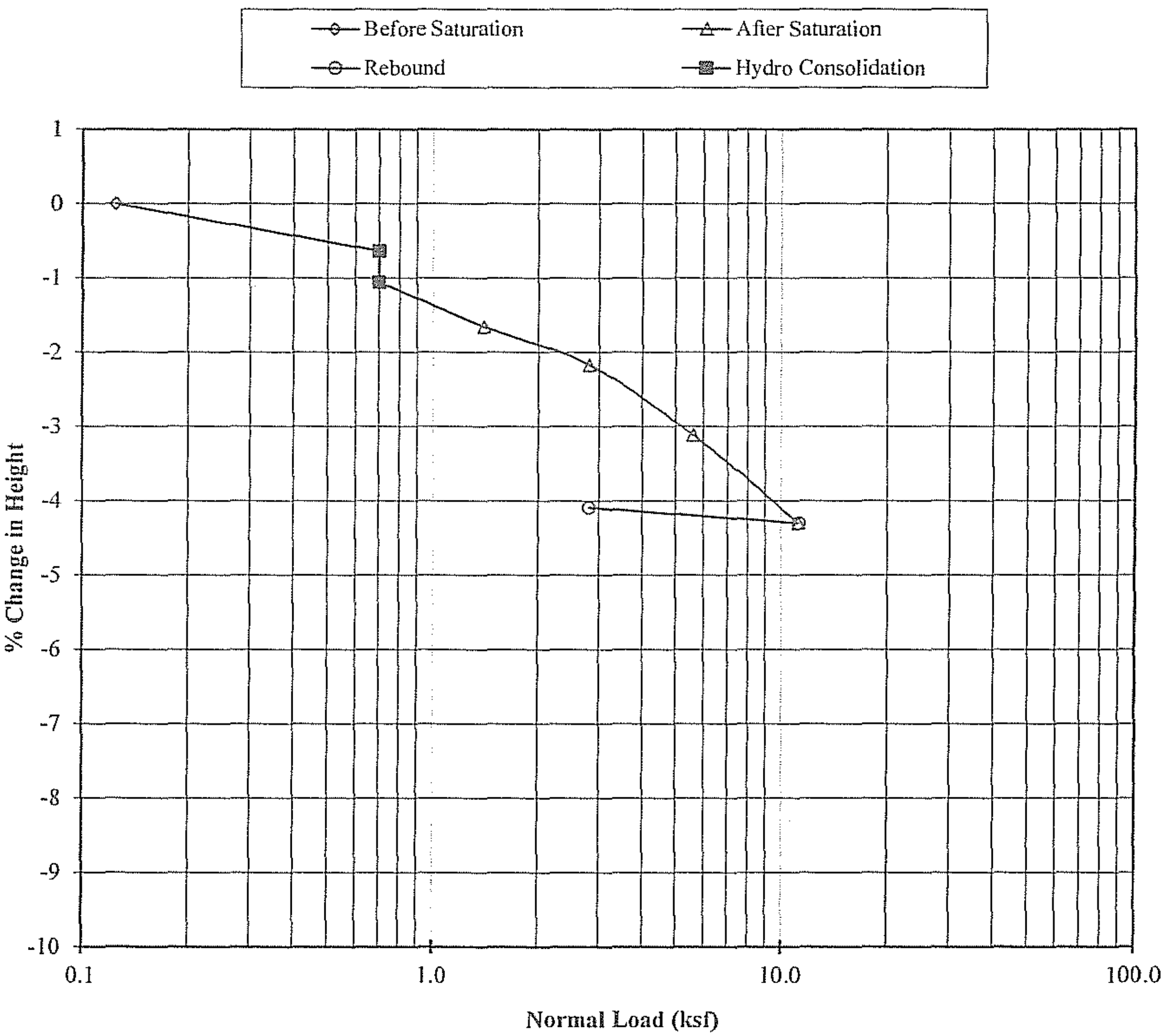
April 25, 2019

Lab ID Number: LN6-19177
Sample ID: BH-2 R-2 @ 10'
Soil Description: Olive Brown Silty Sand (SM)

Initial Dry Density, pcf:	89.0
Initial Moisture, %:	10.9
Initial Void Ratio:	0.873
Specific Gravity:	2.67

