APPENDIX 5.6-1

Geotechnical Investigation South Airport Cargo Center (SACC)
Ontario International Airport, Ontario, California
Cotton, Shires and Associates, Inc.
Consulting Engineers and Geologists. June 2022

GEOTECHNICAL INVESTIGATION

South Airport Cargo Center (SACC)
Ontario International Airport
Ontario, California

Prepared for:
Mr. William Winters
SOUTH AIRPORT CARGO CENTER
2333 Avion Road
Ontario, California 91761

June 2022

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June 28, 2022
SC6101

Mr. William Winters
South Airport Cargo Center
2333 Avion Road
Ontario, California 91761

SUBJECT: **Geotechnical Investigation**
RE: South Airport Cargo Center (SACC) at Ontario International Airport
Ontario, California

Dear Mr. Winters:

Cotton, Shires and Associates, Inc. (CSA) is pleased to present you with the following geotechnical investigation report for design of the new South Airport Cargo Center at Ontario International Airport in Ontario, California. Geotechnical consulting services for this project were provided in accordance with our proposal dated November 1, 2021 (revised December 27, 2021) and authorized under Purchase Order #3004262836 dated December 29, 2021.

In this report, we characterize the geotechnical conditions underlying the subject site and provide geotechnical conclusions and recommendations to aid the project team's design of the site improvements. We appreciate the opportunity to have been of service to you on this project. If you have any questions regarding this report, please feel free to contact us.

Sincerely,
COTTON, SHIRES AND ASSOCIATES, INC.

Gerardo Hernandez
Staff Geologist

Matthew J. Janousek
Supervising Geotechnical Engineer
PE 73401, GE 3005; exp. 12-31-2022

MJ:gh

GEOTECHNICAL INVESTIGATION
South Airport Cargo Center (SACC)
Ontario International Airport, Ontario, California

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GEOTECHNICAL INVESTIGATION
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Ontario International Airport, Ontario, California

1.0 INTRODUCTION

Cotton, Shires and Associates, Inc. (CSA) is pleased to present this geotechnical investigation report for design of the new South Airport Cargo Center at Ontario International Airport in Ontario, California. Geotechnical consulting services for this project were provided in accordance with our proposal dated November 1, 2021 (revised December 27, 2021) and authorized under Purchase Order #3004262836 dated December 29, 2021.

1.1 Project Description

Our understanding of the proposed project and the general scope of geotechnical services are based on: SACC Subsurface Investigation Scope of Work (Rev 1) dated September 2021, prepared by CHA Consulting, Inc. (CHA); Drainage Plan dated September 9, 2021, prepared by CHA; Geotech Information Checklist dated August 2018, prepared by Walker Consultants; Preliminary Structural Concept plans prepared by HSA & Associates, Inc.; and correspondence with the project team from November 2021 through April 2022.

Based on our review of the referenced plans and correspondence with the project team, we understand that the proposed South Airport Cargo Center (SACC) will consist of: a new 204,320-square-foot, three-story cargo sort facility warehouse; a new 41,250-square-foot, three-story office building; and a new three- to four-level, at-grade vehicle parking garage connected to the office building via a pedestrian bridge over East Avion Street. Maximum column and wall foundation loads for the cargo sort facility will be about 970 kips (dead and live load) and 22 kips (dead and live load), respectively. Interior and exterior garage column foundation loads for the vehicle parking garage will be 450 kips and 22 kips, respectively; anticipated vehicle parking column loads will increase by up to 50 percent if the structure is designed for four levels.

A new airfield apron will be constructed on the east, west, and north sides of the cargo sort facility, truck parking will be located on the south side of the cargo sort facility, and an approximately 250-foot-wide x 500-foot-long x 16-foot-deep infiltration basin will be located at the southeast corner of the airfield apron. Other improvements will include up to 15-foot high perimeter retaining walls to accommodate grade changes adjacent to existing offsite

improvements, and associated utilities. We understand that airfield pavement will be designed in accordance with the U.S. Department of Transportation Federal Aviation Administration's Advisory Circular No. AC 150/5320-6G. Site grade will be increased by about 1 to 10 feet in elevation to achieve minimum drainage requirements, with the largest grade increase (i.e., addition of compacted fill) occurring at the southeastern portion of the proposed airfield apron proximal to the infiltration basin.

General project site limits are delineated on Figure 1 – Site Vicinity Map. The proposed site improvements are shown on Figure 2 – Site Exploration Map. Subsurface profiles through the proposed improvements are presented on Figure 3 – Engineering Geologic Cross Sections.

1.2 Purpose and Scope of Work

The purpose of our investigation was to explore and generally characterize the earth materials at the site and to develop preliminary geotechnical recommendations and design criteria for the proposed improvements. A summary of the work we performed is outlined below.

1.2.1 Research and Review of Available Data – We researched, reviewed, and compiled data from available historic aerial photographs and readily available published documents, including previous geotechnical investigations on and near the site in order to gain background information regarding previous site uses and geotechnical conditions.

1.2.2 Subsurface Exploration – Field exploration consisted of excavating eighty-six (86) exploratory hollow-stem auger borings to depths of about 6.0 to 51.5 feet below ground surface (bgs), including two (2) percolation test holes that were each excavated to a depth of 11.5 feet bgs, in the location shown on Figure 2. Summaries of field exploration procedures and boring and percolation test logs are presented in Appendix A – Field Exploration.

1.2.3 Geotechnical Laboratory Testing – Laboratory tests were performed on selected soil samples obtained from the borings. A summary of the laboratory testing program is presented in Appendix B – Laboratory Testing.

1.2.4 Geotechnical Evaluation and Reporting – Geotechnical evaluation of the subject site consisted of characterizing field and laboratory test data and developing conclusions and recommendations regarding geotechnical and seismic hazards, foundation type and design criteria. Based on data obtained from our subsurface exploration and geotechnical laboratory

testing programs, we have provided geotechnical opinions regarding site conditions and geotechnical hazards, and provided recommendations for the proposed improvements, including:

- Soil and groundwater conditions at the site;
- Site seismicity, including potential for liquefaction and seismic induced dry densification;
- Seismic design parameters based on the 2019 California Building Code/ASCE 7-16;
- Site preparation and grading and compaction requirements for fill placement below structures and within other proposed development areas;
- Evaluation of onsite materials for use as compacted fill;
- Import fill recommendations;
- Construction considerations including excavatability of the onsite materials;
- Surface drainage;
- Allowable bearing pressures for shallow foundations;
- Allowable adhesion (skin friction) for deep foundations;
- Resistance to sliding and passive pressure;
- Estimated total and differential settlements of foundations;
- Construction of slabs-on-grade;
- Utility trench backfill;
- General corrosion potential of soil encountered in foundation areas (limited soil chemistry testing for pH, resistivity, chloride and sulfate content);
- Active, passive, and seismic retaining wall lateral earth pressures;
- Airfield pavement geotechnical design parameters;
- Non-airfield heavy-duty traffic asphalt and concrete pavement areas; and
- Percolation test results and design infiltration rates.

2.0 SITE CONDITIONS

2.1 Surface Conditions

The project site is currently occupied by one- to two-story administrative/commercial buildings with surrounding hangers, airfield and landside pavement, other concrete and asphalt paved access roads and intermittent areas of exposed graded soil. The overall site appears to slope gently to the south and west with elevations within the areas of the proposed improvements ranging from about +894 feet on the south end of the site, near East Avion Street, to about +919 feet on the north end near the airport's southernmost taxiway.

2.2 Geologic Setting

The subject site is located in the San Bernardino Valley, which lies in the southern part of the Transverse Range geomorphic province of California. The Transverse Range geomorphic province is an east-west trending province that extends westward from the eastern margin of the San Bernardino Mountains to Point Arguello on the California coast and the Channel Islands off the coast in the Santa Barbara Channel. The San Bernardino Valley is bounded by the San Gabriel Mountains to the north and the Santa Ana Mountains to the south.

Surficial geology at the subject site consists of recent Holocene-age alluvial fan deposits (Qf), as shown on Figure 4 – Regional Geologic Map. Alluvial deposits were encountered below the surficial fill across the site to the depth explored during the subsurface exploration program.

2.3 Subsurface Exploration

We explored subsurface conditions at the site from January 18 through January 27, 2022, by means of eighty-six (86) exploratory hollow-stem auger borings excavated to depths of about 6.0 to 51.5 feet bgs, including two (2) percolation test holes that were each excavated to depths of 11.5 feet bgs. Drilling and percolation services were provided by Choice Drilling of Sylmar, California. Summaries of field exploration procedures and boring and percolation test logs are presented in Appendix A.

2.4 Laboratory Testing

We performed laboratory tests on disturbed and undisturbed soil samples obtained from the borings. Laboratory tests consisted of moisture content, wet and dry unit weight determinations, particle size analysis, #200 sieve wash analysis, direct shear strength, collapse potential, California Bearing Ratio (CBR), R-value, permeability, general corrosion (resistivity, pH, sulfates and chlorides), and maximum unit weight/optimum moisture content. The results of the laboratory tests are presented in Appendix B.

2.5 Subsurface Conditions

Subsurface conditions encountered during the field exploration program generally consisted of shallow artificial fill underlain by coarse-grained alluvium.

2.5.1 Artificial Fill – Artificial fill (Qaf) was generally encountered in the upper 0 to 4.5 feet of the borings and generally consisted of loose to dense silty sand, and medium stiff sandy silt.

Moisture contents of the artificial fill were generally close to or below optimum proctor moisture content.

2.5.2 Coarse-Grained Alluvium – Generally coarse-grained alluvium was encountered in the borings below the artificial fill to the maximum depth explored of about 51.5 feet bgs. The upper 30 feet of alluvium generally consists of loose to medium dense silty sand and sand with varying amounts of silt and gravel, and non-continuous layers of medium stiff sandy silt. Standard Penetration Test (SPT) blow counts in the upper alluvium generally ranged from about 7 to 30 blows per foot (bpf). Fines contents of the upper alluvium ranged from about 3.9 to 54 percent.

Generally, medium to very dense silty sand and sand with varying amounts of silt and gravel were encountered below a depth of about 30 feet. SPT blow counts in the deeper alluvium generally ranged from about 22 to 50+ blows per foot (bpf). Fines contents of the deeper alluvium ranged from about 29 to 56 percent.

2.6 Groundwater Conditions

Groundwater was not encountered in any of the borings performed for this study. Fluctuations in groundwater levels may occur from variations in rainfall, flooding and other factors, and groundwater levels may be different at different times and locations. However, groundwater is not anticipated to rise to a level that would adversely impact the proposed improvements over their expected design life.

3.0 SEISMICITY

The seismicity evaluation for the project consisted of the assessment of earthquake hazards such as seismic setting and nearby faults, CBC/ASCE 7-16 seismic design criteria and estimated strong ground motion, as summarized below.

3.1 Site-Specific Ground Motion Response Analysis

Based on our geotechnical investigation, the site location (latitude N 34.0506° and longitude W 117.6050°) and our interpretation of the 2019 CBC and ASCE 7 Hazards Report for ASCE/SEI 7-16 related to Earthquake Loads and using the online tool, a site-specific ground motion analysis is presented in Appendix C – Site-Specific Ground Motion Response Analysis.

4.0 SEISMIC GEOHAZARDS

In the following sections, we discuss potential seismic geohazards that may impact the subject site along with the corresponding degrees of estimated potential risk.

4.1 Ground Rupture Potential

The subject site is not located within a designated Alquist-Priolo Earthquake Hazard Zone (CGS, 1998). Active or potentially active faults are not known to exist on or trend toward the site. As such, the potential for primary ground surface rupture due to faulting is considered to be low.

4.2 Tsunami and Seiche Hazard

Based on the general site elevation (+894 to +919 feet) and distance to the Pacific Ocean, potential impacts from a tsunami appear to be very low. There are also no large landlocked bodies of water proximal to the subject site. Therefore, we conclude that the potential for earthquake-induced seiche effects to adversely impact the subject site is nil.

4.3 Liquefaction Potential and Seismic Related Settlement

4.3.1 Liquefaction Potential – Liquefaction occurs when saturated, loose to medium dense, sands and low-plasticity silts and clays are subjected to seismically-induced strong shaking. Liquefiable soils typically lose a portion or all of their shear strength and regain strength sometime after the shaking stops. Soil movements, both vertical and lateral, can occur as a result of liquefaction and ground shaking.

The site is not located within a Liquefaction Hazard Zone as mapped by the State of California (CGS, 2002) under the Seismic Hazards Mapping Act of 1990. Site-specific subsurface exploration and data research have shown that generally medium dense to very dense silty sands, sandy silts, and sands are present beneath the subject site, and static groundwater levels are not anticipated to rise within 50 feet of the ground surface. We therefore conclude that the potential for liquefaction to adversely impact the subject site is very low.

4.3.2 Seismic Settlement of "Dry" Sandy Soils – Dry seismic settlement at the site was estimated using procedures outlined in Pradel (1998a and 1998b), which is a simplified procedure based on Tokimatsu and Seed (1987). Due to the previously discussed upper loose to medium dense silty sands and sands present at the subject site, seismic settlement for "dry" sandy soils within the upper 40 feet of alluvium is estimated to be about 2 to 4 inches. Recommended

measures to mitigate the effects of dry seismic settlement (i.e., dynamic densification) on foundations are presented later in this report.

4.3.3 Lateral Movements and Spreading – The estimation of lateral movements resulting from seismic events is highly uncertain. However, based on empirical procedures presented by Bartlett and Youd (1995), deep groundwater, and relatively level site grade, the potential for large lateral movements caused by post-seismic residual shear strength reduction is considered to be nil.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations for site grading and foundation design, as presented below, are based on our subsurface exploration and supporting laboratory testing for the subject site performed from January through March 2022. Overexcavation and recompaction of artificial fill and upper alluvial soil materials, or ground improvement, are recommended to reduce the potential for settlement and to improve foundation and pavement bearing conditions. The recommendations presented below should be incorporated into the project plans and specifications and should be adhered to during construction. Prior to contract bidding, site grading and foundation plans should be reviewed by Cotton, Shires and Associates, Inc. for consistency with our recommendations.

Based on review of the HSA plans and communication with the project team, we understand that Rammed Aggregate Piers (RAP) are being considered to support the foundations of the cargo sort facility and possibly the parking structure. Consequently, we have included recommendations for the RAP design-build contractor to consider.

5.1 Site Development and Grading

5.1.1 Site Preparation – Prior to commencing grading operations, soil materials containing debris, organics, pavement, or other unsuitable materials should be stripped from the building areas. Demolition of on-grade improvements should include removal of old foundations, pavements, slabs, abandoned utilities, and soils disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material should be replaced with compacted, engineered fill.

In areas that are proposed for shallow bearing such as pavements, sidewalks, retaining walls and other improvements that could be adversely impacted by differential settlement, we

recommend further removal of the existing artificial fill material and replacement with compacted, engineered fill as described in Sections 5.1.9 through 5.1.12 below.

5.1.2 Excavation Considerations – The artificial fill and alluvium encountered during field exploration were drilled with light to moderate effort. We anticipate that excavation of earth materials at the site can be performed using conventional earth excavation equipment.

5.1.3 Temporary Excavation Considerations – Sloped excavations may be used as temporary access in areas with enough room to accommodate the slopes. Temporary slopes should be monitored continuously by the contractor. Loose or unstable soil should be removed immediately. Temporary slopes and excavations should conform to Federal Occupational Safety and Health Administration (OSHA) and/or California Division of Occupational Safety and Health (DOSH) regulations and other applicable local ordinances and building codes, as required. However, the contractor should be made responsible for all safety issues regarding open excavations. The contractor should consider an OSHA soil Type C designation for the near-surface material in designing shoring.

5.1.4 Soil Expansiveness – The artificial fill and alluvial subsurface materials encountered during exploration across the site were primarily coarse-grained with varying amounts of silt and little to no clay. As such, the expansion potential of the onsite soils is considered very low.

5.1.5 Cut/Fill Slope Design – Any new permanent cut slopes should not exceed an inclination of 2:1 (H:V). During the dry season, temporary cut slopes of 1.5:1 (H:V) should generally be satisfactory for construction purposes, provided that they are inspected and approved by our field representative at the time of construction and monitored daily during construction. Excavation methods, shoring, bracing and safety of excavations are the responsibility of the contractor. All excavations should comply with applicable local, State and Federal safety regulations.

All permanent fill slopes constructed with onsite excavated earth materials should have a maximum inclination of 2:1 (H:V).

5.1.6 Airfield Apron Area Over-Excavation – Over-excavation and recompaction of artificial fill and upper alluvial materials in the apron area are recommended in some areas to reduce the potential for settlement and to provide uniform bearing conditions. Over-excavation recommendations presented below are based on the boring data obtained from our geotechnical exploration and laboratory testing.

Based on plans provided by CHA, we understand that site grade will be increased by about 1 to 10 feet in elevation to achieve minimum drainage requirements, with the largest grade increase (i.e., addition of compacted fill) occurring at the southeastern portion of the proposed airfield apron proximal to the infiltration basin. In areas where the finished subgrade elevation is less than 2 feet above existing grade, the artificial fill and upper alluvial materials within the apron areas should be over-excavated, as needed, to achieve at least 2 feet of compacted fill beneath finish subgrade elevation. For example, if finish subgrade elevation is 1 foot above existing grade, then the artificial fill and upper alluvial materials should be over-excavated at least 1 foot prior to the placement of compacted fill.

Depressions or disturbed areas left from the removal of such material should be replaced with compacted fill. Following observation of the over-excavation bottom by CSA, the exposed surface should be scarified 8 inches, moisture-conditioned to within 2 percent of optimum moisture content and compacted to at least 90 percent of the maximum dry unit weight, determined using test method ASTM D1557 (current version).

5.1.7 Truck Area and Retaining Wall Shallow Foundation Over-excavation – Artificial fill and upper alluvial materials within the truck area south of the cargo facility and site retaining walls with shallow foundations should be over-excavated to a depth of at least 2 feet below existing grade, 1 foot below proposed finish subgrade elevation, or at least 1 foot below foundation bottom, whichever is deeper. Depressions or disturbed areas left from the removal of such material should be replaced with compacted engineered fill. Following observation of the over-excavation bottom by CSA, the exposed surface should be scarified 8 inches, moisture-conditioned to within 2 percent of optimum moisture content and compacted to at least 90 percent of the maximum dry unit weight, determined using test method ASTM D1557 (current version).

5.1.8 Special Subgrade Stabilization Measures – Yielding or pumping subgrades may develop depending on material type, moisture content, and applied equipment. Unsuitable subgrade conditions can range in severity and often require a trial-and-error procedure to determine the appropriate remedial method. Special stabilization measures may be required to provide a firm and unyielding subgrade surface if loose or pumping subgrade is encountered or created during grading activities. Special subgrade stabilization measures that have been successfully used on other projects consist of:

- Placing a 1- to 2-foot-thick layer of 3- to 4-inch rock on the excavation bottom;

- Placing a 1-foot thick layer of ½-inch to ¾-inch clean crushed drain rock sandwiched by two layers of filter fabric;
- Use of a geosynthetic placed beneath a minimum 1-foot lift of gravel or rock or gravel fill; and/or
- Mixing cement into the subgrade.

Whether these measures are required will depend on the condition of the subgrade at the time of construction, the density and moisture content of the subgrade materials, and the nature of the construction activities (e.g., earthmoving equipment type and loading, number of equipment passes, etc.).

An alternative to use of rock or gravel for excavation bottom stabilization is the treatment of subgrade materials with cement to effect "bridging" over yielding, unstable excavation bottoms. Cement should be thoroughly mixed into the upper 12 inches of the excavation bottom in accordance with Sections 301-3.1 through 301-3.1.6 of the "Greenbook." A "mellowing" period of 16 to 48 hours is required before compacting. After "mellowing," the soil-cement mixture should be moisture-conditioned and compacted according to Section 301-3.1.8. The compacted soil-cement mixture should be cured according to Section 301-3.1.9. At least 2 days of curing time should be allowed, prior to placement of general, select, or treated fill materials.

5.1.9 Compacted Fill in Apron Areas – Following compaction of the scarified excavation bottoms, apron area excavations may be backfilled with engineered, compacted onsite excavated materials or imported granular select fill materials. We recommend that, unless otherwise noted, fill materials placed within 2 feet of finished subgrade elevation should be moisture-conditioned to within 2 percent of optimum moisture content and compacted to at least 90 to 95 percent of the maximum dry unit weight, depending on the design California Bearing Ratio. Refer to Section 5.7 below for California Bearing Ratio recommendations. Compacted fill extending deeper than 2 feet below finished subgrade should be compacted to at least 90 percent of the maximum dry unit weight, determined using test method ASTM D1557 (current version).

Fill materials should be placed and compacted at a moisture content within 2 percent of optimum moisture. Each layer should be spread evenly and should be thoroughly blade-mixed during the spreading to provide relative uniformity of material within each layer. Soft or yielding materials should be removed and be replaced with properly compacted fill material, prior to placing the next layer.

When the moisture content of the fill material is below optimum moisture content, water should be added to the fill. While water is being added, the soil should be bladed and mixed to provide relatively uniform moisture content throughout the material. When the moisture content of the fill material is excessive, excavated materials should be spread and disced or scarified to aerate. Compacted fill materials should be spread in lifts no thicker than approximately 8 inches prior to being compacted. Fill and backfill materials may need to be placed in thinner lifts to achieve the recommended compaction with the equipment being used.

Rocks, gravel and other oversized material, greater than 4 inches in diameter, should be removed from the fill material being placed. Rocks less than 4 inches in diameter should not be nested and voids caused by inclusion of rock in the fill should be filled with sand or other approved material.

5.1.10 General Fill – General fill should be free of organics, oversize material (e.g., greater than 4 inches in diameter), trash and debris, and other deleterious material. General fill materials should have an expansion index no greater than 30, a plasticity index no greater than 15, and a percentage finer than the No. 200 sieve (fines content) of no more than 35 percent.

5.1.11 Import Fill – Import fill, if required for the project, should be well-graded granular materials with the following characteristics:

- Non-expansive (EI ≤ 20);
- Friction angle ≥ 30 degrees;
- Maximum particle size < 2 inches;
- Percentage passing the No. 4 sieve between 60 and 100;
- Percentage passing the No. 200 sieve between 10 and 30; and
- Plasticity Index < 10.

5.1.12 Recycled Onsite Fill Materials – We understand that existing concrete and asphalt demolished at the site may be pulverized and re-used as general compacted fill. These recycled materials should be prepared and placed separately from the other onsite sandy fill and alluvial materials that will be used as compacted fill. The recycled materials used as general compacted fill (i.e., not a part of pavement sections) should meet all grading and compaction requirements in accordance with Section 30 of Caltrans Standard Specifications, or Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook", 2021), as applicable.

5.1.13 Site Drainage – Positive drainage should be developed and maintained away from overexcavated and foundation areas. Water should not be allowed to pond near foundations or on-grade improvements. All roof drainage should be conveyed away from the structures via surface drainage device (non-erosive, hardscape, ribbon gutter, etc.) or via a subsurface area drain system, to an acceptable location. Surface drainage should be directed away from the structures at a minimum 5 percent gradient for at least 10 feet beyond the building footprint for exposed soil conditions, and 2 percent gradient for paved surfaces. If obstructions or lot lines prohibit the 10-foot horizontal distance, the ground surface should be sloped as recommended above to an alternative method of diverting water away from foundations.

Landscaped areas adjacent to the structures should be avoided or should be planted in watertight planter boxes that effectively separate irrigated areas from foundation soils to reduce fluctuations in moisture content. A system of catch basins/area drains in low areas should be implemented and collected drainage should be directed away from the structures to the nearest street, driveway, or drainage structure.

5.2 Foundation Design Considerations

The principal factors affecting foundation type selection include acceptable magnitudes of differential settlement from static loading, and the potential for dry seismic settlement (i.e., dynamic densification) of the upper 25 to 30 feet of loose to medium dense alluvial deposits. The new structures may be supported on deep or shallow (i.e., spread) foundations. The advantages of deep foundations include: 1) deep foundations extending below the zone of dynamic densification should not be susceptible to minor differential settlement; and 2) under static loading, deep foundations should tend to settle less than shallow foundations. If these advantages of a deep foundation are not deemed significant enough to the project team to justify potential cost increases associated with deep foundations, then the proposed structures could be supported on shallow foundations bearing on soil improved by rammed aggregate piers. Recommendations for deep foundations, and shallow foundations with soil improvement, are presented in the following sections of this report.

5.2.1 Cast-in-Drilled Hole (CIDH) Piles – Based on the Walker Consultants Geotech Information Checklist (2018), we understand that the vehicle parking garage may be supported by a reinforced concrete cast-in-drilled-hole (CIDH) pile and grade beam foundation system, and we concur that CIDH piles are a logical foundation type for this structure. CIDH piles should derive vertical support from adhesion (skin friction) below the artificial fill and upper alluvium, in dense

undisturbed alluvial material as determined in the field by the project geotechnical engineer at the time of construction. Note that these pressures have not been factored for a Factor of Safety or Resistance Factor. Piles should be sized according to the following criteria:

Vertical Capacity - minimum three (3) pile diameter spacing
Minimum pile diameter…….24 inches
Minimum pile penetration……Elevation 850
(At least 10 feet into dense sand layer)

Allowable adhesion (skin friction), for dead plus live loads:
0 to up to 4.5 feet fill material…….0 psf
0 to 5 feet into alluvial material…….0 psf
Below 5 feet into alluvial material……500 psf

Lateral Passive Resistance - piles [equivalent fluid pressure applied over an effective width of two (2) pile diameters]
0 to up to 4.5 feet fill material…….0 pcf
0 to 5 feet into alluvial material……..……0 pcf
Below 5 feet into alluvial material…….……...400 pcf

The above adhesion value (skin friction) can be increased by 1/3 for seismic loading and should be decreased by 1/3 for uplift. The upper portion of the piles should be formed to create vertical surfaces, and "mushrooming" of pile tops and over-pours around grade beams should be prevented. Drilled pile holes should be machine cleaned of all loose material prior to the placement of steel and concrete. Piles should be steel-reinforced with a cage including a minimum of 4, No. 5 bars vertical (with greater reinforcement as required by the project Structural Engineer).

Due to the presence of sandy and gravelly soil material, many or all pile holes will likely require temporary casing to prevent caving and to keep the holes open. If water is present in the pile holes (which we do not anticipate) prior to placing concrete, the water should be pumped out until the pile holes are dry, or the concrete should be poured by the tremie method to displace the water. All piles should be connected at their tops by continuous grade beams. The grade beams should be embedded at least 9 inches below pad grade.

If CIDH piles become the preferred foundation alternative for the parking garage, then CSA should perform L-Pile analysis on the CIDH piles to evaluate top deflections based on parameters provided by the Project Structural Engineer.

5.2.2 Shallow Foundations Bearing on Rammed Aggregate Piers

Rammed Aggregate Piers (RAP). If a shallow foundation system is selected, then the soil below the shallow foundations may be improved with a rammed aggregate pier (RAP) system. RAP systems provide increased bearing capacity, reduce dynamic densification and differential settlement potential, and enhance settlement control by delivering composite stiffened bearing materials to reduce the matrix soil compressibility. The construction process typically consists of utilizing pre-augered or displacement methods. The augered or displaced cavities are backfilled with aggregate that is compacted in place using a high frequency, low amplitude, vibratory hammer. The impact hammer densifies aggregate vertically while the tamper foot forces aggregate laterally into cavity sidewalls resulting in stiff RAP elements and a stiffened matrix/soil. Constructed diameters typically range from 18 to 30 inches depending on the method of installation.

RAP systems may be used as foundation support for the new structures if the systems extend a sufficient depth below the upper loose to medium dense sand layers. RAP design and construction is typically performed by a specialty ground improvement contractor who should be consulted to provide further analysis and recommendations. The specialty contractor shall make their own interpretation of strength parameters and soil characteristics from the boring logs and laboratory testing presented in Appendix A and B of this report. The specialty contractor should determine the diameter and depths of the RAP system based on the subsurface conditions in conjunction with the differential static and seismic settlement tolerances provided by the Project Structural Engineer. The RAP design should be reviewed by CSA prior to submittal to the permitting agencies.

Shallow Foundations. If RAP foundation systems are considered for the project, the proposed structures may be supported on shallow foundations. Shallow foundations bearing on a RAP system should be at least 24 inches wide (or wider as determined by the Project Structural Engineer) and founded at least 24 inches below the lowest adjacent final grade. Typically, shallow foundations bearing on a RAP-improved pad may be designed for an allowable bearing capacity of up to 6,000 pounds per square foot (psf) for dead-plus-live loads, including wind or seismic forces; however, the design/build RAP contractor should provide the recommended allowable bearing capacity for the structure. Resistance to lateral loads may be computed using a concrete/soil base friction coefficient of 0.35 and 400 pcf equivalent fluid passive resistance

beginning below an embedment depth of 1 foot, but these values should be verified or amended by the design/build RAP contractor, as appropriate.

Estimated Settlement. Based on input from HSA, we understand that foundation design should accommodate a differential settlement of about 1/2 inch between adjacent columns (at 50-foot spacing) or over a 50-foot length of wall (distortion ratio of 1/1200) for static settlement, and a differential settlement of about 1/2 inch over 35 feet (distortion ratio of 1/420) for seismically induced settlement (e.g., dry seismic settlement).

5.3 Interior Slab-on-Grade Design

The interior slab-on-grade should be designed by the Project Structural Engineer to support the anticipated floor loads. To evaluate the pressure distribution beneath a slab-on-grade floor or rigid mat, we recommend using a Modulus of Subgrade Reaction equal to 150 pounds-per cubic-inch (pci), which is considered a long term load for compacted, coarse-grained subgrade.

As heavy equipment (i.e., fire engines) is likely planned in selected interior slab areas, we recommend that the slab have a minimum thickness of 8 inches and minimum strength of 4,000 psi. Crack control joints should be spaced at a maximum spacing of 12 feet in both directions. Although the Project Structural Engineer should design the slab reinforcement, interior slab-on-grade floors supporting heavy equipment should be reinforced with a minimum of No. 3 steel reinforcing bars at 16 inches on centers both ways. In moisture sensitive areas, the slab may be underlain by a minimum 15 mil vapor barrier. In accordance with ACI recommendations, no sand or gravel should be placed over the vapor barrier prior to the placement of concrete.

5.4 Retaining Wall Design

The following sections provides our recommendations for site retaining walls up to 15 feet in height.

5.4.1 Pile Supported Retaining Walls – If site constraints, compressible near-surface fill and alluvium, and/or wall heights preclude the use of shallow foundations, then pile foundations should be designed according to the Cast-in-Drilled Hole (CIDH) Piles section above. Retaining walls that are free to rotate should be designed to resist an active lateral fluid pressure of 35 pounds per cubic foot (pcf) for horizontal backfill. The above active lateral fluid pressures should be increased by 50% for walls that are restrained from rotation (building walls). The lateral loads on

the retaining wall can be resisted by passive pressure against the side of the piles using the lateral passive resistance provided in Cast-in-Drilled Hole (CIDH) Piles section above.

Retaining walls retaining over 6 feet of earth material should be designed to also resist a seismic load (in addition to the active load), equal to an equivalent fluid pressure of $17H^2$ pcf (where H is the height of the retaining wall).

If retaining walls are planned adjacent to ground level parking or used to support the driveway entrance, a uniform lateral traffic surcharge load of 100 psf should be included and applied against the top 10 feet of the retaining walls.

5.4.2 Shallow Foundation Supported Retaining Walls – If site constraints and/or wall heights permit the use of shallow foundations, then shallow foundations bearing on compacted, engineered fill that is bearing directly on scarified and compacted alluvium per Section 5.1 should be at least 18 inches wide (or wider as determined by the Project Structural Engineer) and founded at least 18 inches below the lowest adjacent final grade. Shallow retaining wall foundations may be designed for an allowable bearing capacity of 2,000 pounds per square foot (psf). Resistance to lateral loads should be computed using a concrete/soil base friction coefficient of 0.35 and 400 pcf equivalent fluid passive resistance beginning below an embedment depth of 1 foot.

Site retaining walls free to rotate should be designed to resist an active lateral fluid pressure of 35 pounds per cubic foot (pcf). The above active lateral fluid pressures should be increased by 50% for walls that are restrained from rotation (building walls). The foundation resistance to lateral loads on the retaining wall should be computed using the lateral passive resistance provided in the Shallow Foundations section above. If additional lateral resistance is required, and as an alternative to excavating a deep, continuous foundation key, shallow piles can be used to support the wall, using the same passive resistance criteria acting over two pile diameters.

Retaining walls retaining over 6 feet of earth material, should be designed to also resist a seismic load (in addition to the active load), equal to an equivalent fluid pressure of $17H^2$ pcf (where H is the height of the retaining wall).

If retaining walls are planned adjacent to ground level parking or used to support the driveway entrance, a uniform lateral traffic surcharge load of 100 psf should be included and applied against the top 10 feet of the retaining walls.

Lower terraced walls should be designed to resist the combined heights of all walls that are bearing within an imaginary 1(H):1(V) line extended up from their base.

5.4.3 Backdrains – Backdrains should be constructed behind all retaining walls regardless of the foundation type. The backdrain should be a minimum 12-inch-wide continuous blanket of either Caltrans Class 2 Permeable Material or 3/4-inch x 1/2-inch clean crush drainrock enclosed in Mirafi 140N (or approved equivalent) filter fabric, and extended to within 1 to 1-½ feet of the ground surface where an impervious fill and/or asphaltic concrete cap should be placed. A minimum 4-inch-diameter PVC Schedule 40 perforated drain pipe should be placed near the bottom of the drainrock (perforations down), surrounded by a minimum of 4 inches of drainrock with at least 2 inches of drainrock underlying the pipe. All backdrain pipes should be sloped to drain at a minimum of 1/2 percent and collected in 4-inch diameter non-perforated Schedule 40 PVC pipes that are sloped a minimum of 2 percent and discharged into the site or airport storm drainage system. The exterior retaining wall backdrains should also discharge to a suitable location away from structures, into the storm drain system, or onto an impermeable surface.

Waterproofing of retaining walls will depend on the type of wall constructed and should be designed by a Waterproofing Specialist to meet the project needs of the owner.

5.5 Utility Trenches, Pipe Bedding, and Trench Backfill

Utilities at the site are likely to include water, sewer, gas, electrical and communication. Utility trenches greater than 5 feet deep should be braced and shored in accordance with good construction practices and all applicable safety ordinances, including OSHA requirements. Pipe bedding for utilities should consist of sand having a minimum sand equivalent of 30. The sand should be placed in a zone that extends from a minimum of 6 inches below to 12 inches above the pipe for the full trench width. Bedding materials should be compacted to a minimum of 90 percent relative compaction.

The trench width should be sufficient to allow compaction equipment to operate between the pipe springline and trench wall. Jetting of trench backfill materials should not be permitted. Trench backfill materials and their placement above the pipe bedding should be in accordance with the local governing authority. At a minimum, trench backfill should be compacted to the standard of surrounding soils (e.g., 90 percent relative compaction for general fill, 95 percent relative compaction for pavement subgrade fill, etc.).

5.6 General Corrosivity Considerations

Bulk samples of the near-surface soils obtained from Borings B-38 and B-61 were tested for resistivity, pH, sulfates, and chlorides. The results are presented in the following Table 1.

Table 1. Summary of Corrosivity Test Results

Boring/Sample Depth	Soil Description	Resistivity (ohm)	pH	Sulfates (%)	Chlorides (%)
B-38 @ 1-5 feet	SM	14,000	7.36	0.001	0.00245
B-38 @ 0-8 feet	SM	30,000	7.46	0.001	0.00275

The resistivity values presented above suggest that onsite soil materials are mildly corrosive to underground steel. Tests results for chlorides indicate that onsite soils may be classified as C0 per ACI 318 Table 19.3.1.1. Tests results for sulfates indicate that onsite soils may be classified as S0 per ACI 318 Table 19.3.1.1. On the basis of sulfate concentration, we recommend that Type II cement be used for concrete in contact with earth materials, in accordance with CBC Chapter 19A (2019).

CSA does not practice in the field of corrosion engineering and the test results presented herein are preliminary. Test results should be evaluated by a corrosion engineer to assess how concrete structures and underground utilities should be protected from anticipated subsurface materials.

5.7 Airfield (Apron) Pavement Design

We understand that airfield (apron) pavement will be designed in accordance with the U.S. Department of Transportation Federal Aviation Administration's (FAA) Advisory Circular Nos. AC 150/5320-6G and 150/5370-10H.

5.7.1 California Bearing Ratio – Bulk samples of the near-surface soils obtained from Borings B-15, B-57, and B-85 were tested for California Bearing Ratio (CBR). The results are presented in the following Table 2.

Table 2. Summary of California Bearing Ratio Test Results

Boring/Sample Depth	Soil Description	CBR for 90% RC	CBR for 95% RC
B-15 @ 1-5 feet	SM	31.8	112.6
B-57 @ 1-6 feet	SM	26.6	66.3
B-85 @ 1-5 feet	SM	16.3	65.1

Based on the laboratory testing results presented above, we recommend that a design CBR of 20 be implemented for the upper 2 feet of apron subgrade materials that are compacted to 90 percent of the maximum dry unit weight, determined using test method ASTM D1557 (current version). If the upper 2 feet of apron subgrade materials are compacted to 95 percent of the maximum dry unit weight, then the CBR may be increased to 30.

5.7.2 Apron Modulus of Subgrade Reaction (k-value) – AC 150/5320-6G permits the modulus of subgrade reaction, k-value, to be determined based on the following equation:

$$\text{k-value} = 28.6926 \times \text{CBR}^{0.7788} \text{ (FAA, 2021, page 3-34)}$$

Based on the above equation, a k-value of 295 pounds per cubic inch (pci) may be used for a design CBR of 20, and a k-value of 405 pci may be used for a design CBR of 30.

5.7.3 Apron Elastic Subgrade Modulus (E value) – AC 150/5320-6G permits the elastic subgrade modulus, E value, to be evaluated in a number of ways. One such method is to determine E value based on the CBR as follows:

$$\text{E value} = 1500 \times \text{CBR (FAA, 2021, page 3-34)}$$

Based on the above equation, an E value of 30,000 pounds per square inch (psi) may be used for a design CBR of 20, and an E value of 45,000 psi may be used for a design CBR of 30.

5.7.4 Recycled Aggregate Base for Apron – We understand that existing concrete and asphalt demolished at the site may be pulverized and re-used as aggregate base in the proposed apron section. The recycled asphalt aggregate base should meet all grading and compaction requirements in accordance with AC 150/5320-6G, 150/5370-10H, Section 30 of Caltrans Standard Specifications, or Section 200-2 of the Standard Specifications for Public Works Construction ("Greenbook", 2021), as applicable.

5.8 Truck Area and Other Light Traffic Pavement Design

Either flexible pavement such as asphaltic concrete or rigid pavement such as reinforced concrete, or both, will be used in the truck area and other parking areas and driveways within the improvement areas. Flexible pavement sections consisting of asphaltic concrete and aggregate base were evaluated using the methods recommended by Caltrans Highway Design Manual Section 630 (2020a). Rigid pavement consisting of concrete and aggregate base was evaluated according to Caltrans Highway Design Manual Section 620 (2020b).

The results of the laboratory testing indicate that the near surface soils have an R-value of 73 based on a representative sample of onsite sandy materials collected from Boring B-41. A Traffic Index (TI) range of 7 to 9 was used for design; if design TI values are different from the assumed values, CSA should be notified so that we can reevaluate the recommended pavement section thickness.

5.8.1 Flexible Pavement – Recommended minimum flexible pavement sections, comprising asphaltic concrete over aggregate base, for the assumed TI range and design R-value of 50 (for conservatism), are presented in the following Table 3.

Table 3. Summary of Minimum Flexible Pavement Sections

Traffic Index	Asphalt Thickness (in)	Aggregate Base Thickness (in)
7	4.0	4.5
8	5.0	5.0
9	5.5	6.5

5.8.2 Rigid Pavement – Recommended minimum rigid pavement sections, comprising concrete over aggregate base, for the assumed TI range and Type II subgrade soil, are presented in the following Table 4.

Table 4. Summary of Minimum Rigid Pavement Sections

Traffic Index (TI)	Concrete Thickness (in)	Aggregate Base Thickness (in)
7	6.5	8.0
8	7.0	8.0
9	7.0	12.0

Concrete should have a minimum 28-day compressive strength of 3,500 pounds per square inch (psi). Reinforcement, if required by the design engineer, should not be less than structural requirements for shrinkage and temperature. Crack control joints should be placed every 12 to 15 feet in each direction. The modulus of rupture for the pavement sections listed in Table 4, assuming normalweight concrete per ACI 318 Table 19.2.4.2 (i.e., $\lambda = 1.0$), may be estimated at 450 psi. As an alternative, if a modulus of rupture of 530 psi is used, then an 8-inch-thick concrete truck apron underlain by 6 inches of aggregate base may be used.

Aggregate base materials placed beneath flexible and rigid pavement should meet the requirements for Processed Miscellaneous Base presented in Section 200 of the Standard Specifications for Public Works Construction ("Greenbook", 2021), and be placed on a subgrade prepared according to the recommendations in Section 5.1.

5.8.3 Pavement Construction Considerations

Subgrade. After removal of the existing fill, the upper 1 foot of pavement subgrade should be compacted to a minimum of 95 percent of maximum dry unit weight as determined using test method ASTM D1557 (current version).

Aggregate Base. Aggregate base material should be compacted in lifts not exceeding 6 to 8 inches in thickness and to at least 95 percent of maximum dry unit weight as determined using test method ASTM D1557 (current version). As-compacted moisture contents for aggregate base materials should be within 2 percent of the optimum moisture, as determined using test method ASTM D1557 (current version).

Drainage. Proper drainage of the paved and surrounding unpaved areas is essential. Grades should be established to expedite runoff away from pavements and reduce moisture infiltration into the base and subgrade.

5.9 Infiltration Basin Design

In accordance with the CHA's request, we conducted soil percolation testing at the subject site as part of the field exploration program. The purpose of our investigation was to calculate an estimated infiltration rate to be utilized in the design of an infiltration basin that will be constructed in the southeastern portion of the airfield apron. Percolation testing was conducted in 8-inch diameter Borings B-9 and B-13. The maximum BMP depth is estimated to be about 9 and 16 feet from existing and finished grade, respectively (CHA, 2021b). We recommend that the civil

designer apply the appropriate modifiers, reductions, and factors of safety based on the reviewing jurisdiction's requirements. The percolation test hole location is shown on Figure 2. Percolation test method and procedure and logs are presented in Appendix A.

5.9.1 Soil and Groundwater Conditions – Percolation test zone materials ranged in depth from 0 to 10 feet below existing grade and generally consist of loose to medium dense silty sand and sand with varying amounts of silt. Groundwater was not encountered within the percolation test holes. Furthermore, groundwater is not anticipated to adversely impact performance of the infiltration basin during the design life of the BMP.

5.9.2 Field Percolation Rate – Measured percolation rates (inch/hour) from the field testing are presented in the following Table 5.

Table 5. Summary of Field Measured Percolation Rates

Boring / Percolation No.	Location	Percolation Test Zone Depth (ft)	Field Percolation Rates (in/hr.)*
B-9	Southeast area of subject site (see Figure 2)	0 to 10	Reading 1: 3,660 Reading 2: 3,540 Reading 3: 3,480 Reading 4: 2,880 **Average: 3,390**
B-13	Southeast area of subject site (see Figure 2)	0 to 10	Reading 1: 3,960 Reading 2: 3,480 Reading 3: 3,240 Reading 4: 3,420 **Average: 3,525**

*For all readings, the 10-foot deep test holes completely drained in less than two minutes. The field percolation rate was then converted to an estimated drop over a 1-hour period.

Hydraulic conductivities (cm/sec) measured during laboratory falling head testing are presented in the following Table 6.

Table 6. Summary of Hydraulic Conductivity Test Results

Boring / Percolation No.	Depth Below Existing Grade (ft)	Effective Confined Pressure (psi)	Saturated Hydraulic Conductivity (cm/sec.)
B-9	6.0	3.2	1.1×10^{-4}
B-9	8.0	4.1	2.2×10^{-4}
B-13	3.0	3.0	2.5×10^{-4}
B-13	6.0	3.0	6.3×10^{-5}

5.9.3 Design Infiltration Rate – Based on the field and laboratory testing results presented above, we recommend a design infiltration rate of 10 in/hr for the proposed basin. The design infiltration rate is consistent with the soil types encountered within the basin limits.

5.9.4 Geotechnical Considerations – Infiltration will result in wetting of the generally loose to medium dense sandy alluvial soil materials. Water infiltration can cause or exacerbate geotechnical issues, including collapse potential, expansive soil movement, and increased liquefaction hazard. Consolidation testing performed on near surface sandy soils similar to those encountered within the percolation test holes generally showed less than 1/2 percent collapse upon inundation with water, and at a higher overburden stress than should be experienced by the basin soils. The collapse potential of the basin soils is therefore considered to be low.

Saturation of the subsurface soils above the existing groundwater table may occur due to stormwater infiltration. However, due to the primarily loose to medium dense nature and high percolation rates of the sandy alluvial soils adjacent to and below the basin, the potential for localized liquefaction to occur above the groundwater table is low. Please refer to Section 4.3 for a further discussion regarding liquefaction potential at the project site.

5.9.5 Geotechnical Conclusions – Based on the tested percolation rates and deep groundwater, it is our opinion that infiltration onsite should be considered feasible. However, the feasibility of infiltration onsite should be evaluated by the Project Civil Engineer. The field test results are not considered to be design rates; they are specific to the test hole location. Percolation rates may vary in other locations within the infiltration basin footprint.

In our opinion, the subsurface conditions encountered within the current infiltration area should not differ significantly from the conditions encountered in the percolation test holes. However, if the Project Civil Engineer determines that a percolation test should be performed within the current infiltration area, then we will prepare a proposal to conduct additional percolation testing as required.

Long-term sustainable infiltration rates may be affected by several factors, including the degree of saturation of the adjacent ground and the infiltration of potentially finer grained soils into the system. To account for these factors, an appropriate factor of safety should be considered in the application of these rates. The development of the factor of safety should be based upon the more conservative rate obtained and include consideration of the impacts of deteriorated performance, life/health safety issues and should anticipate that the rates established in these tests

may be reduced over time. Final selection of the appropriate reduction coefficients and factors of safety should be made by the Project BMP Designer based on the local laws and ordinances and desired level of conservatism.

Based on the soils encountered in our test holes, we expect that the percolation rates of the soils could be different than measured in the field due to variations in fines content. This expected variability in infiltration rates should be accounted for in determining the design elevation and size of the proposed infiltration system.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. Siltation and vegetation growth, along with other factors, may affect the infiltration rates of the basin area. Actual infiltration rates may vary from the values reported here. Infiltration systems should be located at least 10 feet from any existing or proposed foundation system.

5.10 Technical Review

Supplemental geotechnical design recommendations should be provided by our firm based on specific design needs developed by the other project design professionals. This report, and any supplemental recommendations, should be reviewed by the contractor as part of the bid process. It is strongly recommended that no construction be started nor grading undertaken until the final drawings, specifications, and calculations have been reviewed and approved in writing by a representative of our firm.

5.11 Earthwork Construction Inspection and Testing

All excavations including foundations and pier drilling should be inspected by a representative of our firm prior to placing rebar, backfilling, and/or pouring concrete foundations. Any grading should also be inspected and tested as appropriate to confirm adequate stripping, subgrade preparation, and compaction. Our office should be contacted with a minimum of 48 hours advance notice of construction activities requiring inspection and/or testing services.

6.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted engineering geology and geotechnical engineering principles and practices. No warranty, express or implied, of merchantability or fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

This report has been prepared for the exclusive use of the South Airport Cargo Center and their authorized agents for design considerations for the proposed South Airport Cargo Center at Ontario International Airport in Ontario, California. This report is issued with the understanding that it is the responsibility of the owner, or of their representative, to ensure that the information and recommendations contained herein are called to the attention of the project architect and/or engineer and incorporated into the design plans, as appropriate.

7.0 REFERENCES

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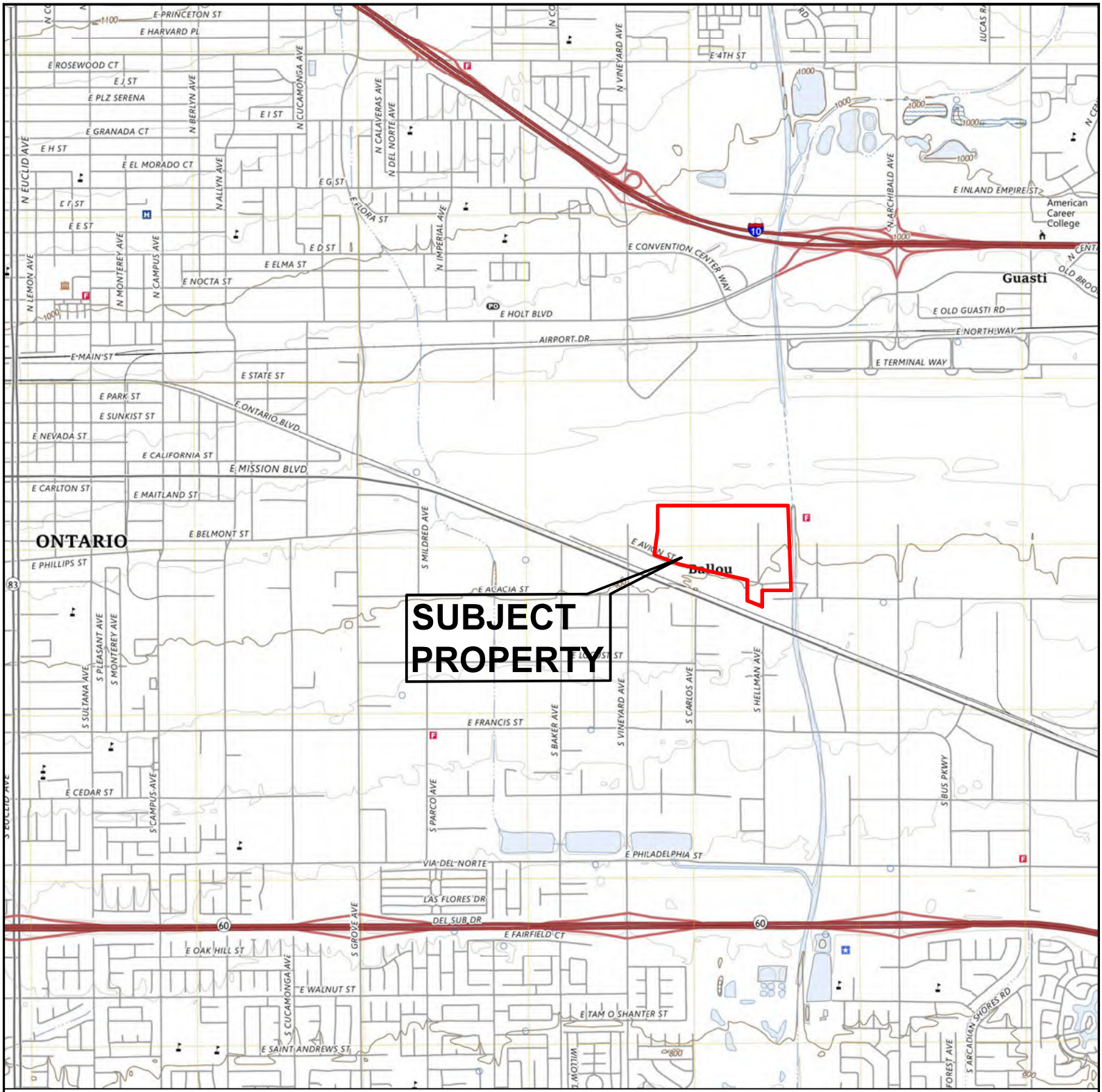
FIGURES



Reference: USGS Topographic Map of the Ontario and Guasti 7.5' Quadrangle, Ontario,California; Dated 2022

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1" = 1/2 mi

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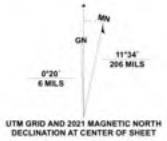

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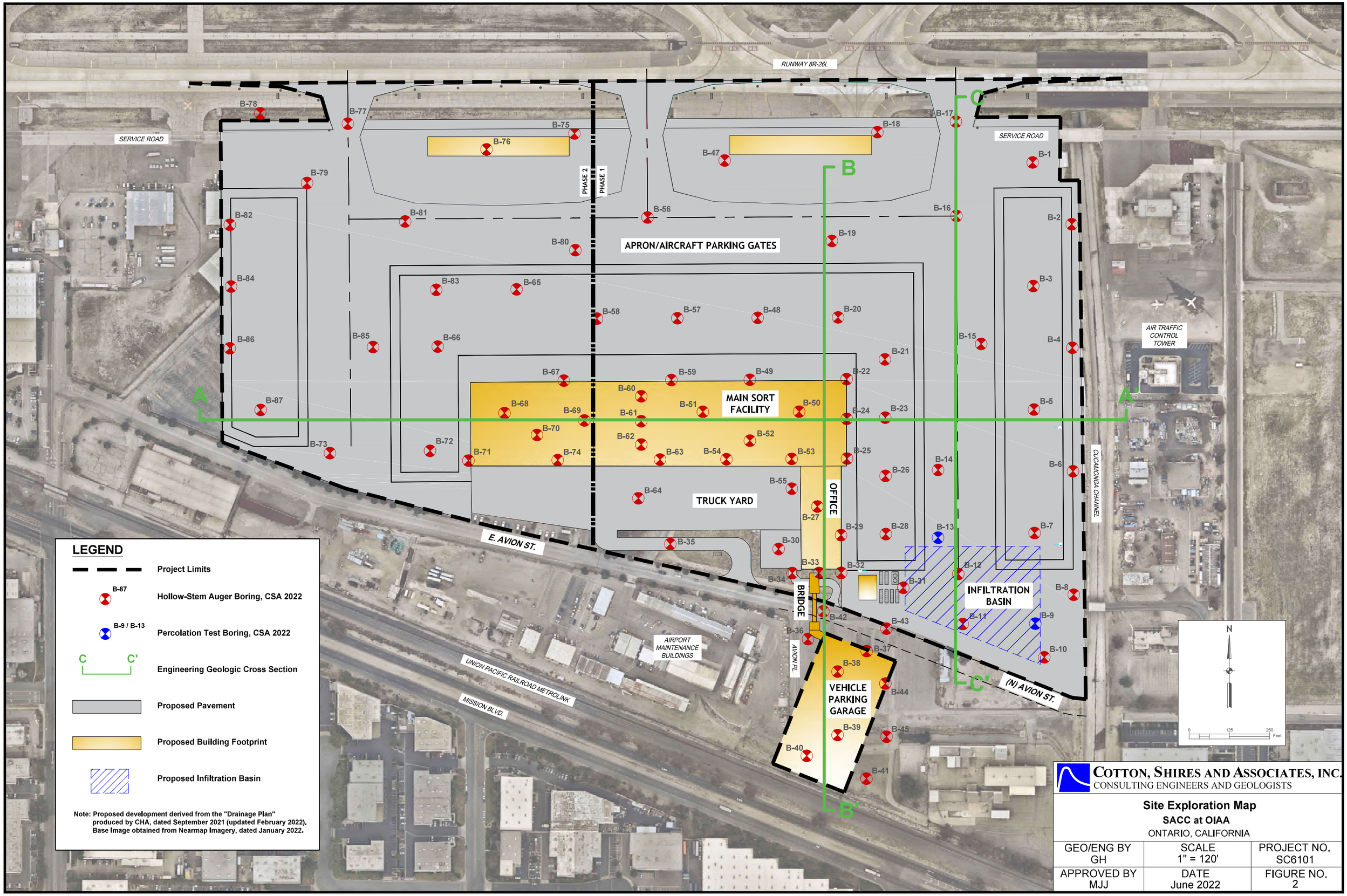
CONSULTING ENGINEERS AND GEOLOGISTS

Site Vicinity Map
SACC at OIAA
ONTARIO, CALIFORNIA

GEO/ENG BY	SCALE	PROJECT NO.
GH	1" = 1/2 mi	SC6101
APPROVED BY	DATE	FIGURE NO.
MJJ	June 2022	1



LEGEND

- Project Limits
- B-87 — Hollow-Stem Auger Boring, CSA 2022
- B-9 / B-13 — Percolation Test Boring, CSA 2022
- C — C' — Engineering Geologic Cross Section
- Proposed Pavement
- Proposed Building Footprint
- Proposed Infiltration Basin

Note: Proposed development derived from the "Drainage Plan" produced by CHA, dated September 2021 (updated February 2022). Base Image obtained from Nearmap Imagery, dated January 2022.

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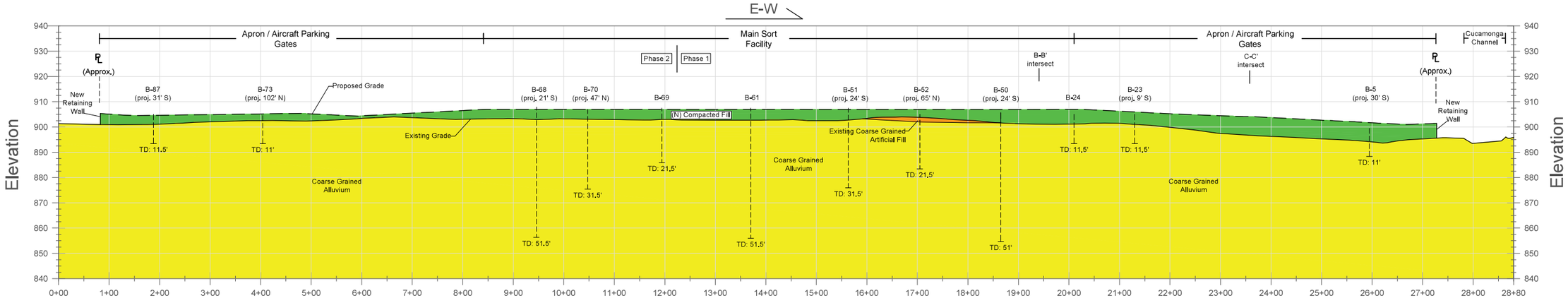
Site Exploration Map

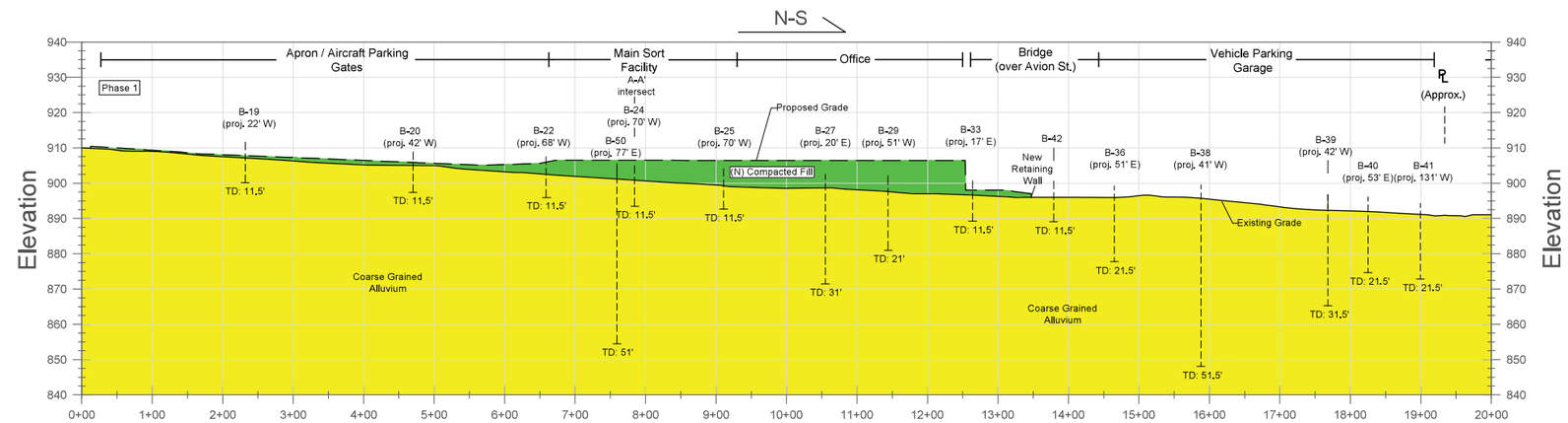
SACC at OIAA

ONTARIO, CALIFORNIA

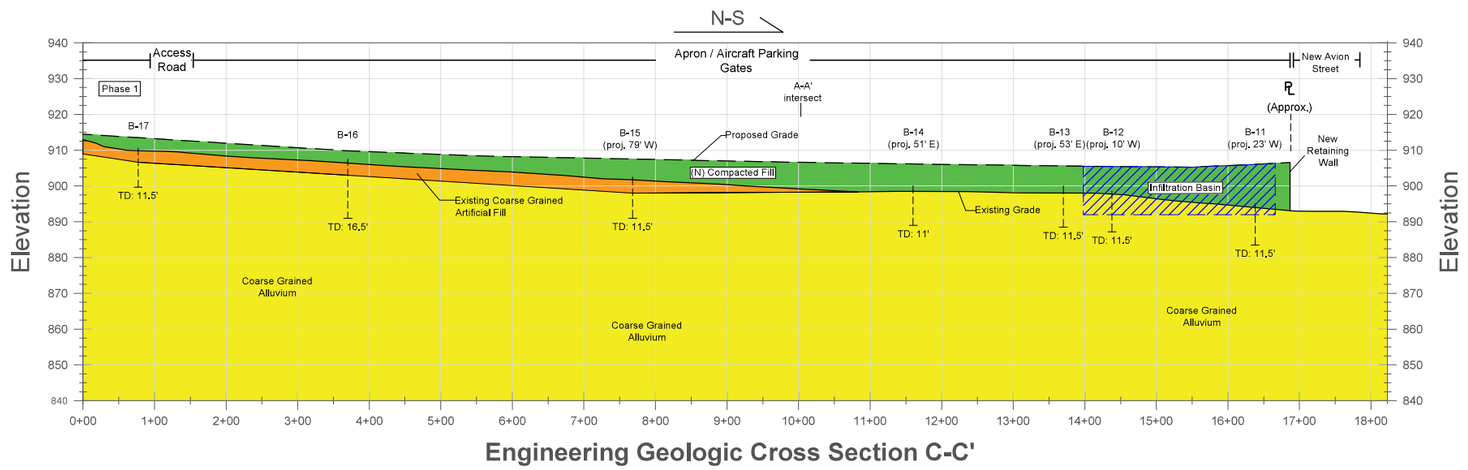
GEO/ENG BY	SCALE	PROJECT NO.
GH	1" = 120'	SC6101
APPROVED BY	DATE	FIGURE NO.
MJJ	June 2022	2



Engineering Geologic Cross Section A-A'



Engineering Geologic Cross Section B-B'



Engineering Geologic Cross Section C-C'

0 100' 200' 400' H

0 20' 40' 80' V

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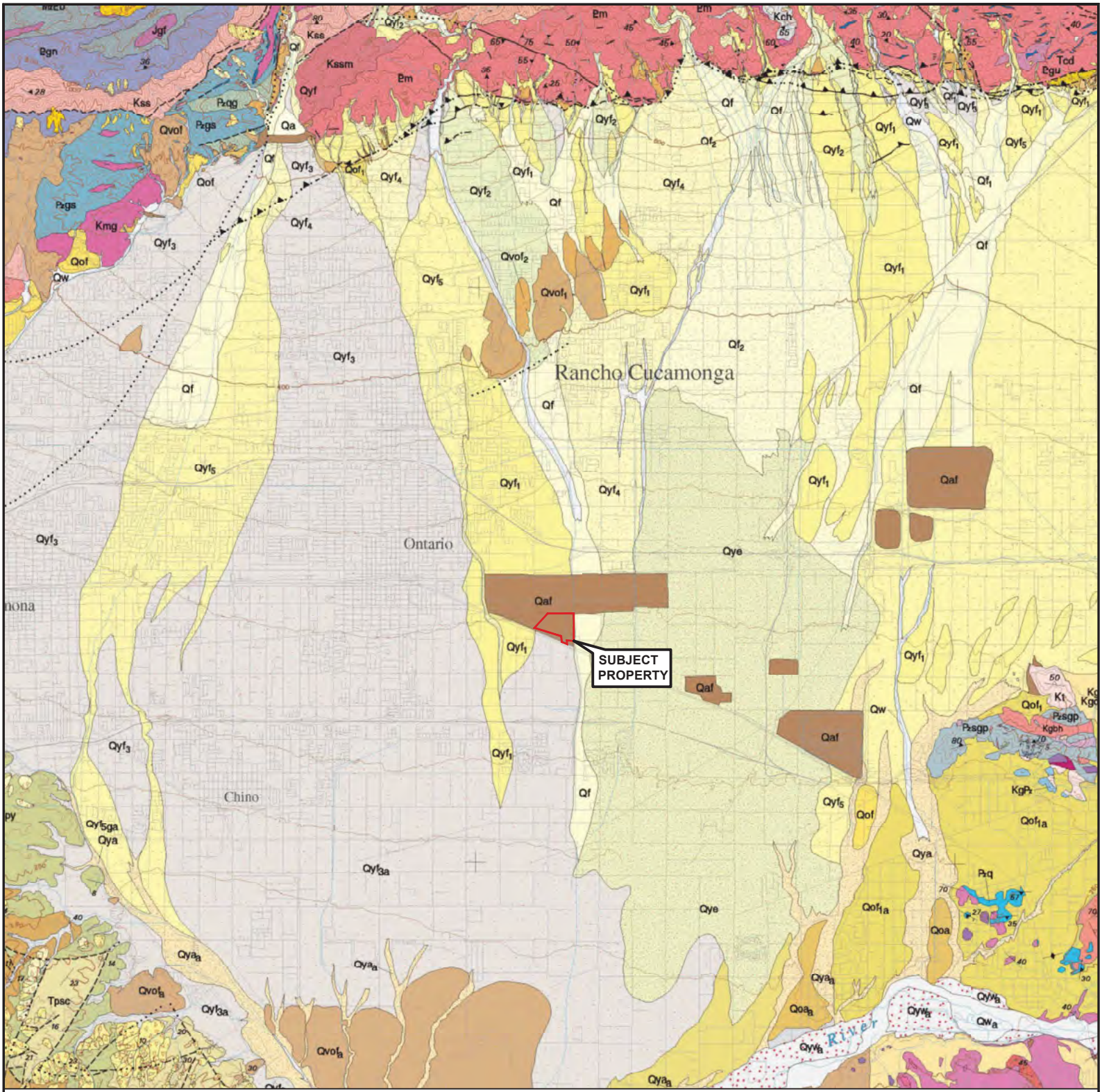
Engineering Geologic Cross Sections A-A' to C-C'

SACC at OIAA

ONTARIO, CALIFORNIA

GEO/ENG BY	SCALE	PROJECT NO.
GH	1"=100' H : 1"=20' V	SC6101
APPROVED BY	DATE	FIGURE
MJJ	June 2022	3



Reference: Geologic Map of the San Bernardino and Santa Ana 7.5' Quadrangle, San Bernardino, California, by Morton, D.M., and Miller, F.K., 2006

0 1 mi 2 mi

1" = 1 mi

N

EXPLANATION:

- Qaf - Aritificial Fill (late Holocene)
- Qf - Very young alluvial-fan deposits (late Holocene)
- Qyf3 - Young alluvial-fan deposits, Unit 3 (middle Holocene)
- Qyf2 - Young alluvial-fan deposits, Unit 2 (middle Holocene)
- Qyf1 - Young alluvial-fan deposits, Unit 1 (middle Holocene)
- Qye - Young eolian deposits (Holocene and late Pleistocene)

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Regional Geologic Map
SACC at OIAA
ONTARIO, CALIFORNIA

GEO/ENG BY	SCALE	PROJECT NO.
GH	1" = 1 mi	SC6101
APPROVED BY	DATE	FIGURE NO.
MJJ	June 2022	4

APPENDIX A
FIELD EXPLORATION

APPENDIX A – FIELD EXPLORATION

HOLLOW-STEM AUGER BORINGS

CSA performed a subsurface exploration program in January 2022 consisting of eighty-six (86) exploratory hollow-stem auger borings within the proposed improvement areas. The borings were excavated by means of truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers provided by Choice Drilling of Sylmar, California. The existing concrete apron was cored prior to excavation of borings B-15 and B-16 by United Coring of Riverside, California. The locations of the borings are shown on Figures 2 and 3. A CSA staff geologist logged the borings under the direct supervision of a registered geotechnical engineer and visually classified the soils in accordance with ASTM D-2487. Both bulk and relatively undisturbed and disturbed samples were obtained of the materials encountered at selected depths. The undisturbed samples were obtained in brass liners that were 2.5 inches in outside diameter and 6 inches long; the liners were inside a 3-inch diameter modified split-barrel California Sampler. The disturbed samples were obtained with an SPT sampler that was 2 inches in outside diameter. Both samplers were driven by an automatic, 140-pound hammer that was dropped 30 inches.