Hydrocollapse: 0.4% @ 0.702 ksf

% Change in Height vs Normal Presssure Diagram



Sladden Engineering

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45090 Golf Center Pkwy, Suite F, Indio CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: April 25, 2019

Account No.: 644-19012

Customer: Innovative Culture Group

Location: APN's 432-130-002, 008 & 009, San Jacinto

Analytical Report

Corrosion Series

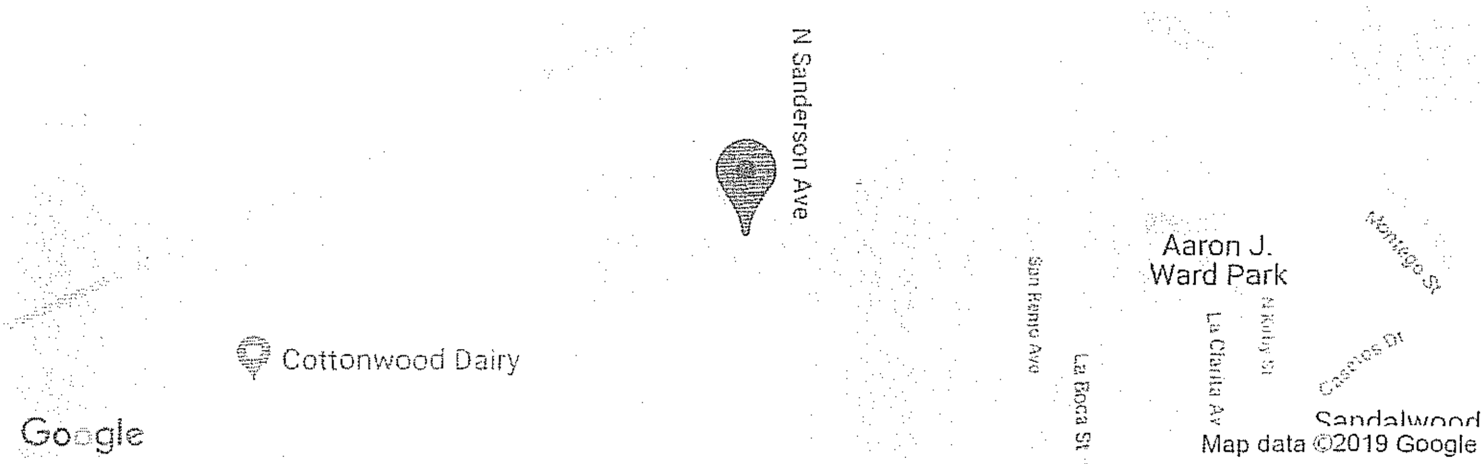
	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5'	9.1	220	180	900

APPENDIX C

SEISMIC DESIGN MAP AND REPORT
DEAGGREGATION OUPUT

OSHPD

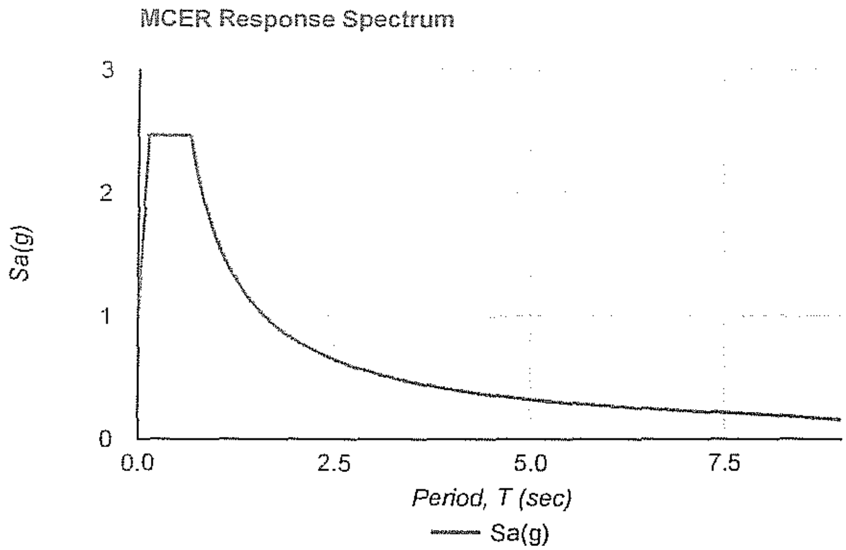
Latitude, Longitude: 33.793155, -117.007893