The borings were excavated between January 18 and January 27, 2022 and ranged in depths from about 6 to 51.5 feet bgs. Logs of the borings are presented as Figures A-1 through A-86. The logs depict our interpretation of the subsurface conditions at the date and location indicated based on representative samples collected at roughly two- to five-foot sampling intervals. It is not warranted that they are representative of subsurface conditions at other times and locations. The contacts on the log represent the approximate boundaries between earth materials, and the transitions between these materials may be gradual.

PERCOLATION TESTING

To measure field percolation rate, two 8-inch diameter percolation test holes (B-9) and (B-13) were excavated between January 18 and January 24, 2022, utilizing a truck-mounted hollow-stem-auger drill rig to a depth of 11.5 feet bgs. Each percolation test hole was backfilled with cuttings to a depth of 10 feet, and then slotted PVC pipe and #3 washed sand between 10 feet and the ground surface. Prior to field testing, each percolation test hole was pre-soaked, and the water completely drained from each hole within two minutes. Following the pre-soak, each test hole was filled to the top of the testing zone and the drop in water was measured until there was no water left in the hole. After every reading, the water level was refilled to the top of the testing zone. A total of four (4) readings were conducted for each test hole. Water depth

measurements were taken to the nearest 0.01-inch increment using an electronic water sounder. Upon completion of testing, the PVC casing was removed, and the test hole was backfilled with soil cuttings to the ground surface. The percolation test hole locations are shown on Figures 2 and 3. The logs of the percolation test holes B-9 and B-13 are presented as Figures A-9 and A-13. Measured percolation rates (inch/hour) from the field testing are presented in the Infiltration Basin Design section of the main report.

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LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Chill **Boring:** B-1

Location: Apron **Ground Surface Elev.:** 907.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907	0			Pavement: 6" AC over 6" AB						
906	1			**Alluvium:**						
905	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation	R1	113.7	9.5	21	MC	Fines: 31.7 %
904	3									
903	4		SM							
902	5				R2	114.2	14.9	14	MC	
901	6									
900	7			Sand (SP); tan, moist, very dense, medium to coarse grained	R3	114.1	5.1	50/6	SPT	
899	8									
898	9		SP							
897	10			-- trace fine subrounded gravel, at 10 feet.	R4	112.8	3	52	MC	
896	11									
895	12			TD: 11.5 feet						
894	13			No groundwater encountered.						
893	14			Boring backfilled w/ cuttings, and						
892	15			capped w/ concrete and black dye at the surface.						
891	16									
890	17									
889	18									
888	19									
887	20									
886	21									
885	22									
884	23									
883	24									
882	25									
881	26									
880	27									
879	28									
878	29									
877	30									
876	31									
875	32									
874	33									
873	34									
	35									

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Figure No.: A-1

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Hazy, Cool **Boring:** B-2

Location: Apron **Ground Surface Elev.:** 906.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
906				Pavement: 4" AC over 7" AB						
905	1			**Alluvium**:						
904	2			Silty sand (SM); brown, moist, very dense, fine grained,						
903	3		SM	light oxidation; trace fine subrounded gravel, at 2 feet.						
902	4				R1	120.1	5.2	50/6	MC	
901	5									
900	6			TD: 6 feet						
899	7			No groundwater encountered.						
898	8			Boring backfilled w/ cuttings, and						
897	9			capped w/ cold patch asphalt at the surface.						
896	10									
895	11									
894	12									
893	13									
892	14									
891	15									
890	16									
889	17									
888	18									
887	19									
886	20									
885	21									
884	22									
883	23									
882	24									
881	25									
880	26									
879	27									
878	28									
877	29									
876	30									
875	31									
874	32									
873	33									
872	34									
	35									

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Figure No.: A-2

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Cloudy, Warm **Boring:** B-3

Location: Apron **Ground Surface Elev.:** 903.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
903				Pavement: 4" AC over 2" AB						
902	1			**Alluvium:**						
901	2			Sand w/ silt (SP-SM); brown, moist, medium dense, fine grained, light oxidation	R1	102.2	3.3	27	MC	Fines: 5.2 %
900	3									
899	4									
898	5				R2	123.2	12.4	33	MC	
897	6		SP-SM							
896	7			-- tan, dense, medium grained, at 7 feet.	R3	121.5	2.2	52	MC	
895	8									
894	9									
893	10			--trace fine to medium subrounded gravel, at 10 feet.	R4	119.4	2.1	65	MC	
892	11									
891	12			TD: 11.5 feet						
890	13			No groundwater encountered.						
889	14			Boring backfilled w/ cuttings, and						
888	15			capped w/ concrete and black dye at the surface.						
887	16									
886	17									
885	18									
884	19									
883	20									
882	21									
881	22									
880	23									
879	24									
878	25									
877	26									
876	27									
875	28									
874	29									
873	30									
872	31									
871	32									
870	33									
869	34									
	35									

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Figure No.: A-3

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Hazy, Cool **Boring:** B-4

Location: Apron **Ground Surface Elev.:** 901.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
				Pavement: 4" AC over 4" AB						
901	1		ML	**Alluvium:** Sandy silt (ML); mottled tan to brown, moist, medium stiff, fine grained, heavy oxidation						
900	2									
899	3				R1	110.4	13.2	27	MC	Fines: 53.6 %
898	4									
897	5		SM	Silty sand (SM); mottled tan to brown, moist, medium dense, fine grained, heavy oxidation; trace gravel						
896	6				R2	117.2	6.9	22	MC	
895	7									
894	8				R3	115	7.9	24	MC	
893	9									
892	10		SP-SM	Sand w/ silt and gravel (SP-SM); tan, moist, dense, medium grained, trace fine subangular gravel						
891	11				R4	125.3	1.9	40 50/5	MC	
890	12			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete and black dye at the surface.						
889	13									
888	14									
887	15									
886	16									
885	17									
884	18									
883	19									
882	20									
881	21									
880	22									
879	23									
878	24									
877	25									
876	26									
875	27									
874	28									
873	29									
872	30									
871	31									
870	32									
869	33									
868	34									
867	35									

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Figure No.: A-4

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-5

Location: Apron **Ground Surface Elev.:** 898.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
898	0			Pavement: 4" AC over 4" AB						
897	1		SM	**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained, light oxidation						
896	2				R1	118.5	8.9	37	MC	Fines: 30.3 %
895	3									
894	4		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained, light oxidation						
893	5				R2	122.7	10.2	19	MC	
892	6									
891	7		SP-SM	Sand w/ silt (SP); brown, moist, dense, medium grained, trace fine subrounded gravel	R3	118.6	8.3	28 50/3	MC	
890	8									
889	9									
888	10			-- fine to coarse gravel, angular fragments, at 10.5 feet.	R4	125.3	1.9	30 50/6	MC	
887	11			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete and black dye at the surface.						
886	12									
885	13									
884	14									
883	15									
882	16									
881	17									
880	18									
879	19									
878	20									
877	21									
876	22									
875	23									
874	24									
873	25									
872	26									
871	27									
870	28									
869	29									
868	30									
867	31									
866	32									
865	33									
864	34									
	35									

Figure No.: A-5

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Int. cloudy, Warm **Boring:** B-6

Location: Apron **Ground Surface Elev.:** 897.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
897				Pavement: 4" AC over 4" AB						
896	1			**Fill:**						
895	2		SM	Silty sand (SM); brown, moist, medium dense, fine grained, glass fragment at 2.5 feet	R1	117.9	9.1	35	MC	
894	3									
893	4			**Alluvium:**						
892	5		SM	Silty sand (SM); brown, moist, medium dense, fine to medium grained, light oxidation	R2	116.1	8.6	32	MC	
891	6									
890	7			-- increased fine grained sand, at 7 feet.	R3	122.4	8.9	30	MC	
889	8									
888	9			Sand (SP); tan, moist, medium dense, medium grained						
887	10		SM		R4	101.9	1.9	28	MC	
886	11			TD: 11.5 feet						
885	12			No groundwater encountered.						
884	13			Boring backfilled w/ cuttings, and						
883	14			capped w/ cold patch asphalt at the surface.						
882	15									
881	16									
880	17									
879	18									
878	19									
877	20									
876	21									
875	22									
874	23									
873	24									
872	25									
871	26									
870	27									
869	28									
868	29									
867	30									
866	31									
865	32									
864	33									
863	34									
	35									

Figure No.: A-6

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Cloudy, Warm **Boring:** B-7

Location: Apron **Ground Surface Elev.:** 898.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
898	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
897	2									
896	3				R1	108.2	11.3	23	MC	
895	4									
894	5									
893	6		SM		R2	105.4	2.8	23	MC	
892	7									
891	8			-- increased fine grained sand, at 7 feet.	R3	115.6	3.4	56	MC	
890	9									
889	10									
888	11				R4	109.8	2.3	52	MC	
887	12		SP	Sand (SP); tan, moist, dense, fine grained trace coarse gravel						
886	13			TD: 11.5 feet						
885	14			No groundwater encountered.						
884	15			Boring backfilled w/ cuttings.						
883	16									
882	17									
881	18									
880	19									
879	20									
878	21									
877	22									
876	23									
875	24									
874	25									
873	26									
872	27									
871	28									
870	29									
869	30									
868	31									
867	32									
866	33									
865	34									
864	35									

Figure No.: A-7

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Cloudy, Cool **Boring:** B-8

Location: Apron **Ground Surface Elev.:** 897.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
897	0			**Alluvium:**						
896	1			Silty sand (SM); brown, moist, medium dense, fine grained						
895	2				R1	110	9.1	27	MC	
894	3									
893	4									
892	5		SM	-- increase fine grained sand, at 5 feet.	R2	109.2	2.4	32	MC	
891	6									
890	7			-- increase medium grained sand; trace fine gravel, light oxidation, at 7 feet.	R3	116.9	1.9	26	MC	
889	8									
888	9									
887	10			Sand (SP); tan, moist, medium dense, fine to medium grained, trace fine to medium subangular gravel						
886	11		SP							
885	12				R4	126.4	0.7	41	MC	
884	13			TD: 13 feet No groundwater encountered. Boring backfilled w/ cuttings.						
883	14									
882	15									
881	16									
880	17									
879	18									
878	19									
877	20									
876	21									
875	22									
874	23									
873	24									
872	25									
871	26									
870	27									
869	28									
868	29									
867	30									
866	31									
865	32									
864	33									
863	34									
	35									

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Figure No.: A-8

COTTON, SHIRES AND ASSOCIATES, INC.

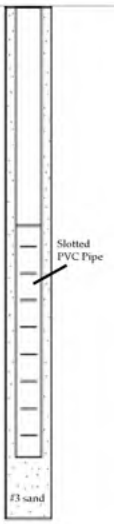
LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-9

Location: Apron **Ground Surface Elev.:** 894.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
894	1		SM	**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained	B1		4.8			
893	2									
892	3				R1	105.4	1.3	14	MC	
891	4									
890	5		SP-SM	Sand w/ silt (SP-SM); tan to brown, moist, loose, fine to medium grained						
889	6				R2	104.8	6.7	9	MC	
888	7			-- trace fine subrounded gravel, light oxidation, at 7 feet.						
887	8				R3	100.8	6	11	MC	
886	9									
885	10		SP	Sand (SP); tan, moist, dense, medium grained, trace fine subangular gravel						
884	11				R4	120.9	5.3	47	MC	
883	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
882	13									
881	14									
880	15									
879	16									
878	17									
877	18									
876	19									
875	20									
874	21									
873	22									
872	23									
871	24									
870	25									
869	26									
868	27									
867	28									
866	29									
865	30									
864	31									
863	32									
862	33									
861	34									
860	35									



Bulk: 0-5'

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Figure No.: A-9

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-10

Location: Apron **Ground Surface Elev.:** 893.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
893	1			Pavement: 4" AC (no base):						Bulk: 1-5'
892	2			**Alluvium:**						Fines: 29.2 %
891	3			Silty sand (SM); brown, moist, loose to medium dense, fine grained	R1	112.3	8.9	15	MC	
890	4									
889	5		SM							
888	6				R2	115.3	10.5	15	MC	Fines: 37.7 %
887	7									
886	8				R3	111.5	10.2	17	MC	
885	9									
884	10		SP	Sand (SP); tan, moist, dense; trace fine subangular gravel						
883	11				R4	122.3	2.3	48	MC	
882	12			TD: 11.5 feet						
881	13			No groundwater encountered.						
880	14			Boring backfilled w/ cuttings.						
879	15									
878	16									
877	17									
876	18									
875	19									
874	20									
873	21									
872	22									
871	23									
870	24									
869	25									
868	26									
867	27									
866	28									
865	29									
864	30									
863	31									
862	32									
861	33									
860	34									
859	35									

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Figure No.: A-10

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-11

Location: Apron **Ground Surface Elev.:** 895.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/25/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
895				Pavement: 3" AC (no base):	B1		6.1			Bulk: 1-5'
894	1			**Alluvium:**						Fines: 25.5 %
893	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
892	3				R1	109.8	9.2	16	MC	
891	4									
890	5		SM							
889	6				R2	118.9	11.3	23	MC	
888	7									
887	8			-- medium grained sand; trace fine subangular to angular gravel, at 7 feet.	R3	109.5	4.8	32	MC	
886	9									
885	10		SP-SM	Sand w/ silt and gravel (SP-SM); tan, moist, medium dense, medium grained, fine subangular gravel	R4	125.5	1.6	38	MC	
884	11									
883	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/cuttings.						
882	13									
881	14									
880	15									
879	16									
878	17									
877	18									
876	19									
875	20									
874	21									
873	22									
872	23									
871	24									
870	25									
869	26									
868	27									
867	28									
866	29									
865	30									
864	31									
863	32									
862	33									
861	34									
	35									

Figure No.: A-11

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-12

Location: Apron **Ground Surface Elev.:** 898.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
898				Pavement: 3" AC over 3" AB						
897	1			**Alluvium:**						
896	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
895	3				R1	105.7	6.7	15	MC	Fines: 18.0 %
894	4									
893	5		SM							
892	6				R2	105.6	4.8	17	MC	Fines: 26.8 %
891	7			-- trace fine subrounded gravel, at 6 feet.						
890	8				R3	113.6	7.6	23	MC	
889	9									
888	10		SP-SM	Sand w/ silt and gravel (SP-SM); tan, moist, medium dense, medium grained, fine subangular gravel						
887	11				R4	116.8	2.5	26	MC	
886	12			TD: 11.5 feet						
885	13			No groundwater encountered.						
884	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
883	15									
882	16									
881	17									
880	18									
879	19									
878	20									
877	21									
876	22									
875	23									
874	24									
873	25									
872	26									
871	27									
870	28									
869	29									
868	30									
867	31									
866	32									
865	33									
864	34									
	35									

Figure No.: A-12

COTTON, SHIRES AND ASSOCIATES, INC.

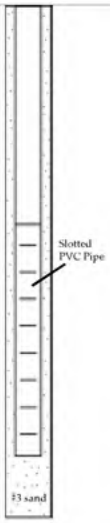
LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cold **Boring:** B-13

Location: Apron **Ground Surface Elev.:** 900.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
900				Pavement: 3" AC over 2" AB:						
899	1			**Alluvium:**						
898	2			Silty sand (SM); brown, moist, medium dense, fine grained						
897	3				R1	103.8	6.3	24	MC	
896	4									
895	5									
894	6		SM		R2	94.4	3.7	16	MC	
893	7			-- trace fine subrounded gravel, at 6 feet						
892	8				R3	111.6	7	19	MC	
891	9									
890	10									
889	11				R4	110.8	2.8	30	MC	
888	12			TD: 11.5 feet						
887	13			No groundwater encountered.						
886	14			Boring backfilled w/cuttings, and capped w/ cold patch asphalt at surface.						
885	15									
884	16									
883	17									
882	18									
881	19									
880	20									
879	21									
878	22									
877	23									
876	24									
875	25									
874	26									
873	27									
872	28									
871	29									
870	30									
869	31									
868	32									
867	33									
866	34									
865	35									



COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-13

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-14

Location: Apron **Ground Surface Elev.:** 900.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
900	0			Pavement: 2" AC over 2" AB:						
899	1			**Alluvium:**						
898	2		SM	Silty sand (SM); brown, moist, medium dense, fine grained	R1	111.4	7	20	MC	
897	3									
896	4									
895	5		SP-SM	Sand w/ silt and gravel (SP-SM); tan, moist, medium dense to dense, medium to coarse grained, fine to medium subangular gravel, at 7.5 feet	R2	116.4	1.7	30	MC	
894	6									
893	7									
892	8									
891	9									
890	10				R3	131.4	1.8	40 50/6	MC	
889	11			TD: 11.0 feet No groundwater encountered. Boring backfilled w/cuttings, and capped w/ cold patch asphalt at surface.						
888	12									
887	13									
886	14									
885	15									
884	16									
883	17									
882	18									
881	19									
880	20									
879	21									
878	22									
877	23									
876	24									
875	25									
874	26									
873	27									
872	28									
871	29									
870	30									
869	31									
868	32									
867	33									
866	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-14

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Cool **Boring:** B-15

Location: Apron **Ground Surface Elev.:** 902.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
902				Pavement: 8" AC (no base):	B1		4.8			Bulk: 1-5' Fines: 21.7 %
901	1		SM	**Fill:** Silty sand (SM); brown, moist, dense, fine to medium grained, light oxidation; trace gravel	R1	116.4	6.9	47	MC	
900	2									
899	3				R2	111.3	3.9	52	MC	
898	4									
897	5		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense, medium grained, light oxidation	R3	121.3	9.9	22	MC	
896	6									
895	7			-- coarse grained sand, at 7 feet.	R4	113.3	4.6	31	MC	
894	8									
893	9		SP	Sand (SP); tan, moist, dense, medium grained						
892	10				R5	106.6	5.2	47	MC	
891	11									
890	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete at surface.						
889	13									
888	14									
887	15									
886	16									
885	17									
884	18									
883	19									
882	20									
881	21									
880	22									
879	23									
878	24									
877	25									
876	26									
875	27									
874	28									
873	29									
872	30									
871	31									
870	32									
869	33									
868	34									
	35									

Figure No.: A-15

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Cloudy, Warm **Boring:** B-16

Location: Apron **Ground Surface Elev.:** 907.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
				Pavement: 8" AC (no base):	B1		6.5			Bulk: 1-5'
907	1			**Fill:**						Fines: 33.6 %
906	2		SM	Silty sand (SM); brown, moist, medium dense to dense, fine to medium grained	R1	115.2	7.2	51	MC	
905	3				R2	115.2	7.6	39	MC	
904	4									
903	5			**Alluvium:**						
902	6		SM	Silty sand (SM); brown, moist, medium dense, medium grained	R3	111.1	9.6	21	MC	Fines: 32.6 %
901	7									
900	8			Sand w/ silt and gravel (SP-SM); tan, moist, very dense, fine to coarse grained, fine to medium subrounded gravel, at 7 feet.						
899	9									
898	10		SP-SM							
897	11				S1			30 50/6	SPT	
896	12									
895	13									
894	14			Silty sand (SM); brown, moist, medium dense, fine grained, light oxidation						
893	15		SM							
892	16				S2			31	MC	
891	17			TD: 16.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete at surface.						
890	18									
889	19									
888	20									
887	21									
886	22									
885	23									
884	24									
883	25									
882	26									
881	27									
880	28									
879	29									
878	30									
877	31									
876	32									
875	33									
874	34									
873	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-16

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Cool **Boring:** B-17

Location: Apron **Ground Surface Elev.:** 911.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
911	0			Pavement: 4" AC (no base)						
910	1		SM	**Fill:** Silty sand (SM); brown, moist, loose, fine grained, trace asphalt debris						
909	2				R1	119	9.8	39	MC	
908	3									
907	4		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
906	5				R2	113.3	13.1	15	MC	
905	6									
904	7									
903	8									Fines: 39.8 %
902	9		SP	Sand (SP); tan, moist, very dense, medium grained						
901	10				R3	127.4	2.2	37	MC	
900	11			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.				50/5		
899	12									
898	13									
897	14									
896	15									
895	16									
894	17									
893	18									
892	19									
891	20									
890	21									
889	22									
888	23									
887	24									
886	25									
885	26									
884	27									
883	28									
882	29									
881	30									
880	31									
879	32									
878	33									
877	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-17

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Cool **Boring:** B-18

Location: Apron **Ground Surface Elev.:** 914.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/19/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914	0			Pavement: 6" AC over 10" AB						
913	1									
912	2		SM	**Fill:** Silty sand (SM); brown, moist, medium dense to dense, fine grained	R1	112.1	10	45	MC	Fines: 36.4 %
911	3									
910	4									
909	5		SM	Alluvium: Silty sand (SM); brown, moist, loose to medium dense, fine grained	R2	125.2	16.3	12	MC	
908	6									
907	7									
906	8									
905	9									
904	10			-- medium dense, at 10 feet.	R3	110.1	14.7	20	MC	
903	11									
902	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
901	13									
900	14									
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

Figure No.: A-18

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-19

Location: Apron **Ground Surface Elev.:** 911.7' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
911	1		SM	**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained						
910	2									
909	3				R1	113.2	9.1	21	MC	Fines: 25.1 %
908	4									
907	5									
906	6				R2	114.3	13.7	9	MC	
905	7									
904	8				R3	114.1	13.7	19	MC	
903	9									
902	10									
901	11				R4	114	13.9	25	MC	
900	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
899	13									
898	14									
897	15									
896	16									
895	17									
894	18									
893	19									
892	20									
891	21									
890	22									
889	23									
888	24									
887	25									
886	26									
885	27									
884	28									
883	29									
882	30									
881	31									
880	32									
879	33									
878	34									
877	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-19

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-20

Location: Apron **Ground Surface Elev.:** 908.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
908	1			**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained						
907	2									
906	3				R1	104.4	10.1	14	MC	Fines: 29.7 %
905	4									
904	5									
903	6		SM		R2	106.4	12.2	9	MC	Fines: 31.2 %
902	7									
901	8				R3	111.8	16.6	18	MC	
900	9									
899	10									
898	11				R4	117.6	14	26	MC	
897	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/cuttings.						
896	13									
895	14									
894	15									
893	16									
892	17									
891	18									
890	19									
889	20									
888	21									
887	22									
886	23									
885	24									
884	25									
883	26									
882	27									
881	28									
880	29									
879	30									
878	31									
877	32									
876	33									
875	34									
874	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-20

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-21

Location: Apron **Ground Surface Elev.:** 907.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907				**Alluvium:**						
906	1			Silty sand (SM); brown, moist, loose, fine grained						
905	2		SM							
904	3				R1	98.5	6.2	11	MC	Fines: 15.5 %
903	4									
902	5		SP-SM	Sand w/ silt (SP-SM); brown, moist, loose, fine to medium grained						
901	6				R2	99.9	5.4	14	MC	Fines: 10.9 %
900	7									
899	8			Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation, trace fine to coarse subrounded gravel	R3	109.7	10	12	MC	Fines: 34.9 %
898	9		SM							
897	10									
896	11				R4	127.2	7.5	35	MC	
895	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/cuttings.						
894	13									
893	14									
892	15									
891	16									
890	17									
889	18									
888	19									
887	20									
886	21									
885	22									
884	23									
883	24									
882	25									
881	26									
880	27									
879	28									
878	29									
877	30									
876	31									
875	32									
874	33									
873	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-21

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-22

Location: Main Sort Facility **Ground Surface Elev.:** 907.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907				**Alluvium:**						
906	1			Silty sand (SM); brown, moist, loose, fine grained						
905	2		SM							
904	3				R1	105	7.6	13	MC	
903	4									
902	5		SP-SM	Sand w/ silt (SP-SM); brown, moist, loose, fine to medium grained						
901	6				R2	107.6	6.7	13	MC	
900	7									
899	8			Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation, trace fine subrounded gravel						
898	9		SM							
897	10									
896	11				R3	123.9	8.5	56	MC	
895	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
894	13									
893	14									
892	15									
891	16									
890	17									
889	18									
888	19									
887	20									
886	21									
885	22									
884	23									
883	24									
882	25									
881	26									
880	27									
879	28									
878	29									
877	30									
876	31									
875	32									
874	33									
873	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-22

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-23

Location: Apron **Ground Surface Elev.:** 905.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	0			**Alluvium:**						
904	1			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
903	2				R1	107.9	6.7	12	MC	Fines: 15.5 %
902	3									
901	4									
900	5				R2	118.5	9.4	16	MC	Fines: 34.2 %
899	6		SM							
898	7				R3	119.1	5.9	37	MC	
897	8									
896	9									
895	10			-- very dense, at 10 feet.	R4	125.4	5.4	72	MC	
894	11									
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-23

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-24

Location: Main Sort Facility **Ground Surface Elev.:** 905.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	0			**Alluvium:**						
904	1		SM	Silty sand (SM); brown, moist, loose to dense, fine to medium grained						
903	2				R1	107.9	6.7	12	MC	
902	3									
901	4			Sand (SP); tan, moist, medium dense, medium grained						
900	5									
899	6		SP		R2	118.5	9.4	16	MC	
898	7									
897	8									
896	9			Silty sand (SM); brown, moist, dense, medium to coarse grained, light oxidation						
895	10		SM							
894	11				R3	125.4	5.4	72	MC	
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
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874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-24

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-25

Location: Main Sort Facility **Ground Surface Elev.:** 904.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
904	0			**Alluvium:**						
903	1			Sand w/ silt (SP-SM); brown, moist, medium dense, medium to coarse grained						
902	2				R1	104.9	7.2	17	MC	
901	3		SP-SM							
900	4									
899	5				R2	104.9	3.3	18	MC	
898	6									
897	7			Silty Sand (SM); brown, moist, medium dense, fine grained, light oxidation	R3	115.8	13.6	25	MC	
896	8									
895	9		SM							
894	10				R4	113.5	8.9	45	MC	
893	11		SP-SM	Sand w/ silt (SP-SM); brown, moist, medium dense to dense, medium to coarse grained						
892	12			TD: 11.5 feet						
891	13			No groundwater encountered.						
890	14			Boring backfilled w/ cuttings.						
889	15									
888	16									
887	17									
886	18									
885	19									
884	20									
883	21									
882	22									
881	23									
880	24									
879	25									
878	26									
877	27									
876	28									
875	29									
874	30									
873	31									
872	32									
871	33									
870	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-25

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-26

Location: Apron **Ground Surface Elev.:** 903.7' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
903	1			**Alluvium:**						
902	2			Sand w/ silt (SP-SM); brown, moist, medium dense, fine to coarse grained						
901	3				R1	110.3	2.7	21	MC	Fines: 9.9 %
900	4		SP-SM							
899	5									
898	6				R2	111.7	1.4	23	MC	
897	7									
896	8				R3	127.5	1.3	31 50/5	MC	
895	9			-- increase fine grained sand, at 8 feet.						
894	10		SM	Silty Sand (SM); brown, moist, very dense, fine grained, light oxidation						
893	11				R4	120.6	3.1	37 50/4	MC	
892	12			TD: 11.5 feet						
891	13			No groundwater encountered.						
890	14			Boring backfilled w/ cuttings.						
889	15									
888	16									
887	17									
886	18									
885	19									
884	20									
883	21									
882	22									
881	23									
880	24									
879	25									
878	26									
877	27									
876	28									
875	29									
874	30									
873	31									
872	32									
871	33									
870	34									
869	35									

Figure No.: A-26

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-27

Location: Main Sort Facility **Ground Surface Elev.:** 902.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
902	1			**Alluvium:**						
901	2			Silty sand (SM); brown, moist, medium dense, fine to medium grained, light oxidation						
900	3				R1	102.4	8.9	23	MC	
899	4		SM							
898	5									
897	6				R2	114.9	9.6	18	MC	
896	7									
895	8				R3	118.7	8	25	MC	
894	9									
893	10			Sand w/ silt (SP-SM); brown, moist, medium dense, medium to coarse grained						
892	11		SP-SM		R4	123.8	4.2	45	MC	
891	12									
890	13				R5	113.5	8.9	45	MC	
889	14									
888	15			Silty Sand (SM); brown, moist, medium dense, fine grained, light oxidation						
887	16				S1			24	SPT	
886	17			-- trace fine subangular gravel, at 17 feet						
885	18		SM							
884	19									
883	20									
882	21				R6	113.5	8.9	45	MC	
881	22									
880	23			Sand (SP); tan, moist, dense, medium grained						
879	24									
878	25			-- trace fine subangular gravel, at 25 feet						
877	26		SP		S2			47	SPT	
876	27									
875	28									
874	29									
873	30			-- very dense trace coarse subangular gravel, at 30 feet	R7			20	MC	
872	31			TD: 31 feet				50/6		
871	32			No groundwater encountered.						
870	33			Boring backfilled w/ cuttings.						
869	34									
868	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-27

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-28

Location: Apron **Ground Surface Elev.:** 901.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
901	0									
900	1		SP-SM	**Alluvium:** Sand w/ silt (SP-SM); brown, moist, loose, medium grained						
899	2				R1	103.1	7.1	12	MC	Fines: 12.7 %
898	3									
897	4			Silty Sand (SM); tan to brown, moist, loose to medium dense, fine to medium grained						
896	5				R2	109.9	6.5	14	MC	Fines: 17.6 %
895	6									
894	7		SM		R3	115.6	4.2	32	MC	
893	8									
892	9									
891	10				R4	115.1	2.6	41	MC	
890	11									
889	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
888	13									
887	14									
886	15									
885	16									
884	17									
883	18									
882	19									
881	20									
880	21									
879	22									
878	23									
877	24									
876	25									
875	26									
874	27									
873	28									
872	29									
871	30									
870	31									
869	32									
868	33									
867	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-28

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-29

Location: Main Sort Facility **Ground Surface Elev.:** 902.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
901	1		SM	**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine to medium grained, light oxidation						
900	2									
899	3				R1	104.5	7.8	11	MC	
898	4									
897	5									
896	6				R2	117.2	9.5	35	MC	
895	7									
894	8		SP-SM	Sand w/ silt and gravel (SP-SM); brown, moist, very dense, fine grained, fine to coarse subrounded gravel	R3	118.7	3.9	32 50/3	MC	
893	9									
892	10				R4	127.6	2.7	50/5	MC	
891	11		SM	Silty sand (SM); brown, moist, dense, fine grained						
890	12									
889	13				R5	112.7	3.2	47	MC	
888	14									
887	15		SP-SM	Sand w/ silt and gravel (SP-SM); brown, moist, very dense, fine grained, fine to coarse subrounded gravel	R6	128	2.3	50/5	MC	
886	16									
885	17									
884	18									
883	19									
882	20				S1			30 50/6	SPT	
881	21			TD: 21 feet No groundwater encountered. Boring backfilled w/ cuttings.						
880	22									
879	23									
878	24									
877	25									
876	26									
875	27									
874	28									
873	29									
872	30									
871	31									
870	32									
869	33									
868	34									
867	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-29

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-30

Location: Truck Yard **Ground Surface Elev.:** 902.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
902				**Alluvium:**						
901	1			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
900	2									
899	3				R1	101.3	8.7	23	MC	
898	4									
897	5									
896	6		SM		R2	113.1	9.2	15	MC	Fines: 30.6 %
895	7									
894	8				R3	110.7	11.3	17	MC	Fines: 39.9 %
893	9									
892	10									
891	11				R4	111.1	11.7	21	MC	
890	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
889	13									
888	14									
887	15									
886	16									
885	17									
884	18									
883	19									
882	20									
881	21									
880	22									
879	23									
878	24									
877	25									
876	26									
875	27									
874	28									
873	29									
872	30									
871	31									
870	32									
869	33									
868	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-30

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-31

Location: Apron **Ground Surface Elev.:** 898.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
898	1		SP-SM	**Alluvium:** Sand w/ silt (SP-SM); brown, moist, loose, fine grained						
897	2									
896	3				R1	103.8	3.8	12	MC	Fines: 5.5 %
895	4									
894	5		SP	Sand (SP); tan to brown, moist, medium dense, fine to medium grained						
893	6				R2	101.9	4.8	18	MC	Fines: 3.8 %
892	7			-- trace fine subrounded gravel, at 7 feet.						
891	8				R3	108.5	4.4	27	MC	
890	9									
889	10									
888	11				R4	112.4	4.9	41	MC	
887	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
886	13									
885	14									
884	15									
883	16									
882	17									
881	18									
880	19									
879	20									
878	21									
877	22									
876	23									
875	24									
874	25									
873	26									
872	27									
871	28									
870	29									
869	30									
868	31									
867	32									
866	33									
865	34									
864	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-31

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-32

Location: Main Sort Facility **Ground Surface Elev.:** 901.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
901				**Alluvium:**						
900	1			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
899	2		SM							
898	3				R1	102.9	6.4	17	MC	
897	4									
896	5			Sand (SP); tan to brown, moist, medium dense, fine to medium grained, trace fine to coarse subrounded gravel						
895	6				R2	119.4	5.1	21	MC	
894	7									
893	8		SP		R3	109.3	11.4	26	MC	
892	9									
891	10									
890	11				R4	101.3	4.9	54	MC	
889	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
888	13									
887	14									
886	15									
885	16									
884	17									
883	18									
882	19									
881	20									
880	21									
879	22									
878	23									
877	24									
876	25									
875	26									
874	27									
873	28									
872	29									
871	30									
870	31									
869	32									
868	33									
867	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-32

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-33

Location: Main Sort Facility **Ground Surface Elev.:** 901.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
901	0									
900	1			**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation	B1		7.4			Bulk: 0-6'
899	2									
898	3				R1	109.3	10.1	15	MC	
897	4									
896	5									
895	6		SM		R2	110.4	10.1	29	MC	
894	7									
893	8				R3	107.5	13.5	18	MC	
892	9									
891	10			-- trace fine subrounded gravel, at 10 feet.	R4	104.5	7.2	26	MC	
890	11									
889	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
888	13									
887	14									
886	15									
885	16									
884	17									
883	18									
882	19									
881	20									
880	21									
879	22									
878	23									
877	24									
876	25									
875	26									
874	27									
873	28									
872	29									
871	30									
870	31									
869	32									
868	33									
867	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-33

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-34

Location: Main Sort Facility **Ground Surface Elev.:** 900.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
900	1		SM	**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation						
899	2									
898	3				R1	105.6	11.5	13	MC	
897	4									
896	5									
895	6				R2	112.2	11.4	19	MC	
894	7									
893	8			-- trace fine subrounded gravel, at 7 feet.	R3	107.2	5.4	39	MC	
892	9									
891	10		SP-SM	Sand w/ silt and gravel (SP-SM); brown, moist, medium dense, fine to medium grained, trace fine subrounded gravel						
890	11				R4	111.8	4.1	26	MC	
889	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
888	13									
887	14									
886	15									
885	16									
884	17									
883	18									
882	19									
881	20									
880	21									
879	22									
878	23									
877	24									
876	25									
875	26									
874	27									
873	28									
872	29									
871	30									
870	31									
869	32									
868	33									
867	34									
866	35									

Figure No.: A-34

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Overcast, Cool **Boring:** B-35

Location: Truck Yard **Ground Surface Elev.:** 901.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/18/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
901	1		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
900	2									
899	3				R1	113.4	6.9	16	MC	Fines: 18.4 %
898	4									
897	5		SP-SM	Sand w/ silt and gravel (SP-SM); tan to brown, moist, medium dense, fine to medium grained, trace fine subrounded gravel						
896	6				R2	107.8	4.8	21	MC	
895	7									
894	8				R3	105.7	3.5	39	MC	
893	9									
892	10									
891	11			-- dense, at 10 feet.	R4	113.6	6.6	60	MC	
890	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
889	13									
888	14									
887	15									
886	16									
885	17									
884	18									
883	19									
882	20									
881	21									
880	22									
879	23									
878	24									
877	25									
876	26									
875	27									
874	28									
873	29									
872	30									
871	31									
870	32									
869	33									
868	34									
867	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-35

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-36

Location: Parking Garage **Ground Surface Elev.:** 899.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
899	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
898	2									
897	3				R1	111.6	6.2	20	MC	
896	4									
895	5									
894	6				R2	111	6.4	25	MC	
893	7									
892	8				R3	107.7	6.4	23	MC	
891	9									
890	10									
889	11		SM		R4	103.6	4.5	28	MC	
888	12									
887	13									
886	14									
885	15									
884	16				R5	113.6	3.4	27	MC	
883	17									
882	18									
881	19									
880	20									
879	21				S1			23	SPT	
878	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
877	23									
876	24									
875	25									
874	26									
873	27									
872	28									
871	29									
870	30									
869	31									
868	32									
867	33									
866	34									
865	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-36

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-37

Location: Parking Garage **Ground Surface Elev.:** 899.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
899				Pavement: 4" AC (no base)						
898	1		SM	**Fill:** Silty sand (SM); brown, moist, loose, fine grained, w/ asphalt debris						
897	2				R1	103.3	7.7	12	MC	
896	3			**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation						
895	4									
894	5				R2	108.2	10	12	MC	
893	6									
892	7				R3	113	8	23	MC	
891	8									
890	9									
889	10				R4	104.5	14	21	MC	
888	11									
887	12		SM							
886	13									
885	14									
884	15				S1			8	SPT	
883	16									
882	17									
881	18									
880	19									
879	20				R5	101.5	10.9	29	MC	
878	21									
877	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
876	23									
875	24									
874	25									
873	26									
872	27									
871	28									
870	29									
869	30									
868	31									
867	32									
866	33									
865	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-37

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-38

Location: Parking Garage **Ground Surface Elev.:** 899.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
899	0			Pavement: 4" AC over 5" AB	B1		5.8			Bulk: 1-5'
898	1			Alluvium:						Fines: 30.5 %
897	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained, trace gravel	R1	106.5	9.8	11	MC	
896	3									
895	4									
894	5				R2	106.2	9.6	12	MC	Fines: 31.6 %
893	6									
892	7			-- medium dense, below 7 feet.	R3	106.1	9.5	19	MC	
891	8									
890	9									
889	10				R4	103.5	9.8	19	MC	
888	11									
887	12									
886	13									
885	14		SM							
884	15				R5	98.4	7.5	16	MC	
883	16									
882	17									
881	18									
880	19									
879	20				S1			11	SPT	Fines: 24.9 %
878	21									
877	22									
876	23									
875	24									
874	25				R6			16	MC	
873	26									
872	27									
871	28									
870	29			Sand w/ silt (SP-SM); tan to brown, moist, dense, fine to coarse , trace fine subrounded gravel						
869	30				S2			20	SPT	
868	31		SP-SM					50/6		
867	32									
866	33									
865	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-38

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-38

Location: Parking Garage **Ground Surface Elev.:** 899.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
864	35		SM	Silty sand (SM); brown, moist, medium dense to dense, fine grained, trace fine subrounded gravel	R7			50/6	MC	
863	36									
862	37									
861	38									
860	39									
859	40				S3			27	SPT	
858	41									
857	42									
856	43		SP-SM	Sand w/ silt (SP-SM); tan to brown, moist, dense to very dense, fine to medium grained, light oxidation						
855	44									
854	45				R8			27	MC	
853	46							50/6		
852	47									
851	48									
850	49									
849	50				S4			40	SPT	
848	51									
847	52			TD: 51.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
846	53									
845	54									
844	55									
843	56									
842	57									
841	58									
840	59									
839	60									
838	61									
837	62									
836	63									
835	64									
834	65									
833	66									
832	67									
831	68									
830	69									
	70									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-38

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-39

Location: Parking Garage **Ground Surface Elev.:** 896.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
896	1		SM	**Fill:** Silty sand (SM); brown, moist, loose, fine grained						
895	2									
894	3				R1	109	6	12	MC	
893	4									
892	5		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense to dense, fine grained						
891	6				R2	108.2	3.9	18	MC	
890	7									
889	8				R3	107.3	7.6	25	MC	
888	9									
887	10									
886	11				R4	104	8.9	45	MC	
885	12									
884	13		SP-SM	Sand w/ silt (SP-SM); tan, moist, very dense, fine to medium grained						
883	14									
882	15									
881	16				S1			20 50/6	SPT	
880	17									
879	18									
878	19		SM	Silty Sand (SM); brown, moist, very dense, fine grained						
877	20									
876	21				R5	109.7	3.1	40 50/4	MC	
875	22									
874	23		SP	Sand (SP); tan, moist, very dense, medium grained						
873	24									
872	25			-- trace fine to coarse subrounded gravel, at 25 feet.						
871	26				S2			71	SPT	
870	27									
869	28									
868	29		SM	Silty Sand (SM); mottled gray to brown, moist, dense, fine grained, light oxidation						
867	30									
866	31				R6			51	MC	
865	32			TD: 31.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
864	33									
863	34									
862	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-39

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-40

Location: Parking Garage **Ground Surface Elev.:** 896.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/25/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
896	0			Pavement: 2" AC (no base)						
895	1			**Alluvium:**						
894	2			Silty sand (SM); brown, moist, medium dense, fine grained, light oxidation	R1	107.9	10.4	20	MC	
893	3									
892	4		SM							
891	5				R2	112.2	9.4	24	MC	
890	6									
889	7				R3	121.8	3	38	MC	
888	8									
887	9			Sand (SP); tan, moist, very dense, fine to medium grained						
886	10				R4	104.3	3.2	51	MC	
885	11									
884	12									
883	13									
882	14									
881	15		SP		S1			53	SPT	
880	16									
879	17									
878	18									
877	19									
876	20			-- medium dense, at 20 feet.	R5	112.5	2.6	29	MC	
875	21									
874	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
873	23									
872	24									
871	25									
870	26									
869	27									
868	28									
867	29									
866	30									
865	31									
864	32									
863	33									
862	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-40

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-41

Location: Parking Garage **Ground Surface Elev.:** 894.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/25/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
894	0									
893	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained, trace gravel	B1		4.7			Bulk: 1-6' Fines: 23.7 %
892	2									
891	3				R1	107	5.2	23	MC	
890	4									
889	5									
888	6				R2	106.2	2.6	31	MC	
887	7		SM							
886	8				R3	113.9	3.8	32	MC	
885	9									
884	10									
883	11				R4	107	2	40	MC	
882	12									
881	13									
880	14			Sand (SP); tan, moist, medium dense, medium grained, trace fine subrounded gravel						
879	15									
878	16				R5	112.5	2.6	35	MC	
877	17		SP							
876	18									
875	19									
874	20									
873	21				S1			34	SPT	
872	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
871	23									
870	24									
869	25									
868	26									
867	27									
866	28									
865	29									
864	30									
863	31									
862	32									
861	33									
860	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-41

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-42

Location: Parking Garage **Ground Surface Elev.:** 901.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
900	1			Pavement: 3" AC (no base)						
899	2			**Alluvium:**						
898	3		SM	Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation	R1	113.7	9.3	15	MC	
897	4									
896	5									
895	6				R2	116.9	11.9	13	MC	
894	7									
893	8		SP-SM	Sand w/ silt and gravel (SP-SM); tan to brown, moist, dense, medium grained, fine subrounded gravel						
892	9									
891	10									
890	11				R3	128.6	1.7	53	MC	
889	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
888	13									
887	14									
886	15									
885	16									
884	17									
883	18									
882	19									
881	20									
880	21									
879	22									
878	23									
877	24									
876	25									
875	26									
874	27									
873	28									
872	29									
871	30									
870	31									
869	32									
868	33									
867	34									
866	35									

Figure No.: A-42

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-43

Location: Parking Garage **Ground Surface Elev.:** 898.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
898	0			Pavement: 3" AC (no base)						
897	1			**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained						
896	2				R1	105.3	7.2	11	MC	
895	3		SM							
894	4									
893	5				R2	104.9	7.4	10	MC	
892	6									
891	7		SP-SM	Sand w/ silt and gravel (SP-SM); brown, moist, very dense, fine grained, fine subrounded gravel	R3	125	2.9	53	MC	
890	8									
889	9		SM	Silty sand (SM); brown, moist, medium dense, fine grained						
888	10				R4	103.8	11.2	20	MC	
887	11									
886	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
885	13									
884	14									
883	15									
882	16									
881	17									
880	18									
879	19									
878	20									
877	21									
876	22									
875	23									
874	24									
873	25									
872	26									
871	27									
870	28									
869	29									
868	30									
867	31									
866	32									
865	33									
864	34									
	35									

Figure No.: A-43

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-44

Location: Parking Garage **Ground Surface Elev.:** 896.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/25/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
896				Pavement: 4" AC (no base)						
895	1			**Alluvium:**						
894	2			Silty sand (SM); brown, moist, medium dense, fine grained						
893	3		SM		R1	105.7	6.5	26	MC	
892	4									
891	5									
890	6				R2	116.3	8.3	33	MC	
889	7			TD: 6.5 feet						
888	8			No groundwater encountered.						
887	9			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
886	10									
885	11									
884	12									
883	13									
882	14									
881	15									
880	16									
879	17									
878	18									
877	19									
876	20									
875	21									
874	22									
873	23									
872	24									
871	25									
870	26									
869	27									
868	28									
867	29									
866	30									
865	31									
864	32									
863	33									
862	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-44

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-45

Location: Parking Garage **Ground Surface Elev.:** 895.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/25/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
895	1		SM	Pavement: 2" AC (no base) **Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained					
894	2									
893	3				R1	111.5	6.6	24	MC	
892	4									
891	5		SP	Sand (SP); tan, moist, medium dense, medium grained						
890	6				R2	103.5	5.3	29	MC	
889	7									
888	8		SM	Silty sand (SM); brown, moist, medium dense, fine grained						
887	9									
886	10									
885	11				R3	110.3	7.1	24	MC	
884	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
883	13									
882	14									
881	15									
880	16									
879	17									
878	18									
877	19									
876	20									
875	21									
874	22									
873	23									
872	24									
871	25									
870	26									
869	27									
868	28									
867	29									
866	30									
865	31									
864	32									
863	33									
862	34									
861	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-45

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-47

Location: Apron **Ground Surface Elev.:** 915.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
				Pavement: 3" AC over 3" AB	B1		5			Bulk: 1-5'
915	1			**Fill:**						Fines: 25.8 %
914	2			Silty sand (SM); brown, moist, dense, fine grained						
913	3		SM		R1	115.1	6.4	48	MC	
912	4									
911	5			**Alluvium:**						
910	6			Silty sand (SM); brown, moist, medium dense, fine grained	R2	105.2	11.9	17	MC	
909	7									
908	8		SM		R3	114	10.3	19	MC	
907	9									
906	10			-- trace fine subrounded gravel, at 10 feet.						
905	11				R4	124.9	11.5	28	MC	
904	12			TD: 11.5 feet						
903	13			No groundwater encountered.						
902	14			Boring backfilled w/ cuttings, and capped w/ concrete and black dye at surface.						
901	15									
900	16									
899	17									
898	18									
897	19									
896	20									
895	21									
894	22									
893	23									
892	24									
891	25									
890	26									
889	27									
888	28									
887	29									
886	30									
885	31									
884	32									
883	33									
882	34									
881	35									

Figure No.: A-46

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-48

Location: Apron **Ground Surface Elev.:** 911.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
911				Pavement: 4" AC over 4" AB						
910	1		SM	**Fill:** Silty sand (SM); brown, moist, dense, fine grained, trace asphalt debris						
909	2									
908	3				R1	111	7.1	48	MC	
907	4		SP-SM	**Alluvium:** Sand w/ silt and gravel (SP-SM); brown, moist, dense, medium grained, fine subrounded gravel						
906	5									
905	6				R2	108.9	4.3	17	MC	
904	7		SM	Silty Sand (SM); brown, moist, medium dense, fine grained, light oxidation						
903	8				R3	106.7	8.4	19	MC	
902	9									
901	10									
900	11				R4	115.7	8.7	28	MC	
899	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete and black dye at surface.						
898	13									
897	14									
896	15									
895	16									
894	17									
893	18									
892	19									
891	20									
890	21									
889	22									
888	23									
887	24									
886	25									
885	26									
884	27									
883	28									
882	29									
881	30									
880	31									
879	32									
878	33									
877	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-47

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-49

Location: Main Sort Facility **Ground Surface Elev.:** 909.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
				Pavement: 4" AC over 4" AB						
909	1			**Fill:**						
908	2		SM	Silty sand (SM); brown, moist, very dense, fine grained, light oxidation						
907	3				R1	117.8	4	35 50/4	MC	
906	4									
905	5			**Alluvium:**						
904	6			Silty sand (SM); brown, moist, loose to medium dense, fine grained, light oxidation	R2	105.7	7.3	24	MC	
903	7									
902	8		SM		R3	103.4	5.6	12	MC	
901	9									
900	10									
899	11				R4	112	5.9	25	MC	
898	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete and black dye at surface.						
897	13									
896	14									
895	15									
894	16									
893	17									
892	18									
891	19									
890	20									
889	21									
888	22									
887	23									
886	24									
885	25									
884	26									
883	27									
882	28									
881	29									
880	30									
879	31									
878	32									
877	33									
876	34									
875	35									

Figure No.: A-48

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-50

Location: Main Sort Facility **Ground Surface Elev.:** 906.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
906				Pavement: 2" AC (no base)						
905	1			**Fill:**						
904	2		SM	Silty sand (SM); brown, moist, medium dense, fine grained						
903	3				R1	112.9	3.6	29	MC	
902	4									
901	5			**Alluvium:**						
900	6			Silty sand (SM); brown, moist, loose to medium dense, fine grained	R2	108.3	7.2	17	MC	Fines: 19.0 %
899	7		SM							
898	8				R3	113.3	12.5	16	MC	Fines: 33.0 %
897	9									
896	10			Sand (SP); tan, moist, dense to very dense, medium to coarse grained						
895	11				R4	127.6	3.1	43	MC	
894	12									
893	13									
892	14									
891	15				S1			30	SPT	
890	16							50/5		
889	17		SP							
888	18									
887	19									
886	20									
885	21				R5	112.1	2.2	54	MC	
884	22									
883	23									
882	24			Silty sand (SM); brown, moist, medium dense to dense, fine grained						
881	25									
880	26				S2			23	SPT	
879	27									
878	28									
877	29									
876	30				R6			30	MC	
875	31		SM					50/6		
874	32									
873	33									
872	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-49

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-50

Location: Main Sort Facility **Ground Surface Elev.:** 906.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
871	35				S3			29	SPT	
870	36									
869	37									
868	38									
867	39		SP-SM	Sand w/ silt (SP-SM); brown, moist, very dense, medium grained, light oxidation						
866	40									
865	41				R7			40 50/5	MC	
864	42									
863	43									
862	44		SM	Silty sand (SM); brown, moist, medium dense to very dense, fine grained						
861	45				S4			22	SPT	
860	46									
859	47									
858	48									
857	49									
856	50				R8			30 50/6	MC	
855	51			TD: 51 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
854	52									
853	53									
852	54									
851	55									
850	56									
849	57									
848	58									
847	59									
846	60									
845	61									
844	62									
843	63									
842	64									
841	65									
840	66									
839	67									
838	68									
837	69									
	70									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-49

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-51

Location: Main Sort Facility **Ground Surface Elev.:** 907.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907	0			Pavement: 3" AC over 3" AB						
906	1			**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained						
905	2		SM		R1	117.1	6	53	MC	
904	3									
903	4			**Alluvium:** Silty sand (SM); brown, moist, medium dense to dense, fine grained, light oxidation						
902	5				R2	118.6	9.1	24	MC	
901	6									
900	7				R3	125.3	3.7	25 50/4	MC	
899	8									
898	9			-- very dense below 7.0 feet, trace fine subrounded gravel, at 8.5 feet						
897	10				R4	114.7	6.5	50/6	MC	
896	11									
895	12									
894	13									
893	14									
892	15				R5	125	3	38 50/5	MC	
891	16									
890	17									
889	18		SM							
888	19									
887	20				S1			25 50/6	SPT	
886	21									
885	22									
884	23									
883	24									
882	25				R6	101.2	5.2	30 50/6	MC	
881	26									
880	27									
879	28									
878	29									
877	30				S2			61	SPT	
876	31									
875	32			TD: 31.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped with cold patch asphalt.						
874	33									
873	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-50

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-52

Location: Main Sort Facility **Ground Surface Elev.:** 905.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905				Pavement: 3" AC (no base)						
904	1		SM	**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained						
903	2				R1	105.8	8.5	20	MC	
902	3			**Alluvium:** Silty sand (SM); brown, moist, medium dense to dense, fine grained						
901	4									
900	5				R2	117.8	7.7	36	MC	
899	6									
898	7				R3	118.4	7.1	33	MC	
897	8									
896	9									
895	10				R4	111.7	4	47	MC	
894	11									
893	12		SM							
892	13									
891	14									
890	15				S1			11	SPT	
889	16									
888	17									
887	18									
886	19									
885	20				R5	110.8	8.7	38	MC	
884	21									
883	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-51

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-53

Location: Main Sort Facility **Ground Surface Elev.:** 904.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
904				Pavement: 4" AC (no base)						
903	1			**Alluvium:**						
902	2			Silty sand (SM); brown, moist, medium dense, fine grained						
901	3				R1	96	13.5	13	MC	
900	4									
899	5		SM							
898	6				R2	117.7	11.4	15	MC	
897	7									
896	8			-- trace coarse subangular gravel, at 7 feet.	R3	118.2	2.7	27	MC	
895	9									
894	10		SP	Sand (SP); tan, slightly moist, very dense, trace fine subangular gravel						
893	11				R4	130.1	1.6	35 50/6	MC	
892	12			TD: 11.5 feet						
891	13			No groundwater encountered.						
890	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
889	15									
888	16									
887	17									
886	18									
885	19									
884	20									
883	21									
882	22									
881	23									
880	24									
879	25									
878	26									
877	27									
876	28									
875	29									
874	30									
873	31									
872	32									
871	33									
870	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-52

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-54

Location: Main Sort Facility **Ground Surface Elev.:** 904.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
904	1			Pavement: 4" AC (no base)						
903	2			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
902	3				R1	108.8	12.8	21	MC	
901	4									
900	5									
899	6		SM	-- trace fine subangular gravel, at 5 feet.	R2	128	6.6	32	MC	
898	7									
897	8									
896	9									
895	10									
894	11				R3	112	9	35	MC	
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
870	35									

Figure No.: A-53

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-55

Location: Main Sort Facility **Ground Surface Elev.:** 903.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/20/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
903				Pavement: 4" AC (no base)	B1		6			Bulk: 0-5'
902	1			**Alluvium:**						
901	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained, some gravel						
900	3				R1	105.1	6..5	12	MC	
899	4									
898	5									
897	6		SM		R2	113.3	8.8	17	MC	
896	7									
895	8			-- trace fine subangular gravel, at 7 feet.	R3	106	8.8	42	MC	
894	9									
893	10									
892	11				R4	107.6	14.6	23	MC	
891	12			TD: 11.5 feet						
890	13			No groundwater encountered.						
889	14			Boring backfilled w/ cuttings.						
888	15									
887	16									
886	17									
885	18									
884	19									
883	20									
882	21									
881	22									
880	23									
879	24									
878	25									
877	26									
876	27									
875	28									
874	29									
873	30									
872	31									
871	32									
870	33									
869	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-54

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-56

Location: Apron **Ground Surface Elev.:** 914.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914				Pavement: 4" AC (no base)						
913	1			**Alluvium:**						
912	2			Silty sand (SM); brown, moist, loose, fine grained						
911	3				R1	107.6	12.2	8	MC	Fines: 35.9 %
910	4									
909	5		SM							
908	6				R2	104.5	6.6	10	MC	Fines: 22.6 %
907	7									
906	8				R3	109.1	7.9	7	MC	Fines: 23.1 %
905	9									
904	10		SP-SM	Sand w/ silt (SP-SM); brown, slightly moist, medium dense, fine to medium grained, trace subangular fine gravel	R4	125.3	3	40	MC	
903	11									
902	12			TD: 11.5 feet						
901	13			No groundwater encountered.						
900	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-55

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-57

Location: Apron **Ground Surface Elev.:** 910.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
910	0			Pavement: 4" AC (no base)	B1		6.8			Bulk: 1-6'
909	1			**Alluvium:**						Fines: 27.7 %
908	2			Silty sand (SM); brown, moist, medium dense, fine grained, trace gravel	R1	102.4	7.1	27	MC	
907	3									
906	4		SM		R2	105.5	7.3	25	MC	
905	5									
904	6				R3	109	8.4	32	MC	
903	7									
902	8									
901	9		SP	Sand (SP); tan, moist, medium dense, fine to medium grained	R4	112.1	3.1	39	MC	
900	10									
899	11									
898	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
897	13									
896	14									
895	15									
894	16									
893	17									
892	18									
891	19									
890	20									
889	21									
888	22									
887	23									
886	24									
885	25									
884	26									
883	27									
882	28									
881	29									
880	30									
879	31									
878	32									
877	33									
876	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-56

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-58

Location: Apron **Ground Surface Elev.:** 911.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
911	0			Pavement: 3" AC (no base)						
910	1			**Alluvium:**						
909	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained	R1	110	7.2	23	MC	Fines: 24.0 %
908	3		SM							
907	4									
906	5				R2	106.6	7.5	11	MC	
905	6									
904	7			Sand w/ silt (SP-SM); brown, moist, medium dense to dense, fine to medium grained	R3	102.5	5.7	25	MC	
903	8									
902	9		SP-SM							
901	10				R4	113.5	5.1	45	MC	
900	11									
899	12			TD: 11.5 feet						
898	13			No groundwater encountered.						
897	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
896	15									
895	16									
894	17									
893	18									
892	19									
891	20									
890	21									
889	22									
888	23									
887	24									
886	25									
885	26									
884	27									
883	28									
882	29									
881	30									
880	31									
879	32									
878	33									
877	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-57

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-59

Location: Main Sort Facility **Ground Surface Elev.:** 908.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
908	0			Pavement: 5" AC over 2" AB						
907	1		SM	**Alluvium:** Silty sand (SM); brown, moist, medium dense becoming dense with depth, fine grained						
906	2				R1	106.5	4.7	27	MC	
905	3									
904	4									
903	5				R2	103.8	2.6	41	MC	
902	6									
901	7			-- trace fine subangular gravel, at 7 feet.	R3	115.7	1.7	51	MC	
900	8									
899	9		SP-SM	Sand w/ silt (SP-SM); brown, moist, dense, medium grained						
898	10				R4	122.9	2.6	70	MC	
897	11			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
896	12									
895	13									
894	14									
893	15									
892	16									
891	17									
890	18									
889	19									
888	20									
887	21									
886	22									
885	23									
884	24									
883	25									
882	26									
881	27									
880	28									
879	29									
878	30									
877	31									
876	32									
875	33									
874	34									
	35									

Figure No.: A-58

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-60

Location: Main Sort Facility **Ground Surface Elev.:** 908.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
908				Pavement: 4" AC (no base)						
907	1			**Alluvium:**						
906	2		SM	Silty sand (SM); brown, moist, medium dense to dense, fine grained						
905	3				R1	111.2	6.7	21	MC	
904	4									
903	5			Sand w/ silt (SP-SM); tan to brown, moist, medium dense, medium grained						
902	6		SP-SM		R2	109.2	3.8	16	MC	
901	7									
900	8			-- trace fine subrounded gravel, at 8 feet.	R3	119.1	3	42	MC	
899	9									
898	10			Silty sand (SM); brown, moist, medium dense to dense, fine grained	R4	112.5	11.4	18	MC	
897	11									
896	12									
895	13									
894	14									
893	15		SM	-- very dense, at 15 feet.	S1			60	SPT	
892	16									
891	17									
890	18									
889	19									
888	20									
887	21				R5	105.7	7.7	19	MC	
886	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
885	23									
884	24									
883	25									
882	26									
881	27									
880	28									
879	29									
878	30									
877	31									
876	32									
875	33									
874	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-59

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-61

Location: Main Sort Facility **Ground Surface Elev.:** 907.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907				Pavement: 4" AC (no base)						
906	1			**Alluvium:**						
905	2		SM	Silty sand (SM); brown, moist, loose to medium dense, fine grained	R1	109.8	7.3	13	MC	Fines: 15.8 %
904	3									
903	4			Sand w/ silt (SP-SM); brown, moist, loose, fine grained						
902	5									
901	6		SP-SM		R2	106.7	5.7	10	MC	Fines: 9.4 %
900	7				R3	107.3	4.2	14	MC	Fines: 7.6 %
899	8									
898	9			Silty sand (SM); brown, moist, medium dense, fine grained						
897	10				R4	114	5.4	24	MC	Fines: 13.5 %
896	11		SM							
895	12									
894	13									
893	14			Sand (SP); tan, moist, medium dense to dense, medium grained						
892	15									
891	16				R5	105.8	3.4	37	MC	Fines: 3.1 %
890	17									
889	18									
888	19									
887	20			-- trace fine subrounded gravel, at 20 feet.	S1			40	SPT	
886	21		SP							
885	22									
884	23									
883	24									
882	25				R6			38	MC	
881	26									
880	27									
879	28									
878	29			Sand w/ silt (SP-SM); tan to brown, moist, medium dense, fine to medium grained, trace fine subrounded gravel						
877	30				S2			35	SPT	
876	31		SP-SM							
875	32									
874	33									
873	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-60

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-61

Location: Main Sort Facility **Ground Surface Elev.:** 907.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
872	35		SM	Silty sand (SM); brown, moist, medium dense to dense, fine grained, heavy oxidation	R7			65	MC	
871	36									
870	37									
869	38									
868	39									
867	40			-- medium dense, at 40 feet.	S3			26	SPT	
866	41									
865	42									
864	43									
863	44		SP-SM	Sand w/ silt and gravel (SP-SM); brown, moist, medium dense to very dense, medium grained, trace fine subrounded gravel						
862	45				R8			25	MC	
861	46							50/6		
860	47									
859	48									
858	49									
857	50									
856	51				S4			30	SPT	
855	52			TD: 51.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
854	53									
853	54									
852	55									
851	56									
850	57									
849	58									
848	59									
847	60									
846	61									
845	62									
844	63									
843	64									
842	65									
841	66									
840	67									
839	68									
838	69									
	70									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-60

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-62

Location: Main Sort Facility **Ground Surface Elev.:** 905.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	1			Pavement: 4" AC (no base)						
904	2			**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained						
903	3				R1	103.1	7.3	10	MC	
902	4									
901	5		SM							
900	6				R2	108.1	5.1	12	MC	
899	7									
898	8				R3	117.2	12.2	14	MC	
897	9									
896	10			Sand (SP); tan, moist, medium dense, medium to coarse grained, trace fine subrounded gravel						
895	11				R4	125.1	1.7	32	MC	
894	12									
893	13									
892	14									
891	15		SP							
890	16				S1			11	SPT	
889	17									
888	18									
887	19									
886	20			-- very dense, at 20 feet.						
885	21				R5	113.7	3.1	16 50/6	MC	
884	22			TD: 21 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
883	23									
882	24									
881	25									
880	26									
879	27									
878	28									
877	29									
876	30									
875	31									
874	32									
873	33									
872	34									
871	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-61

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-63

Location: Main Sort Facility **Ground Surface Elev.:** 905.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905				Pavement: 3" AC (no base)						
904	1			**Alluvium:**						
903	2			Silty sand (SM); brown, moist, medium dense, fine grained						
902	3				R1	108.8	5.6	20	MC	
901	4		SM							
900	5									
899	6				R2	110	2.5	18	MC	
898	7									
897	8			Sand w/ silt and gravel (SP-SM); tan, moist, medium dense, medium grained, trace fine subrounded gravel	R3	114.6	3.3	28	MC	
896	9									
895	10		SP-SM							
894	11				R4	116.6	2.4	26	MC	
893	12			TD: 11.5 feet						
892	13			No groundwater encountered.						
891	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-62

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-64

Location: Truck Yard **Ground Surface Elev.:** 903.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
903	0			Pavement: 5" AC (no base)						
902	1		SM	**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained						
901	2				R1	103.2	7.8	57	MC	
900	3									
899	4		SP-SM	**Alluvium:** Sand w/ silt (SP-SM); brown, moist, medium dense, fine to medium grained						
898	5				R2	116.2	4.1	42	MC	
897	6									
896	7		SM	Silty sand (SM); brown, moist, very dense, fine grained	R3	108.2	6.6	30 50/6	MC	
895	8									
894	9									
893	10				R4	102.4	6.7	50/6	MC	
892	11			TD: 10.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
891	12									
890	13									
889	14									
888	15									
887	16									
886	17									
885	18									
884	19									
883	20									
882	21									
881	22									
880	23									
879	24									
878	25									
877	26									
876	27									
875	28									
874	29									
873	30									
872	31									
871	32									
870	33									
869	34									
	35									

Figure No.: A-63

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-65

Location: Apron **Ground Surface Elev.:** 911.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
911				Pavement: 4" AC (no base)						
910	1			**Alluvium:**						
909	2			Silty sand (SM); brown, moist, medium dense, fine grained						
908	3				R1	105.8	9.1	18	MC	Fines: 31.6 %
907	4									
906	5		SM							
905	6				R2	94.8	11.5	23	MC	
904	7									
903	8				R3	119	7.4	20	MC	
902	9			Sand (SP); tan, moist, dense, fine to coarse grained						
901	10		SP							
900	11				R4	102.4	6.7	57	MC	
899	12			TD: 11.5 feet						
898	13			No groundwater encountered.						
897	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
896	15									
895	16									
894	17									
893	18									
892	19									
891	20									
890	21									
889	22									
888	23									
887	24									
886	25									
885	26									
884	27									
883	28									
882	29									
881	30									
880	31									
879	32									
878	33									
877	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-64

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-66

Location: Apron **Ground Surface Elev.:** 909.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
909	0			Pavement: 5" AC (no base)						
908	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
907	2				R1	112.7	10.6	19	MC	
906	3									
905	4									
904	5		SM		R2	112.8	9.8	18	MC	Fines: 31.1 %
903	6									
902	7				R3	112.5	10.9	30	MC	
901	8									
900	9			Sand (SP); tan, moist, dense, medium grained						
899	10		SP		R4	107.9	2.4	50	MC	
898	11									
897	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
896	13									
895	14									
894	15									
893	16									
892	17									
891	18									
890	19									
889	20									
888	21									
887	22									
886	23									
885	24									
884	25									
883	26									
882	27									
881	28									
880	29									
879	30									
878	31									
877	32									
876	33									
875	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-65

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-67

Location: Main Sort Facility **Ground Surface Elev.:** 908.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
908	1			Pavement: 4" AC (no base)						
907	2			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
906	3				R1	106.4	8.1	16	MC	
905	4									
904	5									
903	6		SM		R2	117.6	9.3	27	MC	
902	7									
901	8				R3	119.3	9.9	20	MC	
900	9									
899	10									
898	11			-- dense; trace fine subrounded gravel, at 10 feet	R4	113.7	5.3	49	MC	
897	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
896	13									
895	14									
894	15									
893	16									
892	17									
891	18									
890	19									
889	20									
888	21									
887	22									
886	23									
885	24									
884	25									
883	26									
882	27									
881	28									
880	29									
879	30									
878	31									
877	32									
876	33									
875	34									
874	35									

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-68

Location: Main Sort Facility **Ground Surface Elev.:** 907.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907	1		SM	**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained						
906	2									
905	3				R1	111	8	25	MC	
904	4									
903	5		SM	**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained						
902	6				R2	107.4	10.9	9	MC	Fines: 37.1 %
901	7									
900	8				R3	119.4	12.7	11	MC	Fines: 40.9 %
899	9									
898	10		SP-SM	Sand w/ silt (SP-SM); tan to brown, moist, medium dense, fine grained						
897	11				R4	114.2	2.5	20	MC	Fines: 3.9 %
896	12									
895	13									
894	14		SM	Silty sand (SM); brown, moist, loose to medium dense, fine grained						
893	15									
892	16				S1			8	SPT	Fines: 17.0 %
891	17									
890	18									
889	19									
888	20									
887	21				R5	114.5	14.6	22	MC	Fines: 45.7 %
886	22									
885	23									
884	24		ML	Sandy silt (ML), brown, moist, stiff to very stiff, fine grained						
883	25									
882	26				S2			13	SPT	Fines: 56.0 %
881	27									
880	28									
879	29									
878	30									
877	31				R6			39	MC	
876	32									
875	33									
874	34			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
873	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-67