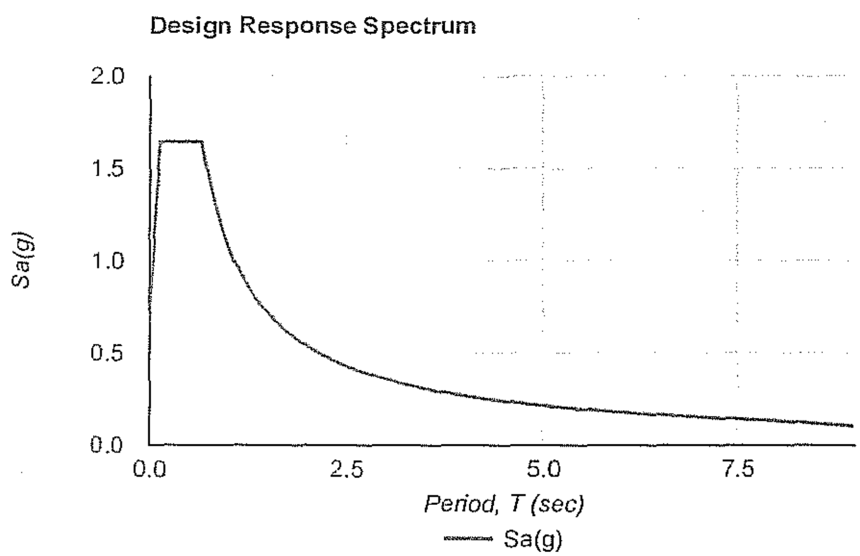


Date	4/29/2019, 1:12:10 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.467	MCE_R ground motion. (for 0.2 second period)
S_1	1.074	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.467	Site-modified spectral acceleration value
S_{M1}	1.612	Site-modified spectral acceleration value
S_{DS}	1.645	Numeric seismic design value at 0.2 second SA
S_{D1}	1.074	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.95	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.95	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	3.094	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	3.266	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.467	Factored deterministic acceleration value. (0.2 second)
S1RT	1.34	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.457	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.074	Factored deterministic acceleration value. (1.0 second)
PGAd	0.95	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.947	Mapped value of the risk coefficient at short periods
C_{R1}	0.92	Mapped value of the risk coefficient at a period of 1 s





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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (v4.1.

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

33.793155

Time Horizon

Return period in years

475

Longitude

Decimal degrees, negative values for western longitudes

-117.007893

Site Class

259 m/s (Site class D)