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-68

Location: Main Sort Facility **Ground Surface Elev.:** 907.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
872	35		SM		S3			17	SPT	Fines: 29.1 %
871	36									
870	37									
869	38									
868	39									
867	40				R7			34	MC	
866	41									
865	42									
864	43									
863	44									
862	45				S4			14	SPT	Fines: 30.5 %
861	46									
860	47									
859	48									
858	49									
857	50				R8			42	MC	
856	51			TD: 51.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
855	52									
854	53									
853	54									
852	55									
851	56									
850	57									
849	58									
848	59									
847	60									
846	61									
845	62									
844	63									
843	64									
842	65									
841	66									
840	67									
839	68									
838	69									
	70									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-67

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-69

Location: Main Sort Facility **Ground Surface Elev.:** 907.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
907	0			Pavement: 4" AC (no base)						
906	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
905	2				R1	106.7	6.1	18	MC	
904	3									
903	4									
902	5		SM		R2	109.3	2.5	18	MC	
901	6									
900	7				R3	115.5	4	30	MC	
899	8									
898	9			Sand w/ silt and gravel (SP-SM); tan, moist, medium dense to very dense, medium grained, trace fine subrounded gravel						
897	10				R4	120.9	1.3	33	MC	
896	11									
895	12									
894	13									
893	14									
892	15		SP-SM		S1			58	SPT	
891	16									
890	17									
889	18									
888	19									
887	20				R5	111.6	11.5	33	MC	
886	21									
885	22			TD: 21.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ concrete and black dye at surface.						
884	23									
883	24									
882	25									
881	26									
880	27									
879	28									
878	29									
877	30									
876	31									
875	32									
874	33									
873	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-68

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-70

Location: Main Sort Facility **Ground Surface Elev.:** 906.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
906	1			Pavement: 4" AC (no base)						
905	2			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained, light oxidation						
904	3				R1	106	7.6	21	MC	
903	4		SM							
902	5									
901	6				R2	114.6	10.6	24	MC	
900	7									
899	8			Sand w/ silt (SP-SM); brown, moist, medium dense, medium grained	R3	111.5	6.6	35	MC	
898	9									
897	10		SP-SM							
896	11				R4	114.5	2.6	45	MC	
895	12									
894	13									
893	14			Silty sand (SM); brown, moist, medium dense to dense, fine to medium grained, trace fine subrounded gravel						
892	15									
891	16				R5	128.3	2.7	29 50/6	MC	
890	17									
889	18									
888	19									
887	20									
886	21				S1			25	SPT	
885	22									
884	23		SM							
883	24									
882	25									
881	26				R6	123.2	4	40 50/5	MC	
880	27									
879	28									
878	29									
877	30									
876	31				S2			53	SPT	
875	32			TD: 31.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped with cold patch asphalt.						
874	33									
873	34									
872	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-69

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-71

Location: Main Sort Facility **Ground Surface Elev.:** 905.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	0			**Alluvium:**						
904	1			Silty sand (SM); brown, moist, medium dense, fine grained						
903	2				R1	99.8	16.3	17	MC	
902	3		SM							
901	4									
900	5				R2	118.4	9.9	17	MC	
899	6									
898	7		SP-SM	Sand w/ silt (SP-SM); brown, moist, medium dense, fine to medium grained	R3	113.2	4	41	MC	
897	8									
896	9			Sand (SP); tan, slightly moist, dense, medium grained						
895	10		SP		R4	105.7	2.7	52	MC	
894	11									
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-70

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-72

Location: Apron **Ground Surface Elev.:** 908.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
908				**Alluvium:**						
907	1			Silty sand (SM); brown, moist, medium dense, fine grained						
906	2									
905	3				R1	110.4	6.8	23	MC	
904	4									
903	5									
902	6		SM		R2	118.6	9	34	MC	
901	7									
900	8				R3	107.2	6.4	17	MC	Fines: 22.8 %
899	9									
898	10									
897	11				R4	103.7	8.8	21	MC	
896	12			TD: 11.5 feet						
895	13			No groundwater encountered.						
894	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
893	15									
892	16									
891	17									
890	18									
889	19									
888	20									
887	21									
886	22									
885	23									
884	24									
883	25									
882	26									
881	27									
880	28									
879	29									
878	30									
877	31									
876	32									
875	33									
874	34									
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COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-71

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-73

Location: Apron **Ground Surface Elev.:** 904.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
904	1			Asphalt: 3" AC (no base)						
903	2			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
902	3		SM		R1	111.7	9.3	20	MC	
901	4									
900	5									
899	6				R2	118.2	11.7	24	MC	
898	7									
897	8		SP-SM	Sand w/ silt and gravel (SP-SM); tan, moist, very dense, fine to coarse grained, trace fine subrounded gravel	R3	128.8	2.2	30 50/6	MC	
896	9									
895	10									
894	11				R4	129	2.2	40 50/5	MC	
893	12			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
870	35									

Figure No.: A-72

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-74

Location: Main Sort Facility **Ground Surface Elev.:** 905.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	0			Asphalt: 4" AC (no base)						
904	1			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
903	2				R1	110.7	7.4	20	MC	
902	3		SM							
901	4									
900	5				R2	115.6	10.2	17	MC	
899	6									
898	7		SP-SM	Sand w/ silt (SP-SM); brown, moist, medium dense to dense, fine to medium grained	R3	120.3	3.8	43	MC	
897	8									
896	9			Sand (SP); tan, moist, dense, medium grained						
895	10		SP		R4	111.7	3	72	MC	
894	11									
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-73

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-75

Location: Apron **Ground Surface Elev.:** 918.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
918	1			Asphalt: 4" AC (no base)						
917	2		SM	**Fill:** Silty sand (SM); brown, moist, medium dense, fine grained						
916	3				R1	102.3	6.5	31	MC	
915	4									
914	5			**Alluvium:** Silty sand (SM); brown, moist, medium dense, fine grained						
913	6				R2	111.4	6.6	25	MC	
912	7									
911	8		SM		R3	119.7	12.2	19	MC	
910	9									
909	10									
908	11			-- trace fine subrounded gravel, at 10 feet.	R4	116.4	7.1	41	MC	
907	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
906	13									
905	14									
904	15									
903	16									
902	17									
901	18									
900	19									
899	20									
898	21									
897	22									
896	23									
895	24									
894	25									
893	26									
892	27									
891	28									
890	29									
889	30									
888	31									
887	32									
886	33									
885	34									
884	35									

Figure No.: A-74

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-76

Location: Apron **Ground Surface Elev.:** 916.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
916	1			Asphalt: 4" AC (no base)						
915	2		SM	**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained						
914	3				R1	112.8	7.6	12	MC	Fines: 18.8 %
913	4									
912	5			Sand (SP); tan, moist, medium dense, fine to medium grained						
911	6				R2	105.7	4.4	19	MC	
910	7									
909	8		SP	-- trace fine subrounded gravel, at 8 feet.	R3	120.3	3.9	37	MC	
908	9									
907	10									
906	11				R4	117.1	6.6	36	MC	
905	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt.						
904	13									
903	14									
902	15									
901	16									
900	17									
899	18									
898	19									
897	20									
896	21									
895	22									
894	23									
893	24									
892	25									
891	26									
890	27									
889	28									
888	29									
887	30									
886	31									
885	32									
884	33									
883	34									
882	35									

Figure No.: A-75

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-77

Location: Apron **Ground Surface Elev.:** 917.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/21/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
917										
916	1			**Fill:** Sand (SP); tan, moist, medium dense, medium grained						
915	2		SP							
914	3				R1	109	7.7	39	MC	
913	4									
912	5			**Alluvium**: Silty Sand (SM); brown, moist, medium dense, fine grained, light oxidation						
911	6		SM		R2	122	9.7	21	MC	
910	7									
909	8			Sand w/ silt and gravel (SP-SM); tan, moist, medium dense, medium to coarse sand, fine subrounded gravel	R3	123.9	2.5	42	MC	
908	9		SP-SM							
907	10									
906	11				R4	110.8	2.4	32	MC	
905	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings.						
904	13									
903	14									
902	15									
901	16									
900	17									
899	18									
898	19									
897	20									
896	21									
895	22									
894	23									
893	24									
892	25									
891	26									
890	27									
889	28									
888	29									
887	30									
886	31									
885	32									
884	33									
883	34									
	35									

Figure No.: A-76

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-78

Location: Apron **Ground Surface Elev.:** 917.9' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-75 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
917	1		SM	**Fill:** Silty sand (SM); brown, moist, very dense, fine grained, light oxidation						
916	2									
915	3				R1	117	5.1	80	MC	
914	4									
913	5		SP-SM	**Alluvium:** Sand w/ silt (SP-SM); tan, moist, dense, fine to medium grained						
912	6				R2	115.3	2	47	MC	
911	7									
910	8		SM	Silty sand (SM); brown, moist, medium dense to very dense, fine grained, light oxidation	R3	116.7	3.9	43	MC	
909	9									
908	10			-- trace medium to coarse subrounded gravel, at 10 feet.	R4	119.2	2	25 50/6	MC	
907	11			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings.						
906	12									
905	13									
904	14									
903	15									
902	16									
901	17									
900	18									
899	19									
898	20									
897	21									
896	22									
895	23									
894	24									
893	25									
892	26									
891	27									
890	28									
889	29									
888	30									
887	31									
886	32									
885	33									
884	34									
883	35									

Figure No.: A-77

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-79

Location: Apron **Ground Surface Elev.:** 914.3' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914				Pavement: 3" AC (no base)						
913	1		SP-SM	**Fill:** Sand w/ silt (SP-SM); mottled tan to brown, moist, loose to medium dense, fine grained, w/ asphalt debris						
912	2				R1	109.2	3.9	15	MC	Fines: 5.1 %
911	3		SP-SM	**Alluvium:** Sand w/ silt (SP-SM); brown, moist, loose to medium dense, fine to medium grained						
910	4									
909	5			Silty sand (SM); brown, moist, loose to medium dense, fine grained, trace fine subrounded gravel	R2	109.5	7.8	21	MC	
908	6									
907	7		SM		R3	112.6	11.4	15	MC	Fines: 31.3 %
906	8									
905	9									
904	10			-- very dense, at 10 feet	R4	110.1	5.1	20 50/6	MC	
903	11			TD: 11 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
902	12									
901	13									
900	14									
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

Figure No.: A-78

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-80

Location: Apron **Ground Surface Elev.:** 914.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / Limited Access Rig / Hollow-Stem **Date of Drilling:** 1/26/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914				**Fill:**						
913	1			Silty sand (SM); brown, moist, medium dense, fine grained						
912	2		SM							
911	3				R1	107	6.9	41	MC	
910	4									
909	5			**Alluvium:**						
908	6		SM	Silty sand (SM); brown, moist, medium dense, fine grained	R2	105.6	5.9	19	MC	Fines: 22.9 %
907	7									
906	8		SP	Sand (SP); tan, slightly moist, medium dense, medium grained	R3	119.6	1.5	22	MC	
905	9									
904	10		SM	Silty sand (SM); brown, moist, dense, fine grained	R4	117.4	6.3	52	MC	
903	11									
902	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
901	13									
900	14									
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-79

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-81

Location: Apron **Ground Surface Elev.:** 914.4' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914				Pavement: 4" AC (no base)						
913	1			**Alluvium:**						
912	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
911	3				R1	115.1	10.5	10	MC	Fines: 38.5 %
910	4									
909	5		SM							
908	6				R2	111.2	8.2	11	MC	
907	7									
906	8				R3	116.7	5.8	18	MC	
905	9			-- medium dense; trace fine subrounded gravel, at 8 feet.						
904	10		SP-SM	Sand w/ silt and gravel (SP-SM); tan to brown, moist, medium dense, medium grained, fine subrounded gravel	R4	108.4	3	22	MC	
903	11									
902	12			TD: 11.5 feet						
901	13			No groundwater encountered.						
900	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

Figure No.: A-80

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-82

Location: Apron **Ground Surface Elev.:** 914.2' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/24/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
914				Pavement: 3" AC (no base)						
913	1			**Alluvium:**						
912	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
911	3				R1	107.9	7.7	21	MC	
910	4									
909	5									
908	6		SM		R2	110	6.1	9	MC	
907	7									
906	8			-- trace fine subrounded gravel, at 7 feet.	R3	121.3	4.5	16	MC	Fines: 12.6 %
905	9									
904	10									
903	11									
902	12			TD: 11.5 feet						
901	13			No groundwater encountered.						
900	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
899	15									
898	16									
897	17									
896	18									
895	19									
894	20									
893	21									
892	22									
891	23									
890	24									
889	25									
888	26									
887	27									
886	28									
885	29									
884	30									
883	31									
882	32									
881	33									
880	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-81

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-83

Location: Apron **Ground Surface Elev.:** 912.0' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
912				Pavement: 4" AC (no base)	B1		5.3			Bulk: 1-5'
911	1			**Alluvium:**						Fines: 23.4 %
910	2			Silty sand (SM); brown, moist, loose to medium dense, fine grained						
909	3				R1	101.9	7	8	MC	
908	4									
907	5									
906	6		SM		R2	110.5	10.3	5	MC	
905	7									
904	8				R3	112.2	11.5	12	MC	
903	9									
902	10									
901	11			-- medium dense, at 10 feet	S1			38	SPT	
900	12			TD: 11.5 feet						
899	13			No groundwater encountered.						
898	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
897	15									
896	16									
895	17									
894	18									
893	19									
892	20									
891	21									
890	22									
889	23									
888	24									
887	25									
886	26									
885	27									
884	28									
883	29									
882	30									
881	31									
880	32									
879	33									
878	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-82

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-84

Location: Apron **Ground Surface Elev.:** 910.8' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
910	1			Pavement: 4" AC (no base)						
909	2		SM	**Alluvium:** Silty sand (SM); brown, moist, loose, fine grained						
908	3				R1	106.7	9.2	14	MC	Fines: 28.1 %
907	4									
906	5			Sand w/ silt (SP-SM); brown, moist, medium dense to dense, fine to medium grained, trace fine subrounded gravel						
905	6				R2	105.6	3.6	23	MC	
904	7									
903	8		SP-SM		R3	115.5	3.4	42	MC	
902	9			-- coarse gravel, at 8 feet.						
901	10									
900	11				R4	117.3	3.2	60	MC	
899	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
898	13									
897	14									
896	15									
895	16									
894	17									
893	18									
892	19									
891	20									
890	21									
889	22									
888	23									
887	24									
886	25									
885	26									
884	27									
883	28									
882	29									
881	30									
880	31									
879	32									
878	33									
877	34									
876	35									

Figure No.: A-83

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-85

Location: Apron **Ground Surface Elev.:** 909.5' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
909	0			Pavement: 4" AC (no base)	B1		9.5			Bulk: 1-5'
908	1			**Alluvium:**						Fines: 36.9 %
907	2			Silty sand (SM); brown, moist, loose, fine grained, trace gravel and clay	R1	111.9	14.3	11	MC	
906	3									
905	4									
904	5		SM		R2	106.9	11.7	6	MC	
903	6									
902	7				R3	116.3	14.5	13	MC	
901	8									
900	9									
899	10		SP	Sand (SP); tan, moist, loose, medium grained, trace fine subrounded gravel	R4	108.1	2.8	13	MC	
898	11									
897	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
896	13									
895	14									
894	15									
893	16									
892	17									
891	18									
890	19									
889	20									
888	21									
887	22									
886	23									
885	24									
884	25									
883	26									
882	27									
881	28									
880	29									
879	30									
878	31									
877	32									
876	33									
875	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-84

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-86

Location: Apron **Ground Surface Elev.:** 909.1' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
909				Pavement: 3" AC (no base)						
908	1			**Alluvium:**						
907	2			Silty sand (SM); brown, moist, loose, fine grained						
906	3				R1	103.7	8.5	6	MC	
905	4									
904	5									
903	6		SM		R2	102.3	7.4	6	MC	Fines: 18.7 %
902	7									
901	8				R3	108.9	6.4	9	MC	
900	9									
899	10			-- medium dense, at 10 feet						
898	11				R4	111.8	7.8	41	MC	
897	12			TD: 11.5 feet						
896	13			No groundwater encountered.						
895	14			Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
894	15									
893	16									
892	17									
891	18									
890	19									
889	20									
888	21									
887	22									
886	23									
885	24									
884	25									
883	26									
882	27									
881	28									
880	29									
879	30									
878	31									
877	32									
876	33									
875	34									
	35									

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Figure No.: A-85

COTTON, SHIRES AND ASSOCIATES, INC.

LOG OF EXPLORATORY DRILLING

Project: SACC at OIAA **Logged By:** GH **Weather:** Clear, Sunny **Boring:** B-87

Location: Apron **Ground Surface Elev.:** 905.6' **Hole Diameter:** 8" **Project No.:** SC6101

Drilling Contractor/Rig: Choice Drilling / CME-95 / Hollow-Stem **Date of Drilling:** 1/27/2022

Elevation (feet)	Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Unit Weight (pcf)	Moisture Content (%)	Field Blow Count	Sample Type	Remarks
905	0			Pavement: 3" AC (no base)						
904	1			**Alluvium:** Silty sand (SM); brown, moist, loose to medium dense, fine grained						
903	2				R1	115.2	12.8	9	MC	Fines: 41 %
902	3		SM							
901	4									
900	5				R2	114.1	11.5	10	MC	
899	6									
898	7			Sand (SP); tan, moist, medium dense, fine to medium grained	R3	116.6	1.5	24	MC	Fines: 4.0 %
897	8		SP							
896	9									
895	10		SP-SM	Sand w/ silt (SP-SM); tan, moist, medium dense, fine to medium grained, fine subrounded gravel	S1			12	SPT	Fines: 11.3 %
894	11									
893	12			TD: 11.5 feet No groundwater encountered. Boring backfilled w/ cuttings, and capped w/ cold patch asphalt at surface.						
892	13									
891	14									
890	15									
889	16									
888	17									
887	18									
886	19									
885	20									
884	21									
883	22									
882	23									
881	24									
880	25									
879	26									
878	27									
877	28									
876	29									
875	30									
874	31									
873	32									
872	33									
871	34									
	35									

Figure No.: A-86

APPENDIX B
LABORATORY TESTING

APPENDIX B - LABORATORY TESTING

INTRODUCTION

The laboratory analysis performed for the geotechnical investigation consisted of limited testing of the principal soil types sampled during the field investigation to evaluate index properties of subsurface materials. Laboratory tests were performed on selected driven ring or SPT and bulk soil samples to estimate engineering characteristics of the various earth materials encountered. Testing was performed in general accordance with ASTM Standards for Soil Testing and Caltrans, latest revision. The soil descriptions and the field and laboratory test results were used to assign parameters to the various materials at the site. Testing procedures are presented below, and results of the laboratory testing program are presented in Table B-1 and Figures B-1a through B-8 included in this appendix, and the boring and percolation test logs included in Appendix A.

Laboratory Moisture and Unit Weight Determinations

Moisture content and dry unit weight determinations were performed on selected driven ring samples collected to evaluate the natural water content and dry unit weight of the various soils encountered in accordance with ASTM D7263. In addition, moisture contents were determined on selected SPT or bulk samples in accordance with ASTM D2216. The results are presented on Table B-1 and on the respective boring and percolation test logs (attached).

Grain Size Distribution

Grain size distribution was determined for 31 soil samples in accordance with standard test method ASTM D422. Grain-size curves are presented on Figures B-1a through B-2e – Grain Size Distribution Curve, and the results of percent passing No. 200 Sieve are shown on Table B-1 and on the respective boring logs.

Percent Passing No. 200 Sieve

The percent passing no. 200 sieve was determined for 42 soil samples in accordance with standard test method ASTM D1140. The results of percent passing the No. 200 sieve are shown on Table B-1 and on the respective boring logs.

Direct Shear Tests

Seven multistage direct shear tests were performed on representative driven ring samples to evaluate the shear strength of earth materials. The tests were performed in accordance with standard test method ASTM D3080. Summary plots of the direct shear data are presented on Figures B-3a through B-3g – Direct Shear.

Collapse Potential Tests

Ten collapse potential tests were performed selected driven ring samples of the near surface earth material. The tests were conducted in general accordance with standard test method ASTM D5333. The results of the collapse potential test are presented on Figures B-4a through B-4j – Collapse Potential.

Maximum Unit Weight/Optimum Moisture Content Tests

Seven maximum unit weight and optimum moisture content test were performed on a selected sample of the near surface onsite soils to assess compaction characteristics. The test was performed in accordance with standard test method ASTM D1557 and the results are presented on Figures B-5a through B-5g – Modified Proctor.

R-Value Tests

One R-value test was performed on a select sample of surficial earth material. The test was performed in accordance with standard test method Caltrans Test NO. 301 and test results are presented on Figure B-6 – R-Value Test Report.

California Bearing Ratios

Three California Bearing Ratio tests were performed on selected samples of surficial earth material. The tests were performed in accordance with standard test method ASTM D1883 and test results are presented in Figures B-7a through B-7c – California Bearing Ratio.

Soil Chemistry Tests/Corrosion Tests

Two soil chemistry tests were performed on a sample to evaluate resistivity, pH, sulfate, and chloride. The results of the testing and an analysis of the corrosivity to pipe and concrete materials are summarized in the main report. Test results are presented in Table B-1.

Falling Head Permeability Tests

Four falling head permeability tests were performed on select samples of surficial earth materials. The tests were performed in accordance with standard test method ASTM D5084 and test results are presented in Figure B-8 – Summary of Permeability Test Results.

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-1	3	SM	9.5	124.5	113.7	31.7	--	--	--	--	--	--	--	--
B-1	6	SM	14.9	131.2	114.2	--	--	--	--	--	--	--	--	--
B-1	8	SP	5.1	119.9	114.1	--	--	--	--	--	--	--	--	--
B-1	11	SP	3.0	116.2	112.8	--	--	--	--	--	--	--	--	--
B-2	4	SM	5.2	126.3	120.1	--	--	--	--	--	--	--	--	--
B-3	3	SP-SM	3.3	105.6	102.2	5.2	--	--	--	--	--	--	--	--
B-3	6	SP-SM	12.4	138.5	123.2	--	--	--	--	--	--	--	--	--
B-3	8	SP-SM	2.2	124.2	121.5	--	--	--	--	--	--	--	--	--
B-3	11	SP-SM	2.1	121.9	119.4	--	--	--	--	--	--	--	--	--
B-4	3	ML	13.2	125.0	110.4	--	--	--	--	--	--	--	--	--
B-4	6	ML	6.9	125.3	117.2	53.6	--	--	--	--	--	--	--	--
B-4	8	ML	7.9	124.1	115.0	--	--	--	--	--	--	--	--	--
B-4	11	SP-SM	1.9	127.7	125.3	--	--	--	--	--	--	--	--	--
B-5	3	SM	8.9	129.0	118.5	30.3	--	--	--	--	--	--	--	--
B-5	6	SM	10.2	135.2	122.7	--	--	--	--	--	--	--	--	--
B-5	7.5	SP-SM	8.3	128.4	118.6	--	--	--	--	--	--	--	--	--
B-5	10	SP-SM	1.9	127.7	125.3	--	--	--	--	--	--	--	--	--
B-6	3	SM	9.1	128.6	117.9	--	--	--	--	--	--	--	--	--
B-6	6	SM	8.6	126.1	116.1	--	--	--	--	--	--	--	--	--
B-6	8	SM	8.9	133.3	122.4	--	--	--	--	--	--	--	--	--
B-6	11	SP	1.9	103.8	101.9	--	--	--	--	--	--	--	--	--
B-7	3	SM	11.3	120.4	108.2	--	--	--	--	--	--	--	--	--
B-7	6	SM	2.8	108.4	105.4	--	--	--	--	--	--	--	--	--
B-7	8	SM	3.4	119.5	115.6	--	--	--	--	--	--	--	--	--
B-7	11	SP	2.3	112.3	109.8	--	--	--	--	--	--	--	--	--
B-8	3	SM	9.1	120.0	110.0	--	--	--	--	--	--	--	--	--
B-8	6	SM	2.4	111.8	109.2	--	--	--	--	--	--	--	--	--
B-8	8	SM	1.9	119.1	116.9	--	--	--	--	--	--	--	--	--
B-8	12.5	SP	0.7	127.3	126.4	--	--	--	--	--	--	--	--	--
B-9	0-5	SM	4.8	--	--	--	--	--	--	--	--	--	--	--
B-9	3	SM	1.3	106.8	105.4	--	--	--	--	--	--	--	--	--
B-9	6	SP-SM	6.7	111.8	104.8	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-9	8	SP-SM	6.0	106.8	100.8	--	--	--	--	--	--	--	--	--
B-9	11	SP	5.3	127.3	120.9	--	--	--	--	--	--	--	--	--
B-10	0-5	SM	4.8	--	--	29.2	--	--	130.0	9.1	--	--	--	--
B-10	3	SM	8.9	122.3	112.3	--	--	--	--	--	--	--	--	--
B-10	6	SM	10.5	127.4	115.3	37.7	--	--	--	--	--	--	--	--
B-10	8	SM	10.2	122.9	111.5	--	--	--	--	--	--	--	--	--
B-10	11	SP	2.3	125.1	122.3	--	--	--	--	--	--	--	--	--
B-11	1-5	SM	6.1	--	--	25.5	--	--	--	--	--	--	--	--
B-11	3	SM	9.2	119.9	109.8	--	--	--	--	--	--	--	--	--
B-11	6	SM	11.3	132.3	118.9	--	--	--	--	--	--	--	--	--
B-11	8	SM	4.8	114.8	109.5	--	--	--	--	--	--	--	--	--
B-11	11	SP-SM	1.6	127.5	125.5	--	--	--	--	--	--	--	--	--
B-12	3	SM	6.7	112.8	105.7	18.0	--	--	--	--	--	--	--	--
B-12	6	SM	4.8	110.7	105.6	26.8	--	--	--	--	--	--	--	--
B-12	8	SM	7.6	122.2	113.6	--	--	--	--	--	--	--	--	--
B-12	11	SP-SM	2.5	119.7	116.8	--	--	--	--	--	--	--	--	--
B-13	3	SM	6.3	110.3	103.8	--	--	--	--	--	--	--	--	--
B-13	6	SM	3.7	97.9	94.4	--	--	--	--	--	--	--	--	--
B-13	8	SM	7.0	119.4	111.6	--	--	--	--	--	--	--	--	--
B-13	11	SM	2.8	113.9	110.8	--	--	--	--	--	--	--	--	--
B-14	3	SM	7.0	119.2	111.4	--	--	--	--	--	--	--	--	--
B-14	7	SP-SM	1.7	118.4	116.4	--	--	--	--	--	--	--	--	--
B-14	10	SP-SM	1.8	133.8	131.4	--	--	--	--	--	--	--	--	--
B-15	1-5	SM	4.8	--	--	21.7	--	--	134.6	7.5	--	--	--	--
B-15	2	SM	6.9	124.4	116.4	--	--	--	--	--	--	--	--	--
B-15	3.5	SM	3.9	115.6	111.3	--	--	--	--	--	--	--	--	--
B-15	6	SM	9.9	133.3	121.3	--	--	--	--	--	--	--	--	--
B-15	8	SM	4.6	118.5	113.3	--	--	--	--	--	--	--	--	--
B-15	11	SP	5.2	112.1	106.6	--	--	--	--	--	--	--	--	--
B-16	1-5	SM	6.5	--	--	33.6	--	--	--	--	--	--	--	--
B-16	2	SM	7.2	123.5	115.2	--	--	--	--	--	--	--	--	--
B-16	3.5	SM	7.6	124.0	115.2	--	--	--	--	--	--	--	--	--
B-16	6	SM	9.6	121.8	111.1	32.6	--	--	--	--	--	--	--	--
B-17	3	SM	9.8	130.7	119.0	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-17	6	SM	13.1	128.1	113.3	39.8	--	--	--	--	--	--	--	--
B-17	10	SP	2.2	130.2	127.4	--	--	--	--	--	--	--	--	--
B-18	3	SM	10.0	123.3	112.1	36.4	--	--	--	--	--	--	--	--
B-18	6	SM	16.3	145.6	125.2	--	--	--	--	--	--	--	--	--
B-18	11	SM	14.7	126.3	110.1	--	--	--	--	--	--	--	--	--
B-19	3	SM	9.1	123.5	113.2	25.1	--	--	--	--	--	--	--	--
B-19	6	SM	13.7	130.0	114.3	--	--	--	--	--	--	--	--	--
B-19	8	SM	13.7	129.7	114.1	--	--	--	--	--	--	--	--	--
B-19	11	SM	13.9	129.8	114.0	--	--	--	--	--	--	--	--	--
B-20	3	SM	10.1	114.9	104.4	29.7	--	--	--	--	--	--	--	--
B-20	6	SM	12.2	119.4	106.4	31.2	--	--	--	--	--	--	--	--
B-20	8	SM	16.6	130.4	111.8	--	--	--	--	--	--	--	--	--
B-20	11	SM	14.0	134.1	117.6	--	--	--	--	--	--	--	--	--
B-21	3	SM	6.2	104.6	98.5	15.5	--	--	--	--	--	--	--	--
B-21	6	SP-SM	5.4	105.3	99.9	10.9	--	--	--	--	--	--	--	--
B-21	8	SM	10.0	120.7	109.7	34.9	--	--	--	--	--	--	--	--
B-21	11	SM	7.5	136.7	127.2	--	--	--	--	--	--	--	--	--
B-22	3	SM	7.6	113.0	105.0	--	--	--	--	--	--	--	--	--
B-22	6	SP-SM	6.7	114.8	107.6	--	--	--	--	--	--	--	--	--
B-22	11	SM	8.5	134.4	123.9	--	--	--	--	--	--	--	--	--
B-23	3	SM	6.7	115.1	107.9	15.5	--	--	--	--	--	--	--	--
B-23	6	SM	9.4	129.6	118.5	34.2	--	--	--	--	--	--	--	--
B-23	8	SM	5.9	126.1	119.1	--	--	--	--	--	--	--	--	--
B-23	11	SM	5.4	132.2	125.4	--	--	--	--	--	--	--	--	--
B-24	3	SM	6.7	115.1	107.9	--	--	--	--	--	--	--	--	--
B-24	6	SP	9.4	129.6	118.5	--	--	--	--	--	--	--	--	--
B-24	11	SM	5.4	132.2	125.4	--	--	--	--	--	--	--	--	--
B-25	3	SP-SM	7.2	112.5	104.9	--	--	--	--	--	--	--	--	--
B-25	6	SP-SM	3.3	108.4	104.9	--	--	--	--	--	--	--	--	--
B-25	8	SM	13.6	131.5	115.8	--	--	--	--	--	--	--	--	--
B-25	11	SP-SM	8.9	123.6	113.5	--	--	--	--	--	--	--	--	--
B-26	3	SP-SM	2.7	113.3	110.3	9.9	--	--	--	--	--	--	--	--
B-26	6	SP-SM	1.4	113.3	111.7	--	--	--	--	--	--	--	--	--
B-26	8	SP-SM	1.3	129.2	127.5	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-26	11	SM	3.1	124.3	120.6	--	--	--	--	--	--	--	--	--
B-27	3	SM	8.9	111.5	102.4	--	--	--	--	--	--	--	--	--
B-27	6	SM	9.6	125.9	114.9	--	--	--	--	--	--	--	--	--
B-27	8	SM	8.0	128.2	118.7	--	--	--	--	--	--	--	--	--
B-27	11	SP-SM	4.2	129.0	123.8	--	--	--	--	--	--	--	--	--
B-27	13	SP-SM	8.9	123.6	113.5	--	--	--	--	--	--	--	--	--
B-27	21	SM	8.9	123.6	113.5	--	--	--	--	--	--	--	--	--
B-28	3	SP-SM	7.1	110.4	103.1	12.7	--	--	--	--	--	--	--	--
B-28	6	SM	6.5	117.0	109.9	17.6	--	--	--	--	--	--	--	--
B-28	8	SM	4.2	120.5	115.6	--	--	--	--	--	--	--	--	--
B-28	11	SM	2.6	118.1	115.1	--	--	--	--	--	--	--	--	--
B-29	3	SM	7.8	112.7	104.5	--	--	--	--	--	--	--	--	--
B-29	6	SM	9.5	128.3	117.2	--	--	--	--	--	--	--	--	--
B-29	7.5	SP-SM	3.9	123.3	118.7	--	--	--	--	--	--	--	--	--
B-29	10	SP-SM	2.7	131.0	127.6	--	--	--	--	--	--	--	--	--
B-29	13.5	SM	3.2	116.3	112.7	--	--	--	--	--	--	--	--	--
B-29	15	SP-SM	2.3	130.9	128.0	--	--	--	--	--	--	--	--	--
B-30	3	SM	8.7	110.1	101.3	30.6	--	--	--	--	--	--	--	--
B-30	6	SM	9.2	123.5	113.1	39.9	--	--	--	--	--	--	--	--
B-30	8	SM	11.3	123.2	110.7	--	--	--	--	--	--	--	--	--
B-30	11	SM	11.7	124.1	111.1	--	--	--	--	--	--	--	--	--
B-31	3	SP-SM	3.8	107.7	103.8	5.5	--	--	--	--	--	--	--	--
B-31	6	SP	4.8	106.8	101.9	3.8	--	--	--	--	--	--	--	--
B-31	8	SP	4.4	113.3	108.5	--	--	--	--	--	--	--	--	--
B-31	11	SP	4.9	117.9	112.4	--	--	--	--	--	--	--	--	--
B-32	3	SM	6.4	109.5	102.9	--	--	--	--	--	--	--	--	--
B-32	6	SP	5.1	125.5	119.4	--	--	--	--	--	--	--	--	--
B-32	8	SP	11.4	121.8	109.3	--	--	--	--	--	--	--	--	--
B-32	11	SP	4.9	106.3	101.3	--	--	--	--	--	--	--	--	--
B-33	0-5	SM	7.4	--	--	--	--	--	--	--	--	--	--	--
B-33	3	SM	10.1	120.3	109.3	--	--	--	--	--	--	--	--	--
B-33	6	SM	10.1	121.6	110.4	--	--	--	--	--	--	--	--	--
B-33	8	SM	13.5	122.0	107.5	--	--	--	--	--	--	--	--	--
B-33	11	SM	7.2	112.0	104.5	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-34	3	SM	11.5	117.7	105.6	--	--	--	--	--	--	--	--	--
B-34	6	SM	11.4	125.0	112.2	--	--	--	--	--	--	--	--	--
B-34	8	SM	5.4	113.0	107.2	--	--	--	--	--	--	--	--	--
B-34	11	SP-SM	4.1	116.4	111.8	--	--	--	--	--	--	--	--	--
B-35	3	SM	6.9	121.2	113.4	18.4	--	--	--	--	--	--	--	--
B-35	6	SP-SM	4.8	113.0	107.8	--	--	--	--	--	--	--	--	--
B-35	8	SP-SM	3.5	109.4	105.7	--	--	--	--	--	--	--	--	--
B-35	11	SP-SM	6.6	121.1	113.6	--	--	--	--	--	--	--	--	--
B-36	3	SM	6.2	118.5	111.6	--	--	--	--	--	--	--	--	--
B-36	6	SM	6.4	118.1	111.0	--	--	--	--	--	--	--	--	--
B-36	8	SM	6.4	114.6	107.7	--	--	--	--	--	--	--	--	--
B-36	11	SM	4.5	108.3	103.6	--	--	--	--	--	--	--	--	--
B-36	16	SM	3.4	117.5	113.6	--	--	--	--	--	--	--	--	--
B-37	3	SM	7.7	111.3	103.3	--	--	--	--	--	--	--	--	--
B-37	6	SM	10.0	119.0	108.2	--	126	30	--	--	--	--	--	--
B-37	8	SM	8.0	122.0	113.0	--	--	--	--	--	--	--	--	--
B-37	11	SM	14.0	119.1	104.5	--	--	--	--	--	--	--	--	--
B-37	21	SM	10.9	112.6	101.5	--	--	--	--	--	--	--	--	--
B-38	1-5	SM	5.8	--	--	30.5	--	--	--	--	14,000	7.36	0.00245	0.001
B-38	3	SM	9.8	116.9	106.5	--	--	--	--	--	--	--	--	--
B-38	6	SM	9.6	116.4	106.2	31.6	--	--	--	--	--	--	--	--
B-38	8	SM	9.5	116.2	106.1	--	--	--	--	--	--	--	--	--
B-38	11	SM	9.8	113.6	103.5	--	--	--	--	--	--	--	--	--
B-38	16	SM	3.5	101.8	98.4	--	--	--	--	--	--	--	--	--
B-38	20	SM	--	--	--	24.9	--	--	--	--	--	--	--	--
B-38	26	SM	--	--	--	--	91	37	--	--	--	--	--	--
B-39	3	SM	6.0	115.5	109.0	--	--	--	--	--	--	--	--	--
B-39	6	SM	3.9	112.4	108.2	--	--	--	--	--	--	--	--	--
B-39	8	SM	7.6	115.5	107.3	--	--	--	--	--	--	--	--	--
B-39	11	SM	8.9	113.3	104.0	--	180	32	--	--	--	--	--	--
B-39	21	SM	3.1	113.1	109.7	--	--	--	--	--	--	--	--	--
B-40	3	SM	10.4	119.1	107.9	--	--	--	--	--	--	--	--	--
B-40	6	SM	9.4	122.7	112.2	--	--	--	--	--	--	--	--	--
B-40	8	SM	3.0	125.5	121.8	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-40	11	SP	3.2	107.6	104.3	--	--	--	--	--	--	--	--	--
B-40	21	SP	2.6	115.4	112.5	--	--	--	--	--	--	--	--	--
B-41	1-6	SM	4.7	--	--	23.7	--	--	126.3	9.5	--	--	--	--
B-41	3	SM	5.2	112.6	107.0	--	--	--	--	--	--	--	--	--
B-41	6	SM	2.6	109.0	106.2	--	--	--	--	--	--	--	--	--
B-41	8	SM	3.8	118.2	113.9	--	--	--	--	--	--	--	--	--
B-41	11	SM	2.0	109.1	107.0	--	--	--	--	--	--	--	--	--
B-41	16	SP	2.6	115.4	112.5	--	--	--	--	--	--	--	--	--
B-42	3	SM	9.3	124.3	113.7	--	--	--	--	--	--	--	--	--
B-42	6	SM	11.9	130.8	116.9	--	--	--	--	--	--	--	--	--
B-42	11	SP-SM	1.7	130.8	128.6	--	--	--	--	--	--	--	--	--
B-43	3	SM	7.2	112.9	105.3	--	--	--	--	--	--	--	--	--
B-43	6	SM	7.4	112.7	104.9	--	--	--	--	--	--	--	--	--
B-43	8	SP-SM	2.9	128.6	125.0	--	--	--	--	--	--	--	--	--
B-43	11	SM	11.2	115.4	103.8	--	--	--	--	--	--	--	--	--
B-44	3	SM	6.5	112.6	105.7	--	--	--	--	--	--	--	--	--
B-44	6	SM	8.3	126.0	116.3	--	--	--	--	--	--	--	--	--
B-45	3	SM	6.6	118.9	111.5	--	--	--	--	--	--	--	--	--
B-45	6	SP	5.3	109.0	103.5	--	--	--	--	--	--	--	--	--
B-45	11	SM	7.1	118.1	110.3	--	--	--	--	--	--	--	--	--
B-47	1-5	SM	5.0	--	--	25.8	--	--	131.0	8.0	--	--	--	--
B-47	3	SM	6.4	122.5	115.1	--	--	--	--	--	--	--	--	--
B-47	6	SM	11.9	117.7	105.2	--	--	--	--	--	--	--	--	--
B-47	8	SM	10.3	125.7	114.0	--	--	--	--	--	--	--	--	--
B-47	11	SM	11.5	139.3	124.9	--	--	--	--	--	--	--	--	--
B-48	3	SM	7.1	118.9	111.0	--	--	--	--	--	--	--	--	--
B-48	6	SP-SM	4.3	113.6	108.9	--	--	--	--	--	--	--	--	--
B-48	8	SM	8.4	115.7	106.7	--	--	--	--	--	--	--	--	--
B-48	11	SM	8.7	125.8	115.7	--	--	--	--	--	--	--	--	--
B-49	2.5	SM	4.0	122.5	117.8	--	--	--	--	--	--	--	--	--
B-49	6	SM	7.3	113.4	105.7	--	--	--	--	--	--	--	--	--
B-49	8	SM	5.6	109.2	103.4	--	--	--	--	--	--	--	--	--
B-49	11	SM	5.9	118.6	112.0	--	--	--	--	--	--	--	--	--
B-50	3	SM	3.6	117.0	112.9	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-50	6	SM	7.2	116.1	108.3	19.0	--	--	--	--	--	--	--	--
B-50	8	SM	12.5	127.5	113.3	33.0	--	--	--	--	--	--	--	--
B-50	11	SP	3.1	131.6	127.6	--	--	--	--	--	--	--	--	--
B-50	21	SP	2.2	114.6	112.1	--	--	--	--	--	--	--	--	--
B-50	25	SM	--	--	--	15.7	--	--	--	--	--	--	--	--
B-51	3	SM	6.0	124.1	117.1	--	--	--	--	--	--	--	--	--
B-51	6	SM	9.1	129.4	118.6	--	--	--	--	--	--	--	--	--
B-51	7.5	SM	3.7	129.9	125.3	--	--	--	--	--	--	--	--	--
B-51	10	SM	6.5	122.2	114.7	--	--	--	--	--	--	--	--	--
B-51	15.5	SM	3.0	128.8	125.0	--	--	--	--	--	--	--	--	--
B-51	25.5	SP	5.2	106.5	101.2	--	--	--	--	--	--	--	--	--
B-52	3	SM	8.5	114.8	105.8	--	--	--	--	--	--	--	--	--
B-52	6	SM	7.7	126.9	117.8	--	--	--	--	--	--	--	--	--
B-52	8	SM	7.1	126.8	118.4	--	--	--	--	--	--	--	--	--
B-52	11	SM	4.0	116.2	111.7	--	--	--	--	--	--	--	--	--
B-52	21	SM	8.7	120.4	110.8	--	--	--	--	--	--	--	--	--
B-53	3	SM	13.5	109.0	96.0	--	--	--	--	--	--	--	--	--
B-53	6	SM	11.4	131.1	117.7	--	--	--	--	--	--	--	--	--
B-53	8	SM	2.7	121.4	118.2	--	--	--	--	--	--	--	--	--
B-53	11	SP	1.6	132.2	130.1	--	--	--	--	--	--	--	--	--
B-54	3	SM	12.8	122.7	108.8	--	--	--	--	--	--	--	--	--
B-54	6	SM	6.6	136.4	128.0	--	--	--	--	--	--	--	--	--
B-54	11	SM	9.0	122.1	112.0	--	--	--	--	--	--	--	--	--
B-55	0-5	SM	6.0	--	--	--	--	--	125.2	10.0	--	--	--	--
B-55	3	SM	6.5	111.9	105.1	--	--	--	--	--	--	--	--	--
B-55	6	SM	8.8	123.3	113.3	--	--	--	--	--	--	--	--	--
B-55	8	SM	8.8	115.3	106.0	--	--	--	--	--	--	--	--	--
B-55	11	SM	14.6	123.3	107.6	--	--	--	--	--	--	--	--	--
B-56	3	SM	12.2	120.7	107.6	35.9	--	--	--	--	--	--	--	--
B-56	6	SM	6.6	111.4	104.5	22.6	--	--	--	--	--	--	--	--
B-56	8	SM	7.9	117.7	109.1	23.1	--	--	--	--	--	--	--	--
B-56	11	SP-SM	3.0	129.1	125.3	--	--	--	--	--	--	--	--	--
B-57	1-6	SM	6.8	--	--	27.7	--	--	128.3	8.9	--	--	--	--
B-57	3	SM	7.1	109.7	102.4	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-57	6	SM	7.3	113.2	105.5	--	--	--	--	--	--	--	--	--
B-57	8	SM	8.4	118.2	109.0	--	--	--	--	--	--	--	--	--
B-57	11	SP	3.1	115.6	112.1	--	--	--	--	--	--	--	--	--
B-58	3	SM	7.2	117.9	110.0	24.0	--	--	--	--	--	--	--	--
B-58	6	SM	7.5	114.6	106.6	--	--	--	--	--	--	--	--	--
B-58	8	SP-SM	5.7	108.3	102.5	--	--	--	--	--	--	--	--	--
B-58	11	SP-SM	5.1	119.3	113.5	--	--	--	--	--	--	--	--	--
B-59	3	SM	4.7	111.5	106.5	--	--	--	--	--	--	--	--	--
B-59	6	SM	2.6	106.5	103.8	--	--	--	--	--	--	--	--	--
B-59	8	SM	1.7	117.7	115.7	--	--	--	--	--	--	--	--	--
B-59	11	SP-SM	2.6	126.1	122.9	--	--	--	--	--	--	--	--	--
B-60	3	SM	6.7	118.7	111.2	--	--	--	--	--	--	--	--	--
B-60	6	SP-SM	3.8	113.3	109.2	--	--	--	--	--	--	--	--	--
B-60	8	SP-SM	3.0	122.7	119.1	--	--	--	--	--	--	--	--	--
B-60	11	SM	11.4	125.3	112.5	--	--	--	--	--	--	--	--	--
B-60	21	SM	7.7	113.8	105.7	--	--	--	--	--	--	--	--	--
B-61	0-8	SM	4.8	--	--	--	--	--	--	--	30,000	7.46	0.00275	0.001
B-61	3	SM	7.3	117.8	109.8	15.8	--	--	--	--	--	--	--	--
B-61	6	SP-SM	5.7	112.8	106.7	9.4	148	31	--	--	--	--	--	--
B-61	8	SP-SM	4.2	111.8	107.3	7.6	--	--	--	--	--	--	--	--
B-61	11	SM	5.4	120.2	114.0	13.5	122	33	--	--	--	--	--	--
B-61	17	SP	3.4	109.4	105.8	3.1	--	--	--	--	--	--	--	--
B-61	26	SP	12.0	115.9	103.5	--	--	--	--	--	--	--	--	--
B-62	3	SM	7.3	110.6	103.1	--	--	--	--	--	--	--	--	--
B-62	6	SM	5.1	113.6	108.1	--	--	--	--	--	--	--	--	--
B-62	8	SM	12.2	131.5	117.2	--	--	--	--	--	--	--	--	--
B-62	11	SP	1.7	127.2	125.1	--	--	--	--	--	--	--	--	--
B-62	20.5	SP	3.1	117.2	113.7	--	--	--	--	--	--	--	--	--
B-63	3	SM	5.6	114.9	108.8	--	--	--	--	--	--	--	--	--
B-63	6	SM	2.5	112.8	110.0	--	--	--	--	--	--	--	--	--
B-63	8	SP-SM	3.3	118.4	114.6	--	--	--	--	--	--	--	--	--
B-63	11	SP-SM	2.4	119.4	116.6	--	--	--	--	--	--	--	--	--
B-64	3	SM	7.8	111.2	103.2	--	--	--	--	--	--	--	--	--
B-64	6	SP-SM	4.1	121.0	116.2	--	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-64	7.5	SM	6.6	115.3	108.2	--	--	--	--	--	--	--	--	--
B-64	10	SM	6.7	109.3	102.4	--	--	--	--	--	--	--	--	--
B-65	3	SM	9.1	115.4	105.8	31.6	--	--	--	--	--	--	--	--
B-65	6	SM	11.5	105.7	94.8	--	--	--	--	--	--	--	--	--
B-65	8	SM	7.4	127.8	119.0	--	--	--	--	--	--	--	--	--
B-65	11	SP	6.7	109.3	102.4	--	--	--	--	--	--	--	--	--
B-66	3	SM	10.6	124.6	112.7	--	--	--	--	--	--	--	--	--
B-66	6	SM	9.8	123.9	112.8	31.1	--	--	--	--	--	--	--	--
B-66	8	SM	10.9	124.8	112.5	--	--	--	--	--	--	--	--	--
B-66	11	SP	2.4	110.5	107.9	--	--	--	--	--	--	--	--	--
B-67	3	SM	8.1	115.0	106.4	--	--	--	--	--	--	--	--	--
B-67	6	SM	9.3	128.5	117.6	--	--	--	--	--	--	--	--	--
B-67	8	SM	9.9	131.1	119.3	--	--	--	--	--	--	--	--	--
B-67	11	SM	5.3	119.7	113.7	--	--	--	--	--	--	--	--	--
B-68	3	SM	8.0	119.9	111.0	--	--	--	--	--	--	--	--	--
B-68	6	SM	10.9	119.1	107.4	37.1	--	--	--	--	--	--	--	--
B-68	8	SM	12.7	134.6	119.4	40.9	--	--	--	--	--	--	--	--
B-68	11	SP-SM	2.5	117.1	114.2	3.9	--	--	--	--	--	--	--	--
B-68	15	SM	--	--	--	17.0	--	--	--	--	--	--	--	--
B-68	21	SM	14.6	131.2	114.5	45.7	642	29	--	--	--	--	--	--
B-68	25	ML	--	--	--	56.0	--	--	--	--	--	--	--	--
B-68	31	ML	--	--	--	56.0	568	33	--	--	--	--	--	--
B-68	35	SM	--	--	--	29.1	--	--	--	--	--	--	--	--
B-68	45	SM	--	--	--	30.5	--	--	--	--	--	--	--	--
B-69	3	SM	6.1	113.2	106.7	--	--	--	--	--	--	--	--	--
B-69	6	SM	2.5	112.0	109.3	--	--	--	--	--	--	--	--	--
B-69	8	SM	4.0	120.1	115.5	--	--	--	--	--	--	--	--	--
B-69	11	SP-SM	1.3	122.5	120.9	--	--	--	--	--	--	--	--	--
B-69	21	SP-SM	11.5	124.4	111.6	--	--	--	--	--	--	--	--	--
B-70	3	SM	7.6	114.1	106.0	--	--	--	--	--	--	--	--	--
B-70	6	SM	10.6	126.7	114.6	--	--	--	--	--	--	--	--	--
B-70	8	SP-SM	6.6	118.9	111.5	--	--	--	--	--	--	--	--	--
B-70	11	SP-SM	2.6	117.5	114.5	--	--	--	--	--	--	--	--	--
B-70	15.5	SM	2.7	131.8	128.3	--	--	--	--	--	--	--	--	--

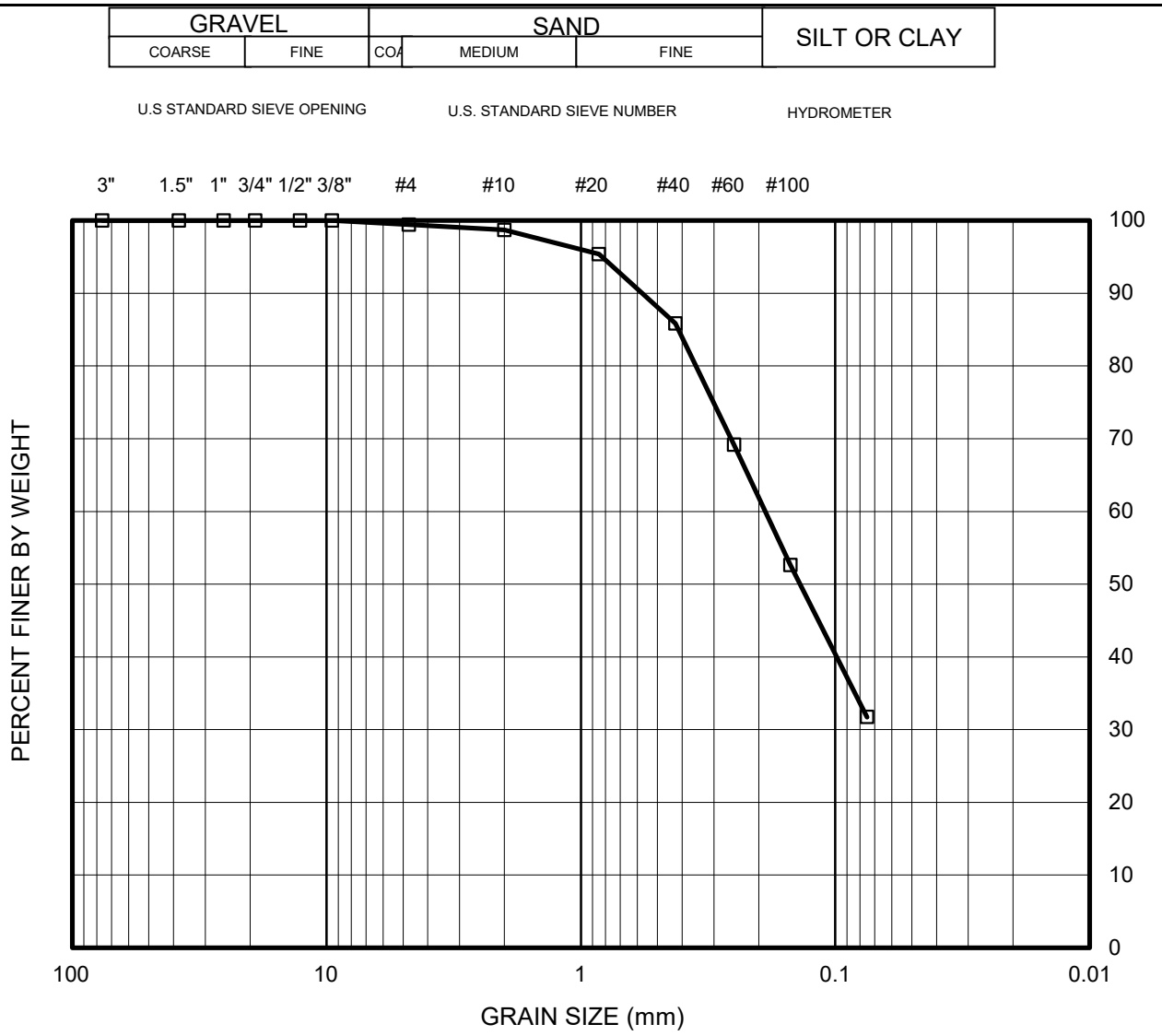
TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-70	26	SM	4.0	128.1	123.2	--	--	--	--	--	--	--	--	--
B-71	3	SM	16.3	116.1	99.8	--	--	--	--	--	--	--	--	--
B-71	6	SM	9.9	130.1	118.4	--	--	--	--	--	--	--	--	--
B-71	8	SP-SM	4.0	117.7	113.2	--	--	--	--	--	--	--	--	--
B-71	11	SP	2.7	108.6	105.7	--	--	--	--	--	--	--	--	--
B-72	3	SM	6.8	117.9	110.4	--	--	--	--	--	--	--	--	--
B-72	6	SM	9.0	129.3	118.6	--	--	--	--	--	--	--	--	--
B-72	8	SM	6.4	114.1	107.2	22.8	--	--	--	--	--	--	--	--
B-72	11	SM	8.8	112.8	103.7	--	--	--	--	--	--	--	--	--
B-73	3	SM	9.3	122.1	111.7	--	--	--	--	--	--	--	--	--
B-73	6	SM	11.7	132.0	118.2	--	--	--	--	--	--	--	--	--
B-73	8	SP-SM	2.2	131.6	128.8	--	--	--	--	--	--	--	--	--
B-73	10.5	SP-SM	2.2	131.8	129.0	--	--	--	--	--	--	--	--	--
B-74	3	SM	7.4	118.9	110.7	--	--	--	--	--	--	--	--	--
B-74	6	SM	10.2	127.4	115.6	--	--	--	--	--	--	--	--	--
B-74	8	SP-SM	3.8	124.9	120.3	--	--	--	--	--	--	--	--	--
B-74	11	SP	3.0	115.1	111.7	--	--	--	--	--	--	--	--	--
B-75	3	SM	6.5	108.9	102.3	--	--	--	--	--	--	--	--	--
B-75	6	SM	6.6	118.8	111.4	--	--	--	--	--	--	--	--	--
B-75	8	SM	12.2	134.3	119.7	--	--	--	--	--	--	--	--	--
B-75	11	SM	7.1	124.7	116.4	--	--	--	--	--	--	--	--	--
B-76	3	SM	7.6	121.4	112.8	18.8	--	--	--	--	--	--	--	--
B-76	6	SP	4.4	110.4	105.7	--	--	--	--	--	--	--	--	--
B-76	8	SP	3.9	125.0	120.3	--	--	--	--	--	--	--	--	--
B-76	11	SP	6.6	124.8	117.1	--	--	--	--	--	--	--	--	--
B-77	3	SP	7.7	117.4	109.0	--	--	--	--	--	--	--	--	--
B-77	6	SM	9.7	133.8	122.0	--	--	--	--	--	--	--	--	--
B-77	8	SP-SM	2.5	127.0	123.9	--	--	--	--	--	--	--	--	--
B-77	11	SP-SM	2.4	113.5	110.8	--	--	--	--	--	--	--	--	--
B-78	3	SM	5.1	123.0	117.0	--	--	--	--	--	--	--	--	--
B-78	6	SP-SM	2.0	117.6	115.3	--	--	--	--	--	--	--	--	--
B-78	8	SM	3.9	121.3	116.7	--	--	--	--	--	--	--	--	--
B-78	11	SM	2.0	121.6	119.2	--	--	--	--	--	--	--	--	--
B-79	3	SP-SM	3.9	113.5	109.2	5.1	--	--	--	--	--	--	--	--

TABLE B-1 SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Depth (feet)	USCS Symbol	Moisture Content (%)	In-Situ Wet Unit Weight (pcf)	In-Situ Dry Unit Weight (pcf)	Passing #200 Sieve (%)	Shear Strength		Maximum Unit Weight / Optimum Moisture Content		Corrosion Potential			
							ϕ (deg)	c (psf)	Unit Weight (pcf)	Moisture Content (%)	Resistivity (ohm)	pH	Chorides (%)	Sulfates (%)
B-79	6	SM	7.8	118.0	109.5	--	--	--	--	--	--	--	--	--
B-79	8	SM	11.4	125.4	112.6	31.3	--	--	--	--	--	--	--	--
B-79	10.5	SM	5.1	115.7	110.1	--	--	--	--	--	--	--	--	--
B-80	3	SM	6.9	114.4	107.0	--	--	--	--	--	--	--	--	--
B-80	6	SM	5.9	111.8	105.6	22.9	--	--	--	--	--	--	--	--
B-80	8	SP	1.5	121.4	119.6	--	--	--	--	--	--	--	--	--
B-80	11	SM	6.3	124.8	117.4	--	--	--	--	--	--	--	--	--
B-81	3	SM	10.5	127.2	115.1	38.5	--	--	--	--	--	--	--	--
B-81	6	SM	8.2	120.3	111.2	--	--	--	--	--	--	--	--	--
B-81	8	SM	5.8	123.5	116.7	--	--	--	--	--	--	--	--	--
B-81	11	SP-SM	3.0	111.7	108.4	--	--	--	--	--	--	--	--	--
B-82	3	SM	7.7	116.2	107.9	--	--	--	--	--	--	--	--	--
B-82	6	SM	6.1	116.7	110.0	--	--	--	--	--	--	--	--	--
B-82	8	SM	4.5	126.8	121.3	12.6	--	--	--	--	--	--	--	--
B-83	1-5	SM	5.3	--	--	23.4	--	--	--	--	--	--	--	--
B-83	3	SM	7.0	109.0	101.9	--	--	--	--	--	--	--	--	--
B-83	6	SM	10.3	121.9	110.5	--	--	--	--	--	--	--	--	--
B-83	8	SM	11.5	125.1	112.2	--	--	--	--	--	--	--	--	--
B-84	3	SM	9.2	116.5	106.7	28.1	--	--	--	--	--	--	--	--
B-84	6	SP-SM	3.6	109.4	105.6	--	--	--	--	--	--	--	--	--
B-84	8	SP-SM	3.4	119.4	115.5	--	--	--	--	--	--	--	--	--
B-84	11	SP-SM	3.2	121.1	117.3	--	--	--	--	--	--	--	--	--
B-85	1-5	SM	9.5	--	--	36.9	--	--	131.5	8.5	--	--	--	--
B-85	3	SM	14.3	127.9	111.9	--	--	--	--	--	--	--	--	--
B-85	6	SM	11.7	119.4	106.9	--	--	--	--	--	--	--	--	--
B-85	8	SM	14.5	133.2	116.3	--	--	--	--	--	--	--	--	--
B-85	11	SP	2.8	111.1	108.1	--	--	--	--	--	--	--	--	--
B-86	3	SM	8.5	112.5	103.7	--	--	--	--	--	--	--	--	--
B-86	6	SM	7.4	109.9	102.3	18.7	--	--	--	--	--	--	--	--
B-86	8	SM	6.4	115.9	108.9	--	--	--	--	--	--	--	--	--
B-86	11	SM	7.8	120.5	111.8	--	--	--	--	--	--	--	--	--
B-87	3	SM	12.8	129.9	115.2	41.0	--	--	--	--	--	--	--	--
B-87	6	SM	11.5	127.2	114.1	--	--	--	--	--	--	--	--	--
B-87	8	SP	1.5	118.3	116.6	4.0	--	--	--	--	--	--	--	--
B-87	11	SP-SM	--	--	--	11.3	--	--	--	--	--	--	--	--

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B1	R1	3.0	Ring	SM	N/A	N/A

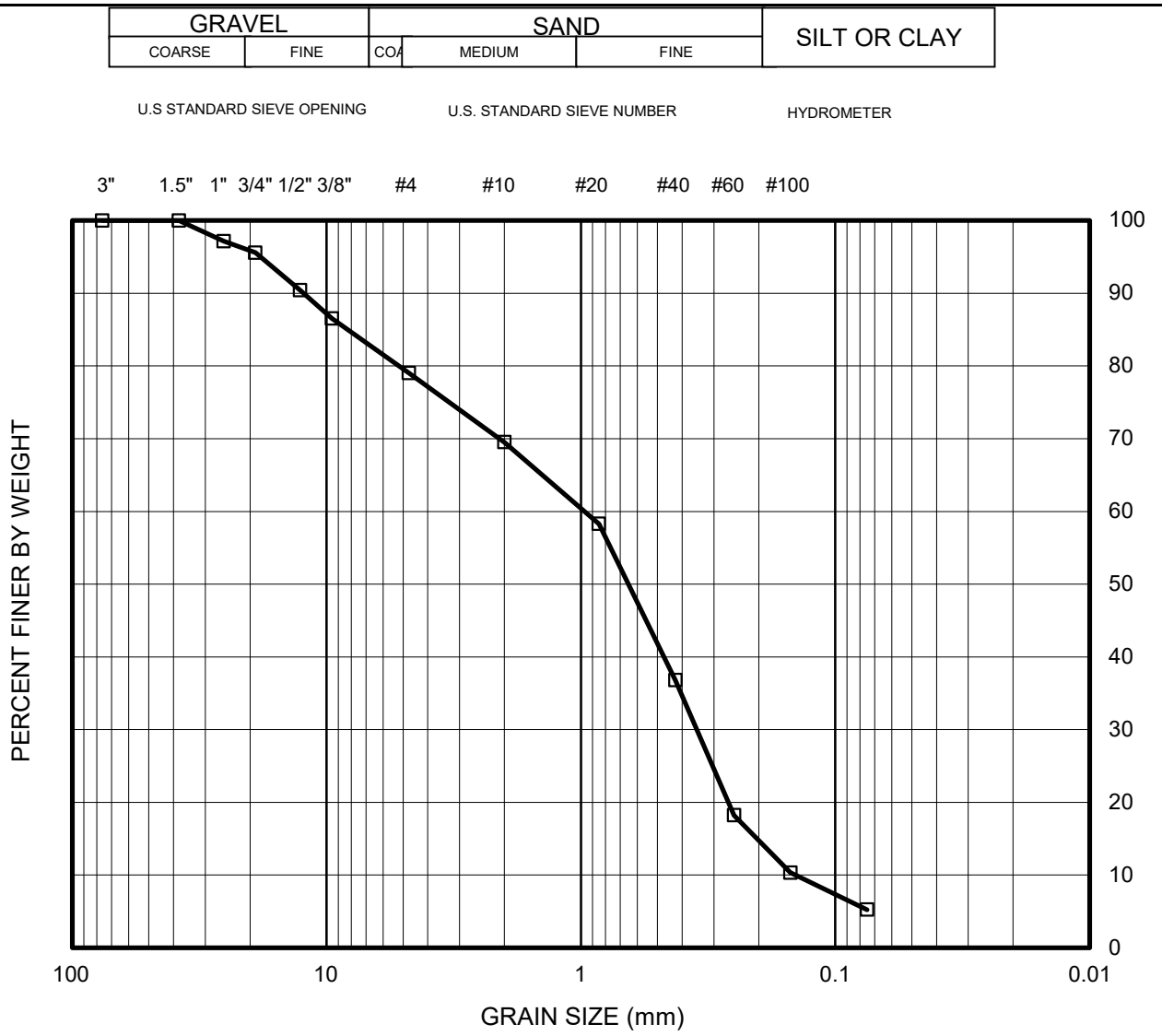
Gravel:	0.6%
Sand:	67.7%
Fine:	31.7%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1a

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B3	R3	8.0	Ring	SP-SM	N/A	N/A

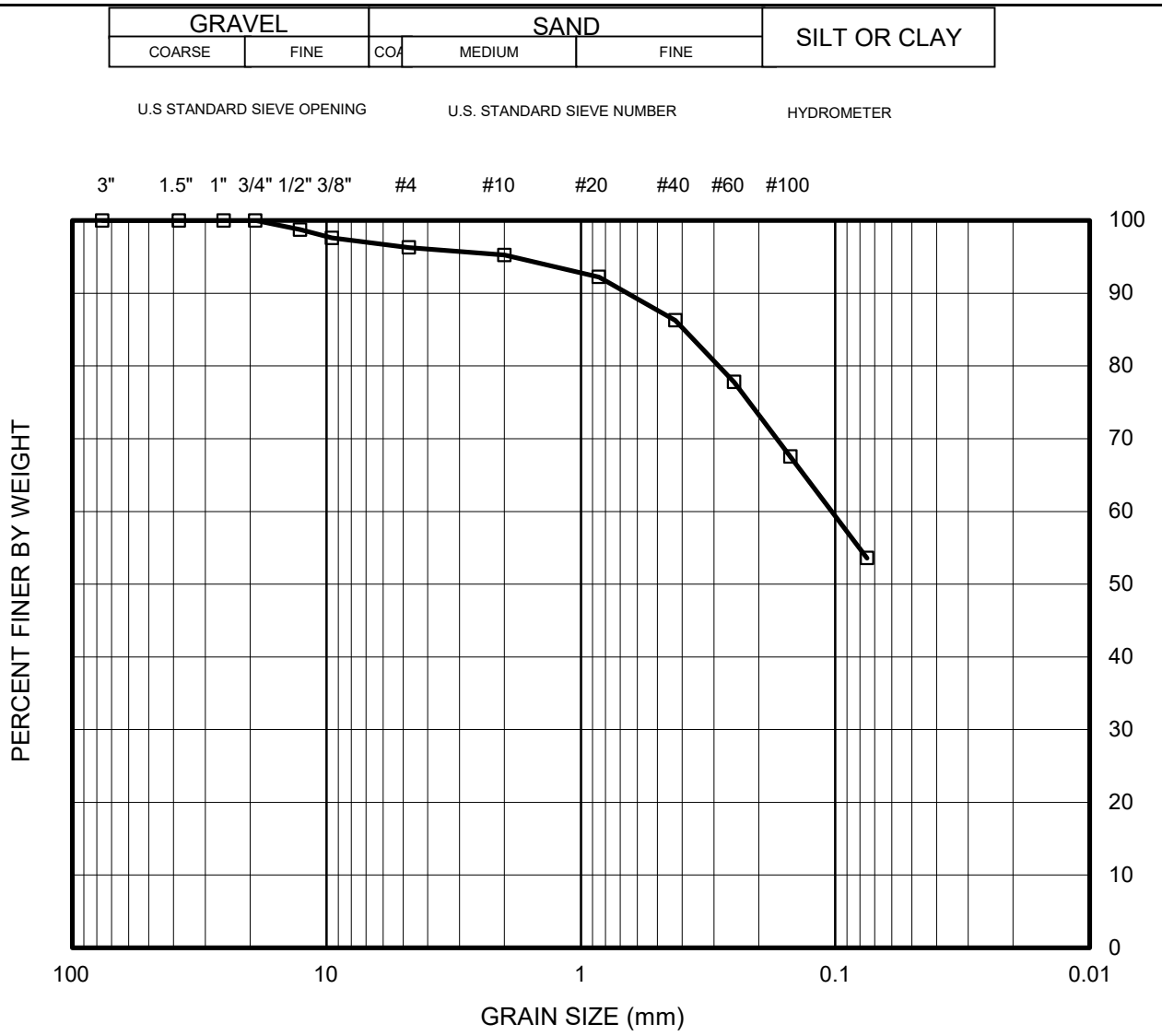
Gravel:	21.0%
Sand:	73.8%
Fine:	5.2%

Project Name:	SACC at OIAA
Client Job No.:	SC6101
Client Name:	Cotton, Shires and Associates, Inc.
EGLAB Project No.:	22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1b