Hazard Curve

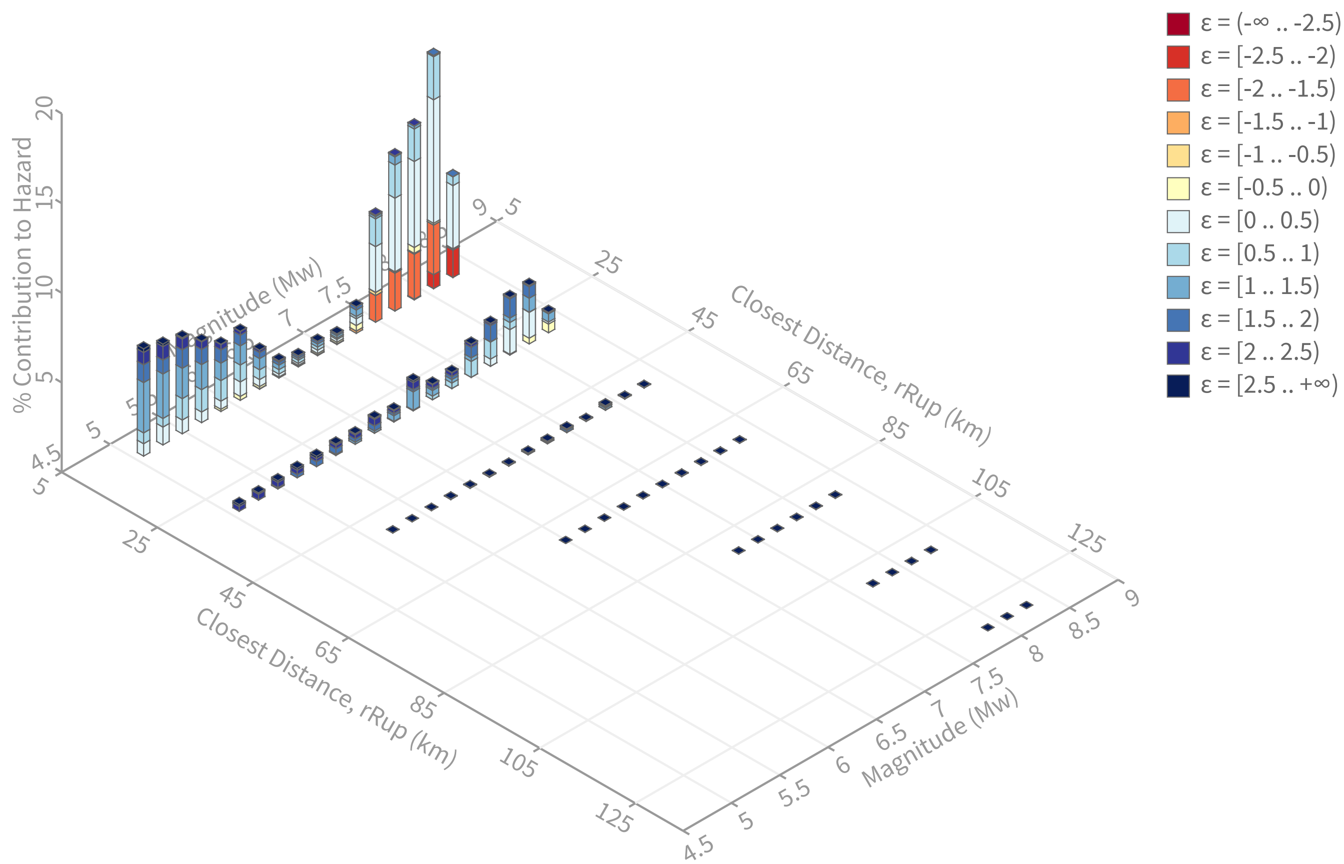
Please select “Edition”, “Location” & “Site Class” above to compute a hazard curve.

Compute Hazard Curve

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.61557634 g

Recovered targets

Return period: 514.27127 yrs
Exceedance rate: 0.001944499 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.25 %

Mean (for all sources)

r: 10.85 km
m: 7.01
ε_0: 0.59 σ

Mode (largest r-m bin)

r: 2.64 km
m: 8.1
ε_0: -0.32 σ
Contribution: 13 %

Mode (largest ε_0 bin)

r: 2.47 km
m: 8.11
ε_0: 0.15 σ
Contribution: 6.88 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							31.34
San Jacinto (Stepovers Combined) [2]		2.47	7.91	-0.29	116.989°W	33.809°N	45.14	20.58
San Andreas (San Bernardino S) [6]		25.37	7.67	1.00	116.820°W	33.959°N	43.21	5.03
UC33brAvg_FM32	System							31.26
San Jacinto (Stepovers Combined) [2]		2.47	7.91	-0.29	116.989°W	33.809°N	45.14	20.51
San Andreas (San Bernardino S) [6]		25.37	7.67	1.00	116.820°W	33.959°N	43.21	5.04
UC33brAvg_FM31 (opt)	Grid							18.70
PointSourceFinite: -117.008, 33.807		5.33	5.51	0.81	117.008°W	33.807°N	0.00	3.38
PointSourceFinite: -117.008, 33.807		5.33	5.51	0.81	117.008°W	33.807°N	0.00	3.38
PointSourceFinite: -117.008, 33.879		10.56	5.60	1.37	117.008°W	33.879°N	0.00	1.03
PointSourceFinite: -117.008, 33.879		10.56	5.60	1.37	117.008°W	33.879°N	0.00	1.03
UC33brAvg_FM32 (opt)	Grid							18.69
PointSourceFinite: -117.008, 33.807		5.33	5.51	0.81	117.008°W	33.807°N	0.00	3.38
PointSourceFinite: -117.008, 33.807		5.33	5.51	0.81	117.008°W	33.807°N	0.00	3.38
PointSourceFinite: -117.008, 33.879		10.56	5.60	1.37	117.008°W	33.879°N	0.00	1.03
PointSourceFinite: -117.008, 33.879		10.56	5.60	1.37	117.008°W	33.879°N	0.00	1.03