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B4	R1	3.0	Ring	ML	N/A	N/A

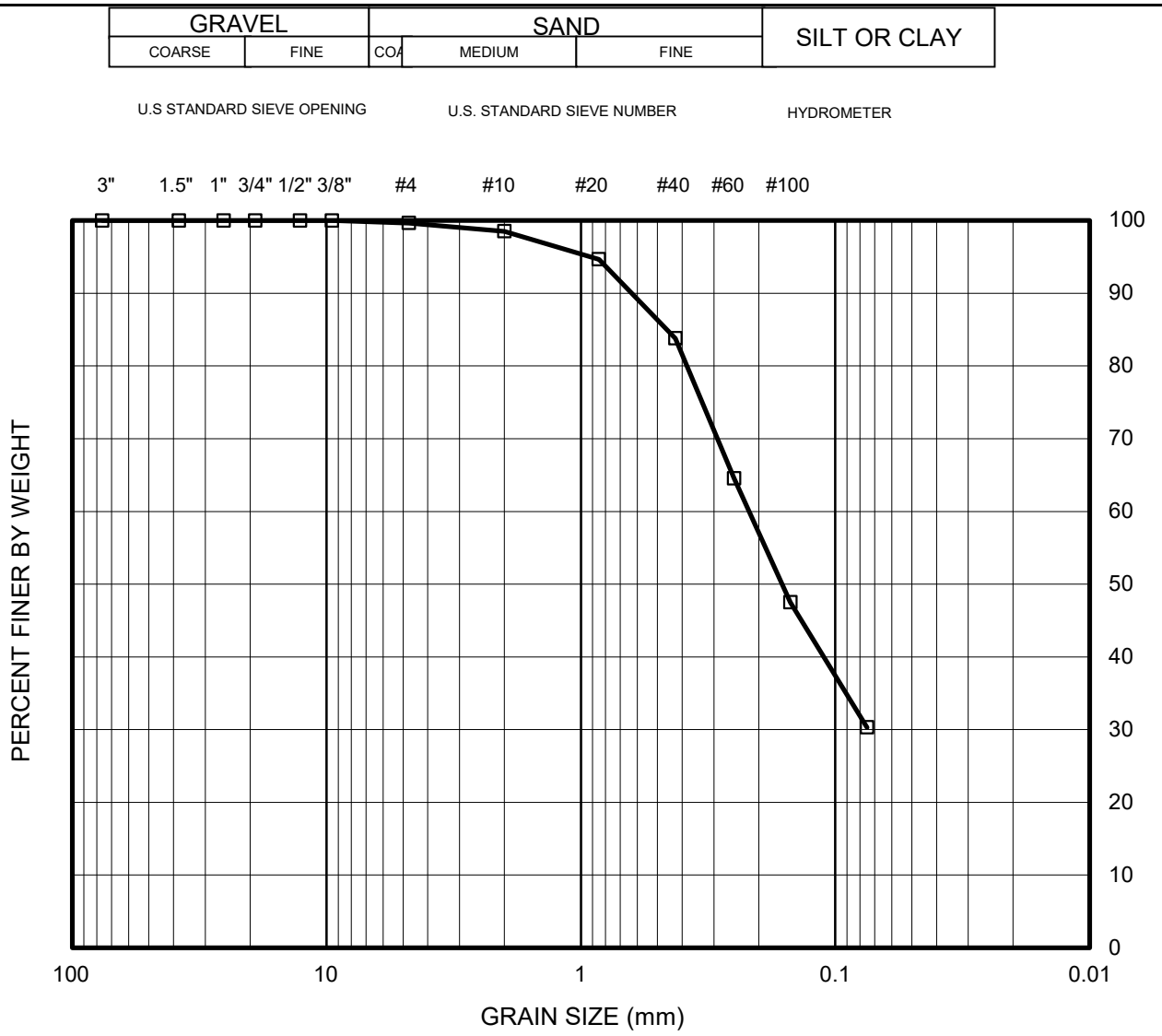
Gravel:	3.7%
Sand:	42.7%
Fine:	53.6%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1c

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B5	R1	3.0	Ring	SM	N/A	N/A

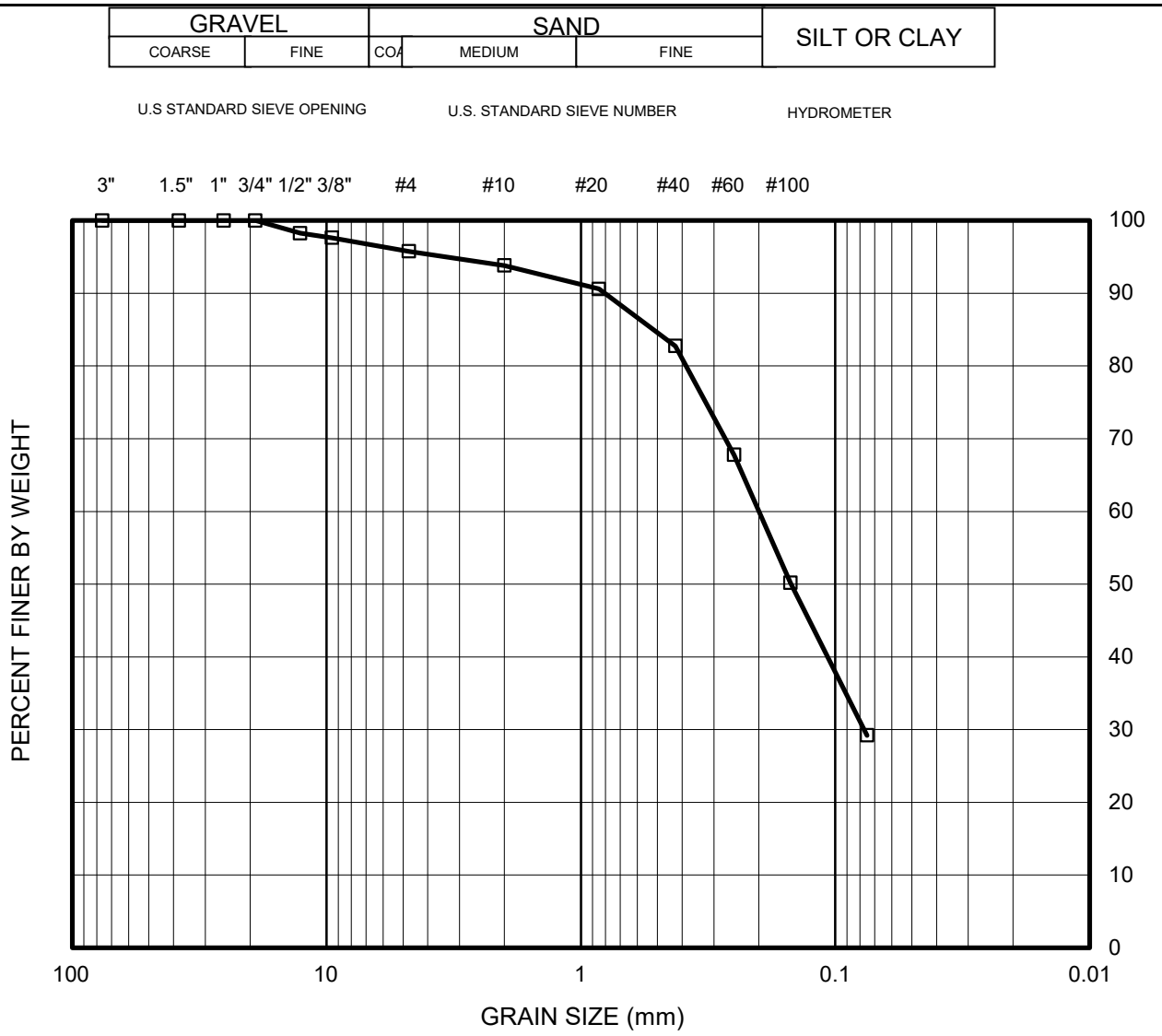
Gravel:	0.3%
Sand:	69.4%
Fine:	30.3%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1d

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B10	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

Gravel:	4.2%
Sand:	66.6%
Fine:	29.2%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1e

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B10	R2	6.0	Ring	SM	N/A	N/A

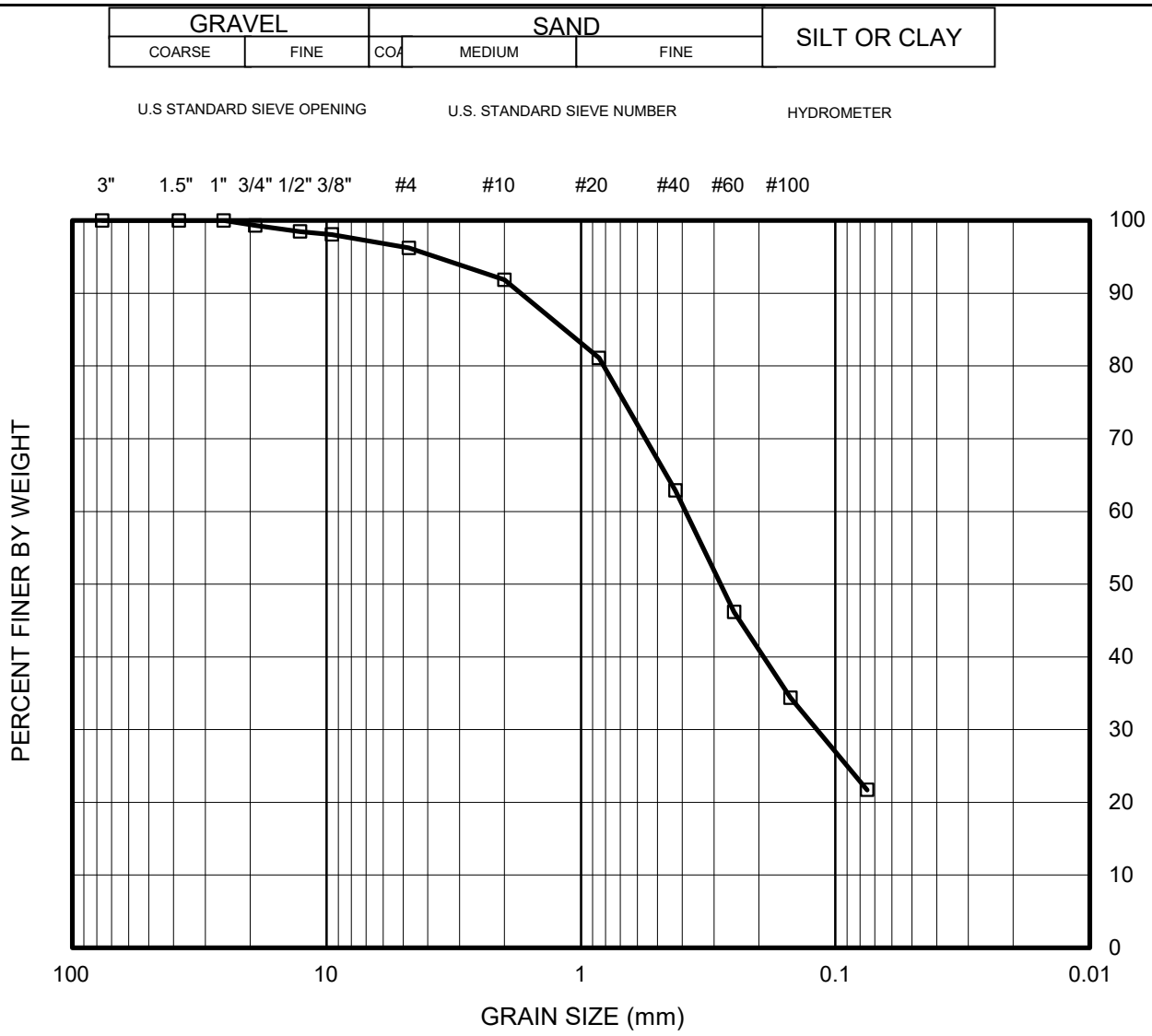
Gravel:	0.1%
Sand:	62.2%
Fine:	37.7%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1f

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B15	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

Gravel:	3.8%
Sand:	74.5%
Fine:	21.7%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1g

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B16	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

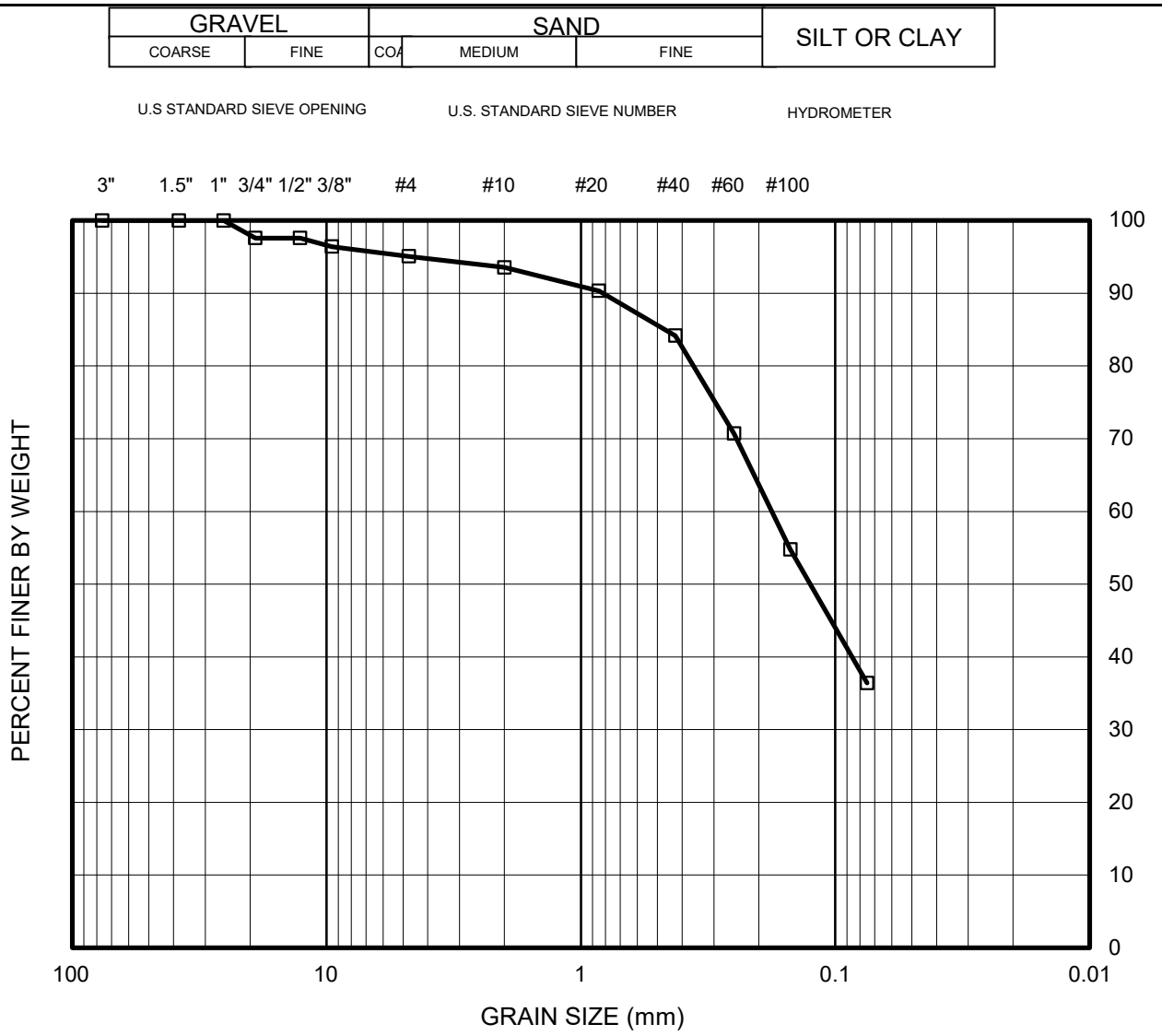
Gravel:	0.6%
Sand:	65.8%
Fine:	33.6%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1h

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B18	R3	11.0	Ring	SM	N/A	N/A

Gravel:	4.9%
Sand:	58.7%
Fine:	36.4%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1i

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B20	R2	6.0	Ring	SM	N/A	N/A

Gravel:	0.0%
Sand:	68.8%
Fine:	31.2%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1j

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B21	R1	3.0	Ring	SM	N/A	N/A

Gravel:	1.9%
Sand:	82.6%
Fine:	15.5%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1k

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B23	R1	3.0	Ring	SM	N/A	N/A

Gravel:	0.6%
Sand:	83.9%
Fine:	15.5%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1I

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B23	R2	6.0	Ring	SM	N/A	N/A

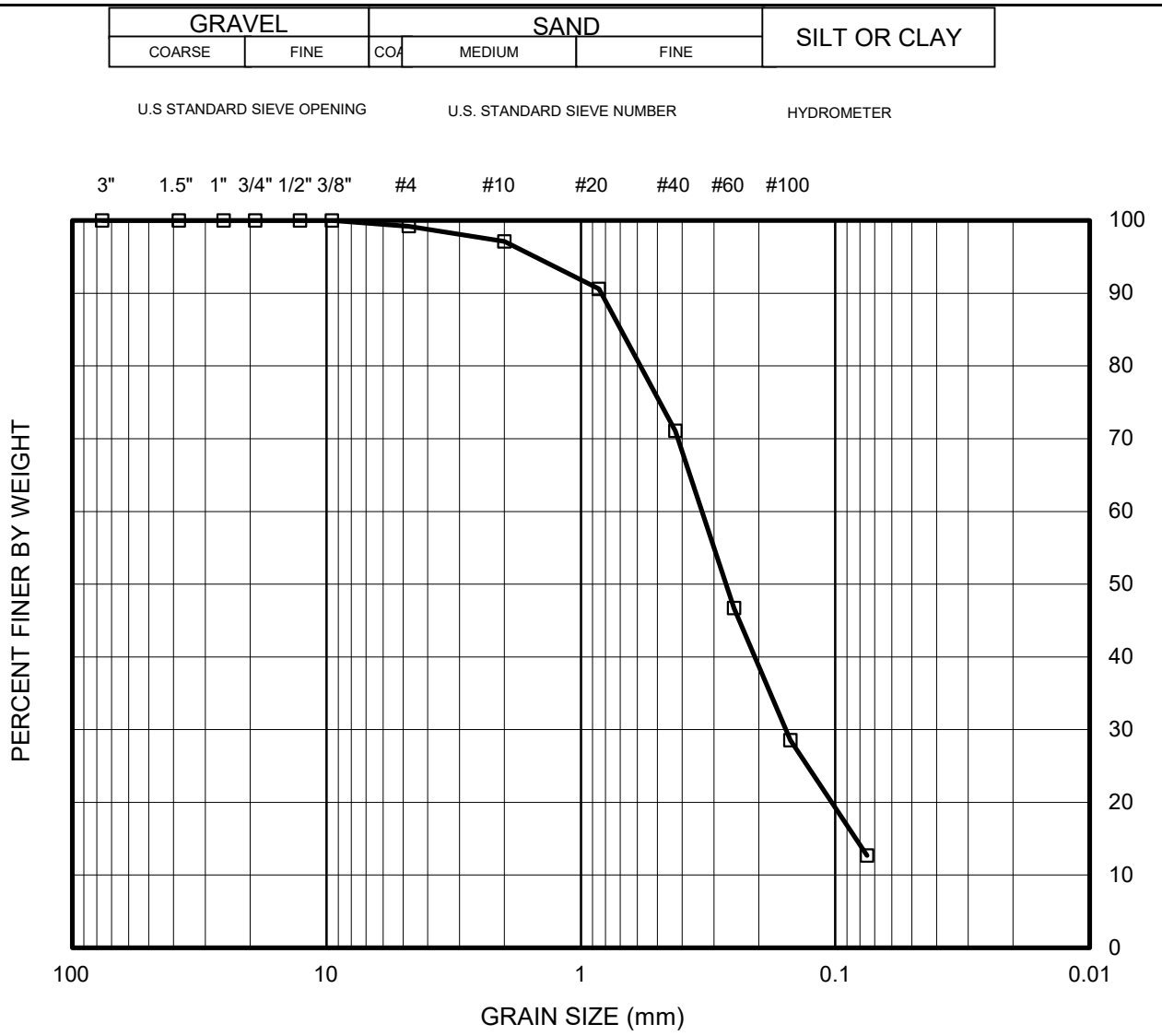
Gravel:	1.5%
Sand:	64.3%
Fine:	34.2%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1m

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B28	R1	3.0	Ring	SP-SM	N/A	N/A

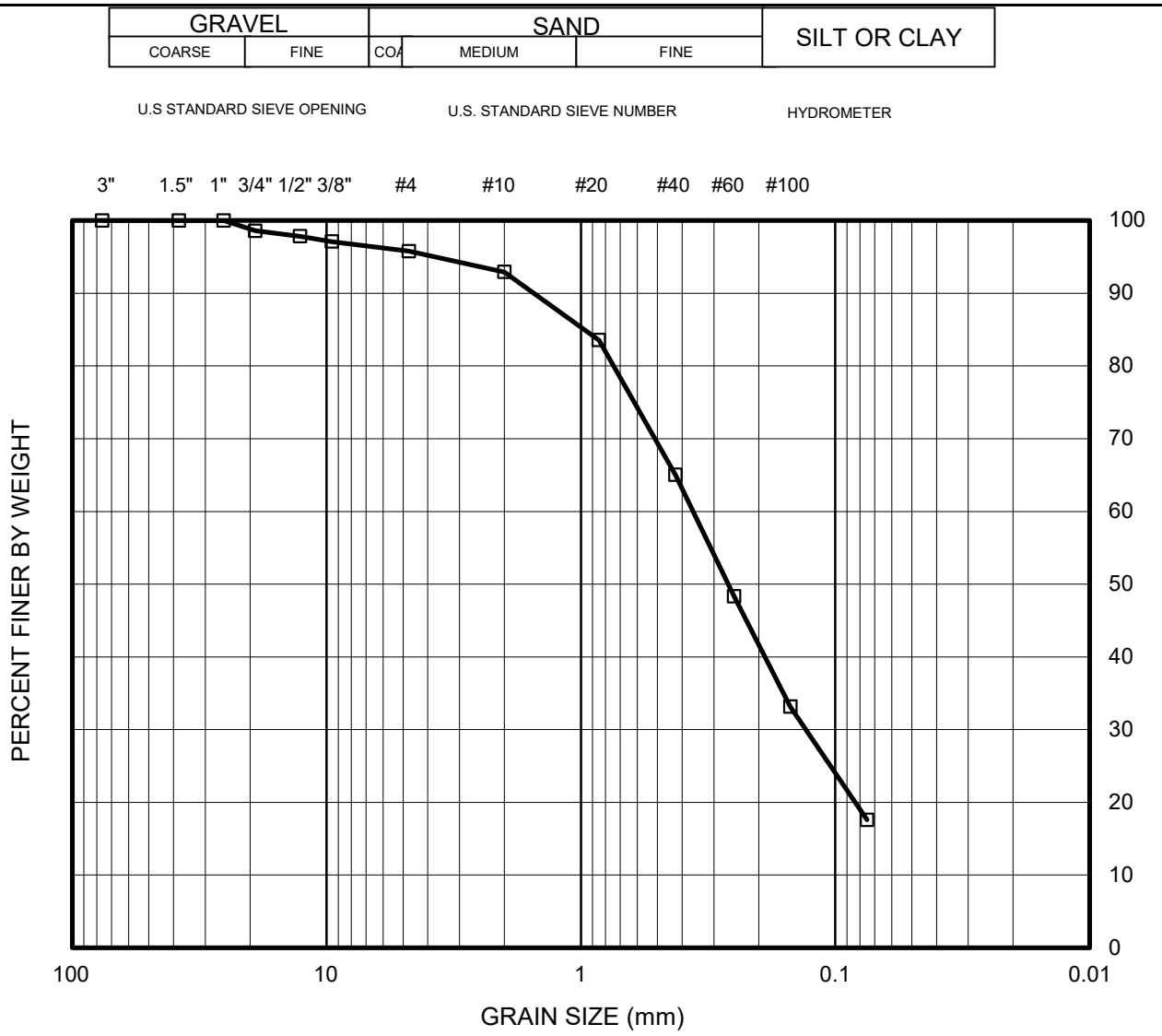
Gravel:	0.8%
Sand:	86.5%
Fine:	12.7%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1n

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B28	R2	6.0	Ring	SM	N/A	N/A

Gravel:	4.2%
Sand:	78.2%
Fine:	17.6%

Project Name:
SACC at OIAA

Client Job No.: SC6101

Client Name: Cotton, Shires and Associates, Inc.

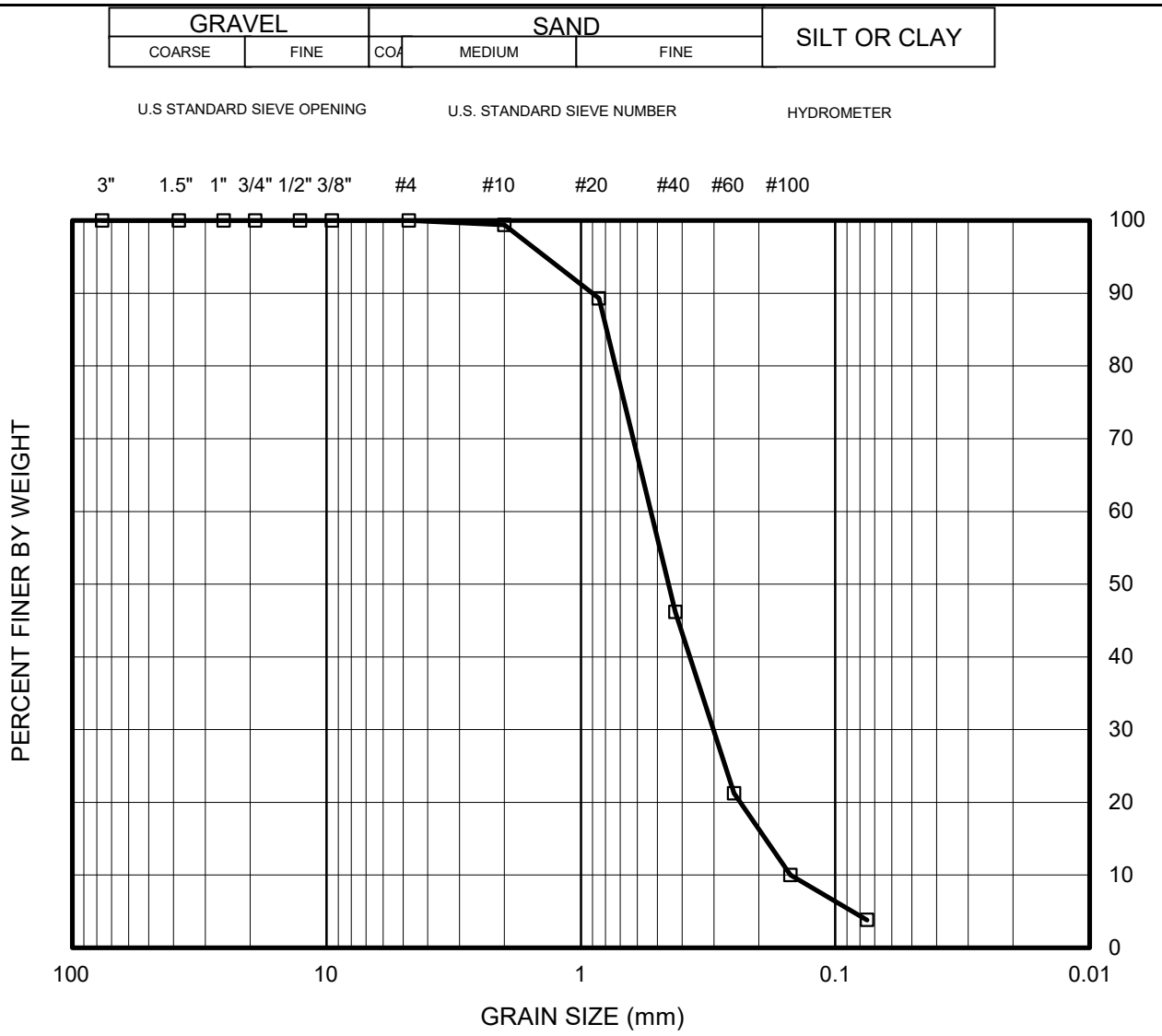
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

FIGURE B-1o

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B31	R2	6.0	Ring	SP	N/A	N/A

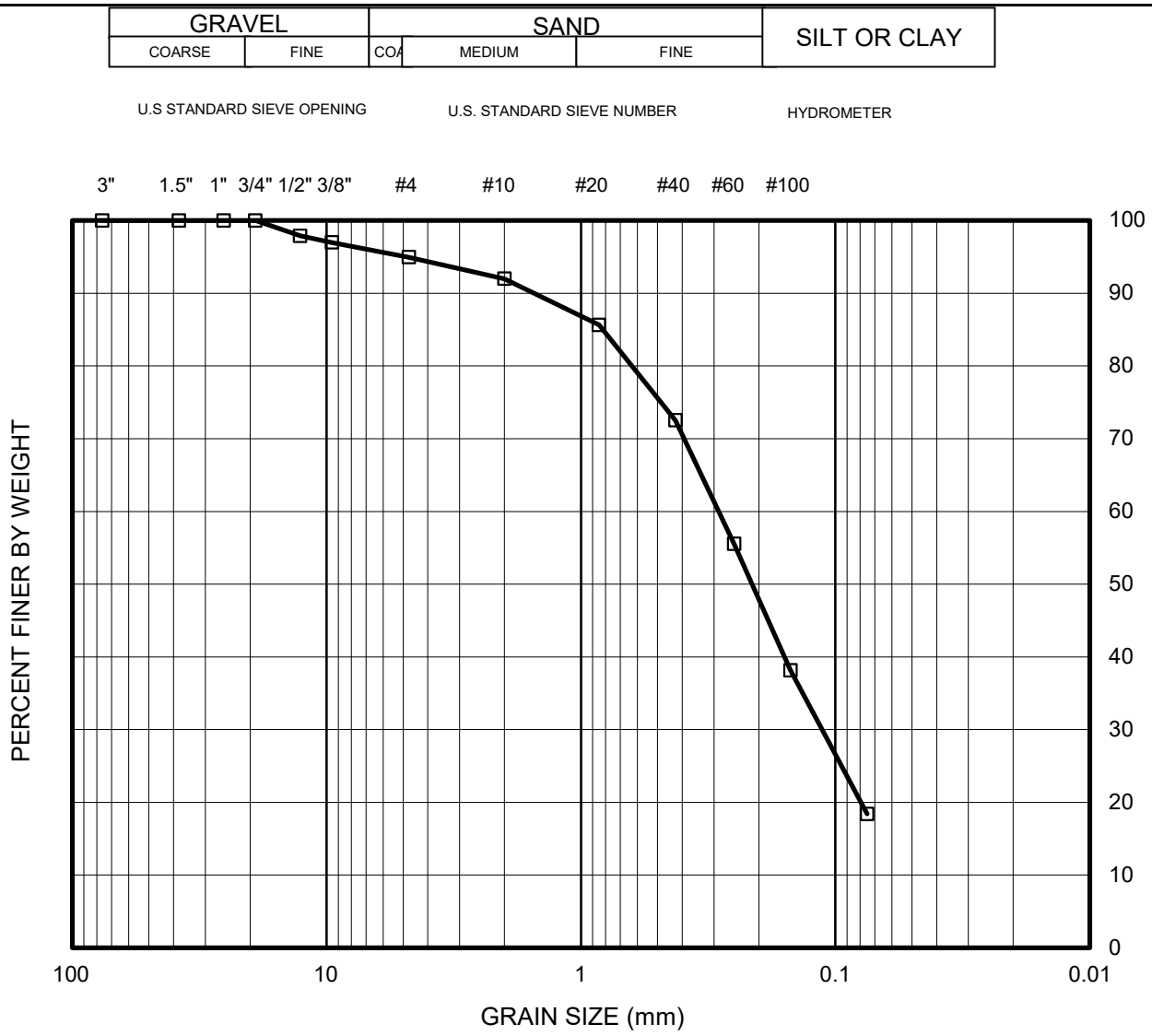
Gravel:	0.0%
Sand:	96.2%
Fine:	3.8%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1p

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B35	R1	3.0	Ring	SM	N/A	N/A

Gravel:	5.0%
Sand:	76.6%
Fine:	18.4%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1q

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B38	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

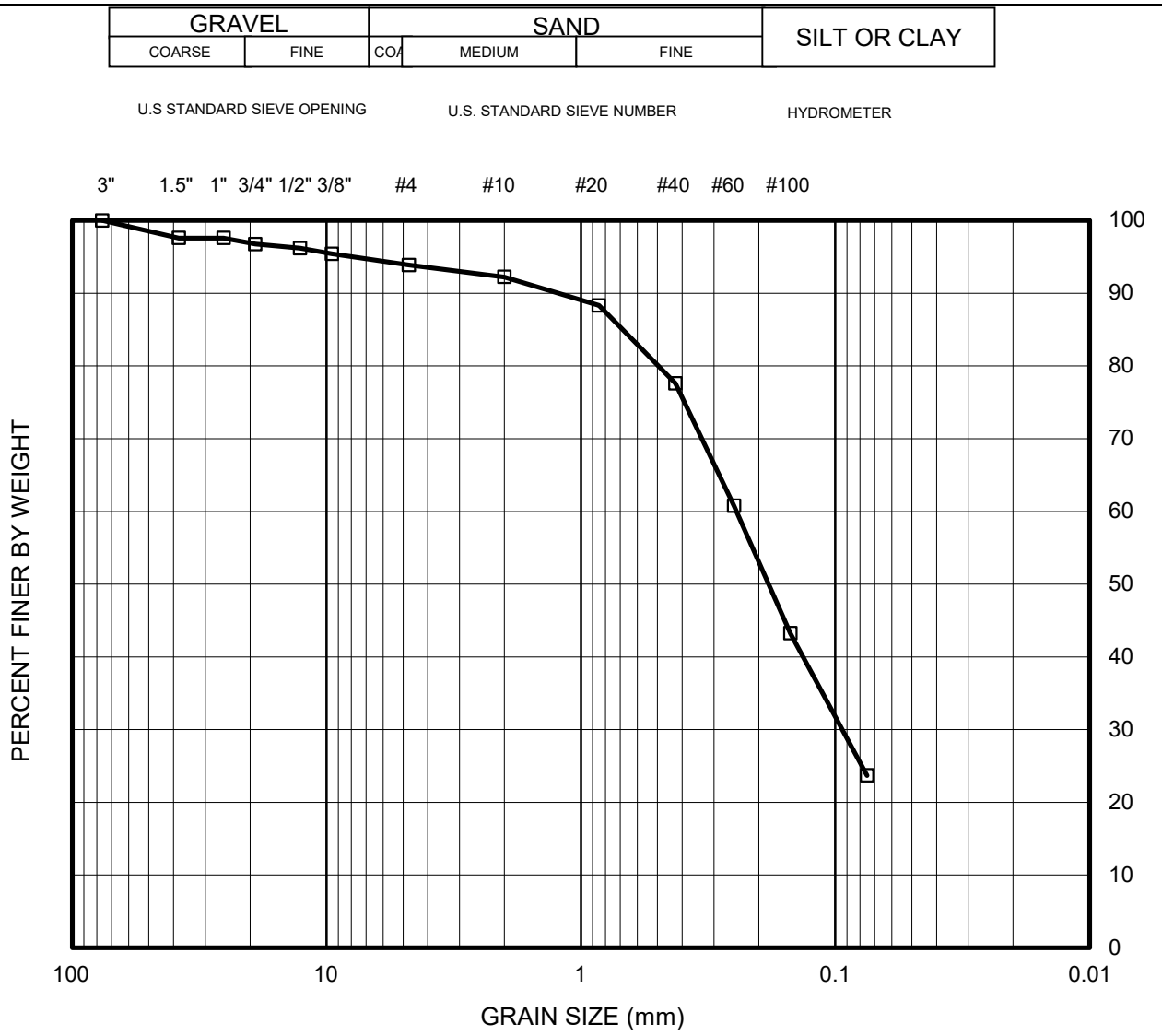
Gravel:	9.7%
Sand:	59.8%
Fine:	30.5%

Project Name:	SACC at OIAA
Client Job No.:	SC6101
Client Name:	Cotton, Shires and Associates, Inc.
EGLAB Project No.:	22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1r

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B41	Bulk	1.0-6.0	Bulk	SM	N/A	N/A

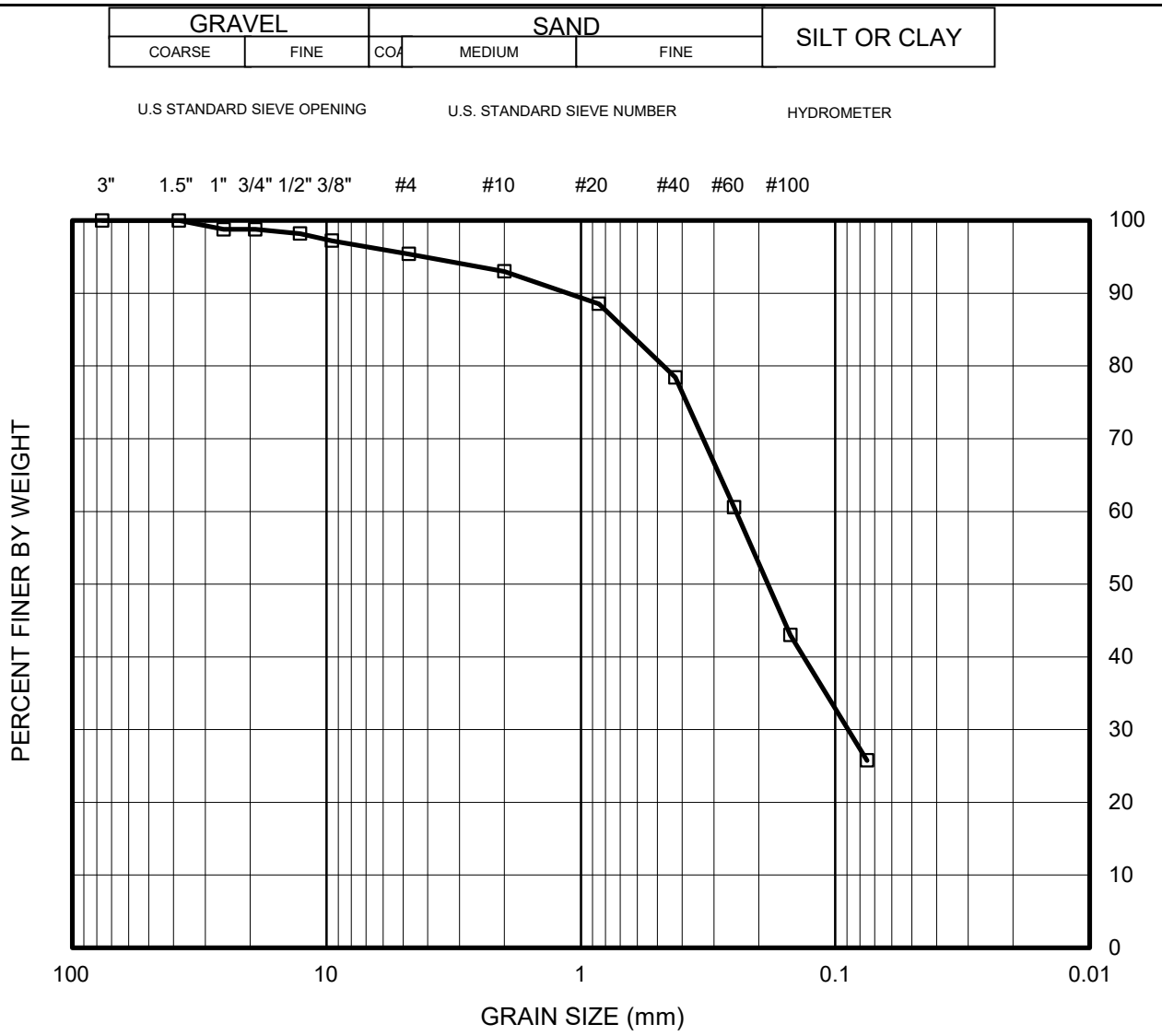
Gravel:	6.1%
Sand:	70.2%
Fine:	23.7%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1s

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B47	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

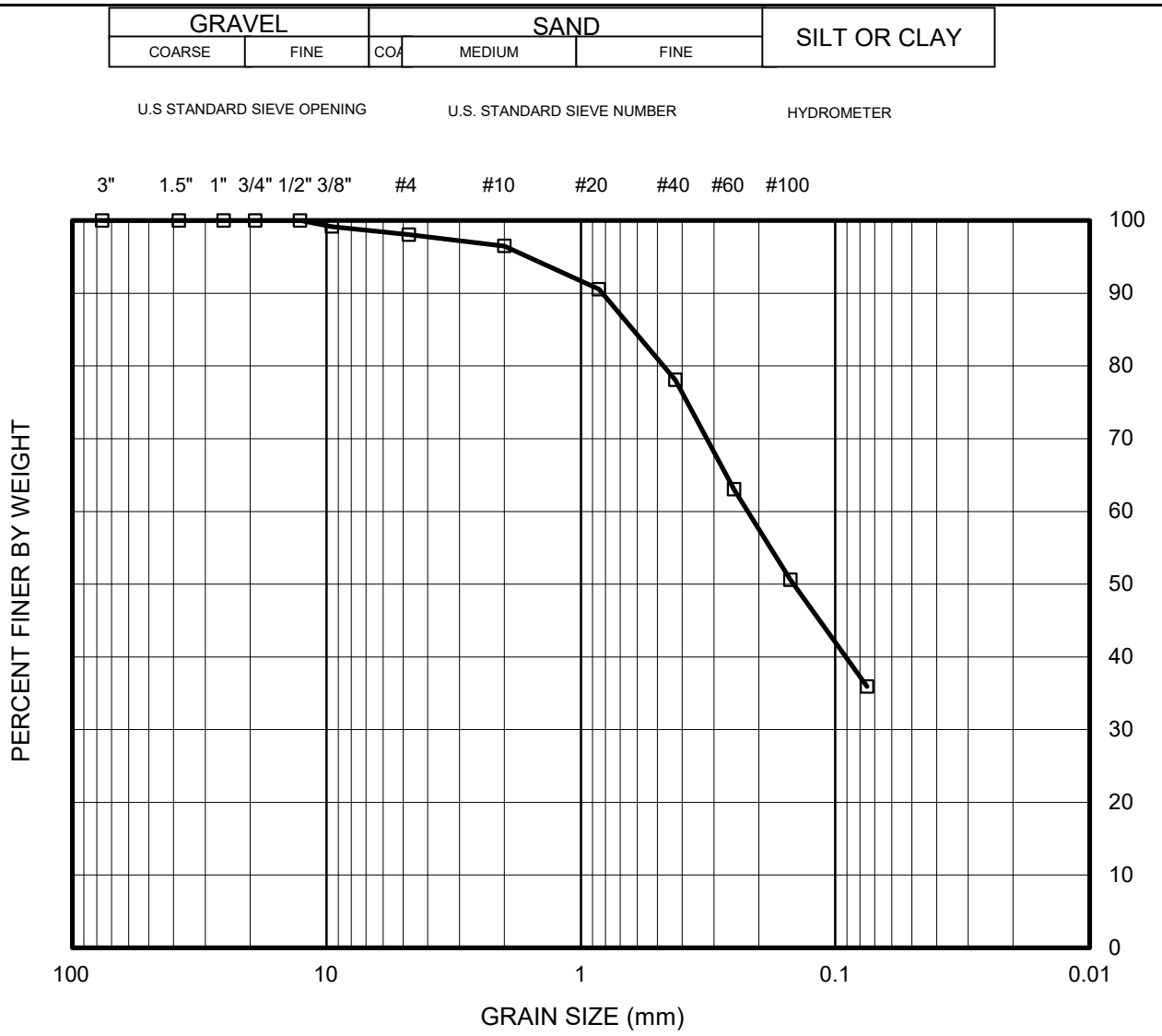
Gravel:	4.6%
Sand:	69.6%
Fine:	25.8%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1t

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B56	R1	3.0	Ring	SM	N/A	N/A

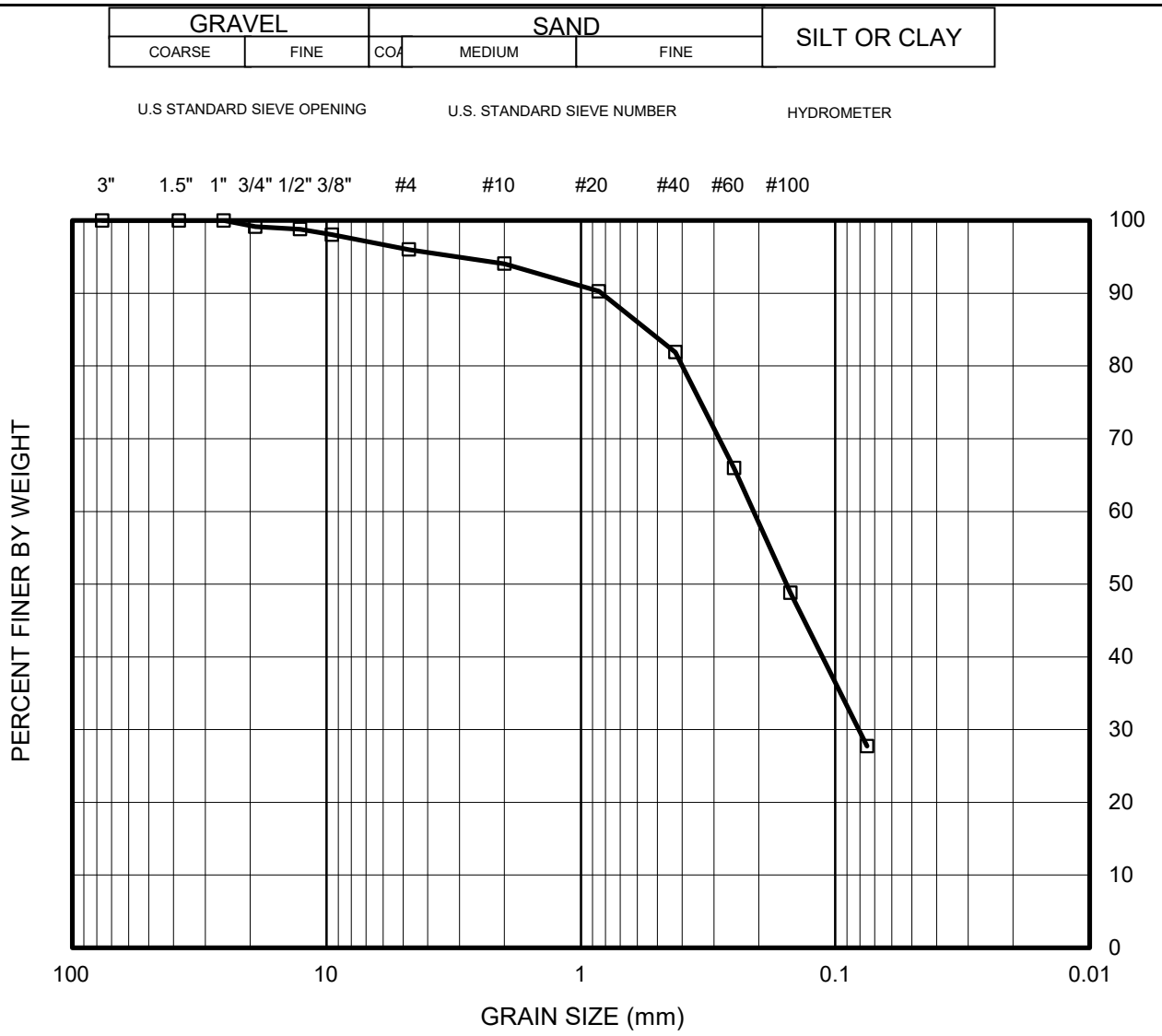
Gravel:	2.0%
Sand:	62.1%
Fine:	35.9%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1u

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B57	Bulk	1.0-6.0	Bulk	SM	N/A	N/A

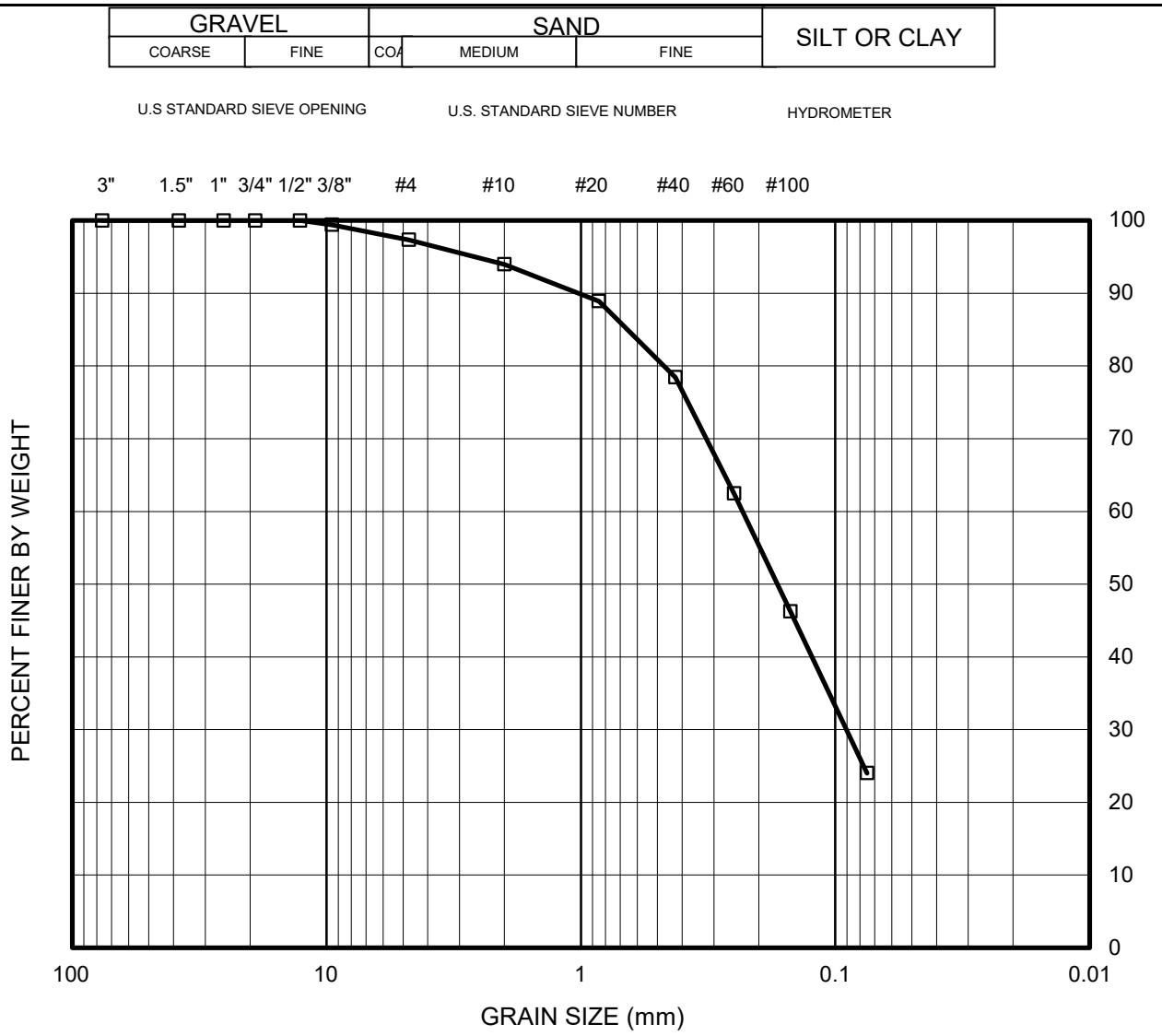
Gravel:	4.0%
Sand:	68.3%
Fine:	27.7%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1v

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B58	R1	3.0	Ring	SM	N/A	N/A

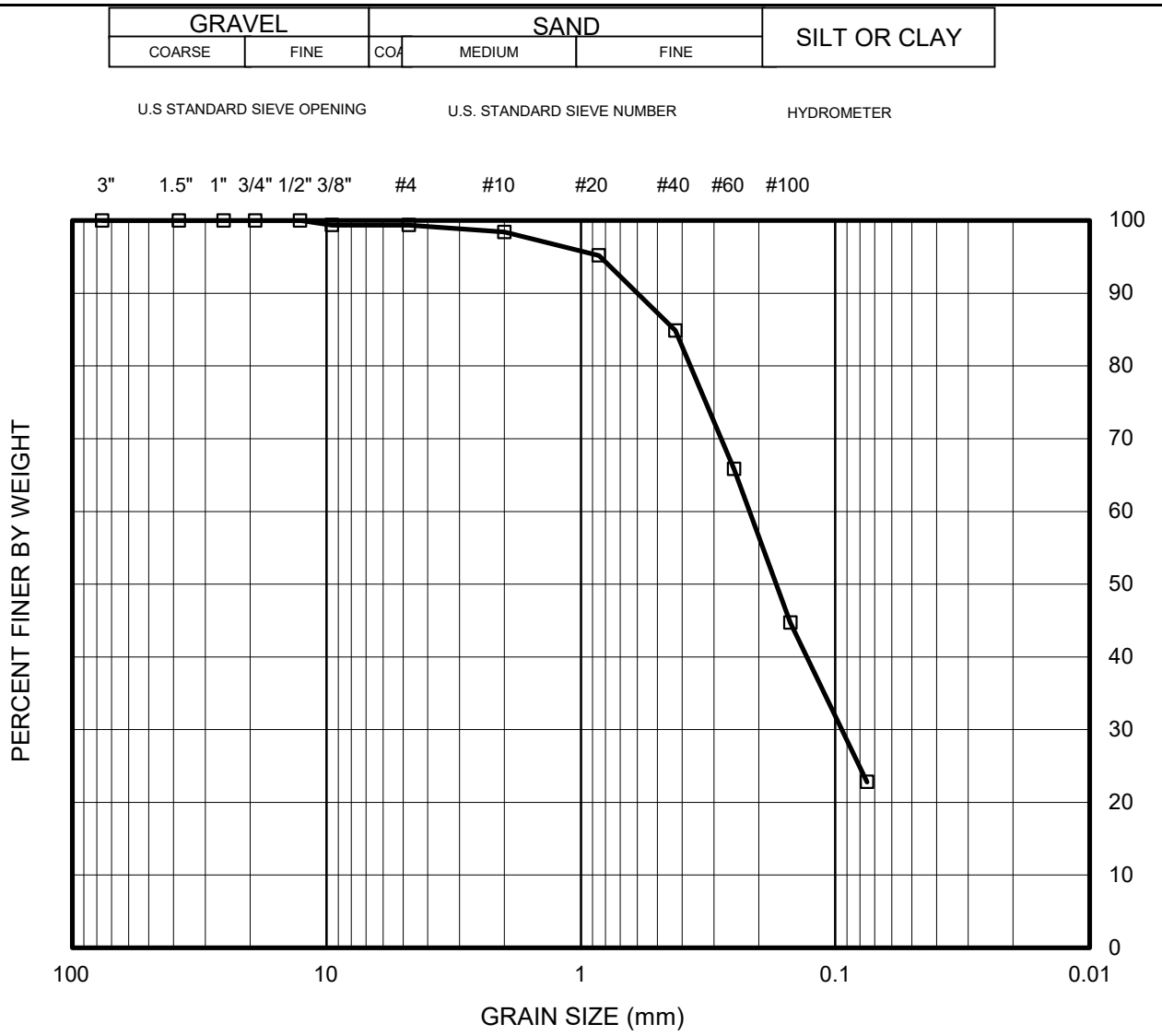
Gravel:	2.7%
Sand:	73.3%
Fine:	24.0%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1w

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B72	R3	8.0	Ring	SM	N/A	N/A

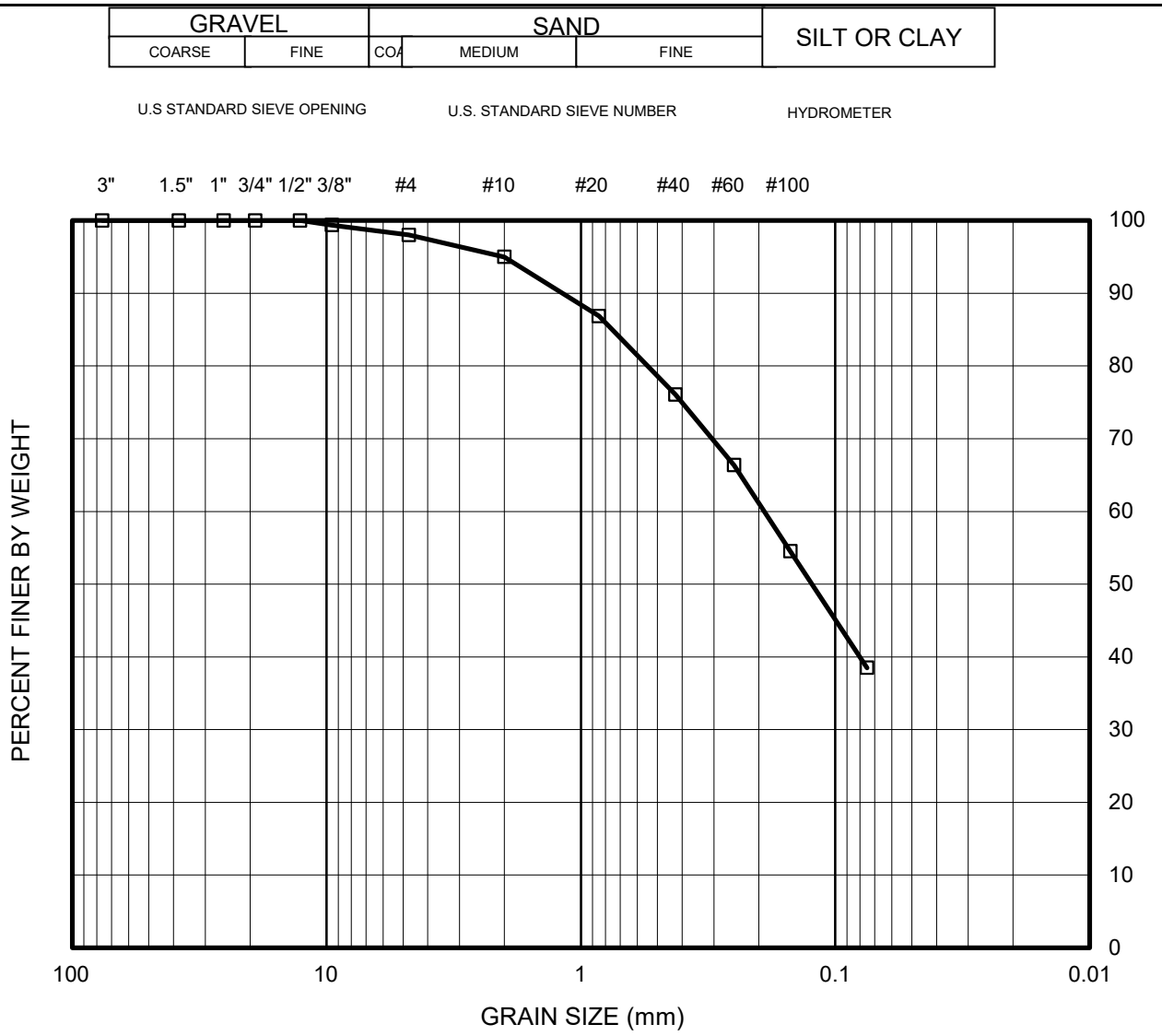
Gravel:	0.6%
Sand:	76.6%
Fine:	22.8%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1x

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B81	R1	3.0	Ring	SM	N/A	N/A

Gravel:	2.0%
Sand:	59.5%
Fine:	38.5%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1y

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B82	R1	3.0	Ring	SM	N/A	N/A

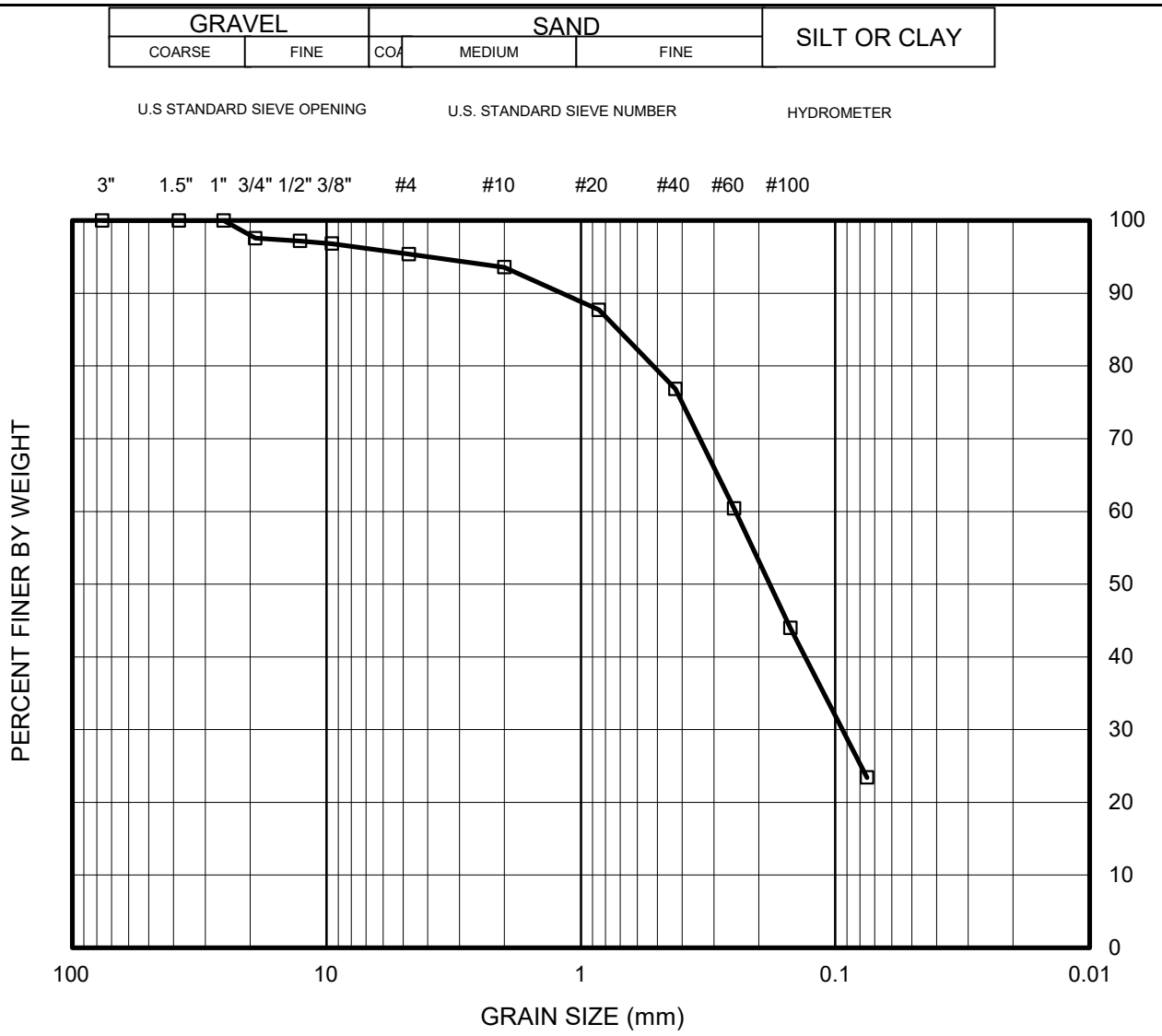
Gravel:	1.9%
Sand:	67.5%
Fine:	30.6%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-1z

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B83	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

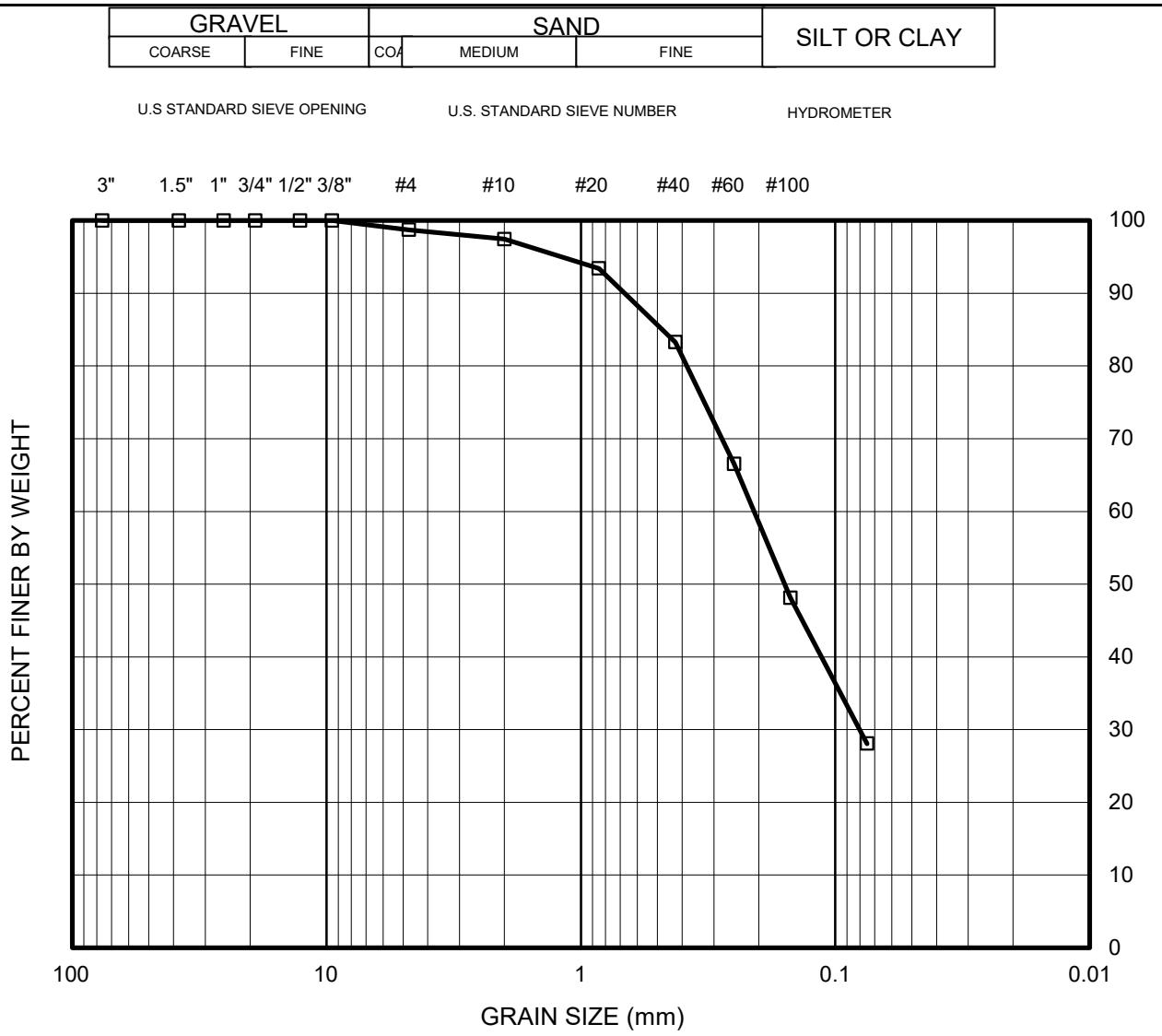
Gravel:	4.6%
Sand:	72.0%
Fine:	23.4%

	Project Name: SACC at OIAA
	Client Job No.: SC6101
	Client Name: Cotton, Shires and Associates, Inc.
	EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-2a

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B84	R1	3.0	Ring	SM	N/A	N/A

Gravel:	1.3%
Sand:	70.6%
Fine:	28.1%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-2b

Project SC6101

SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B85	Bulk	1.0-5.0	Bulk	SM	N/A	N/A

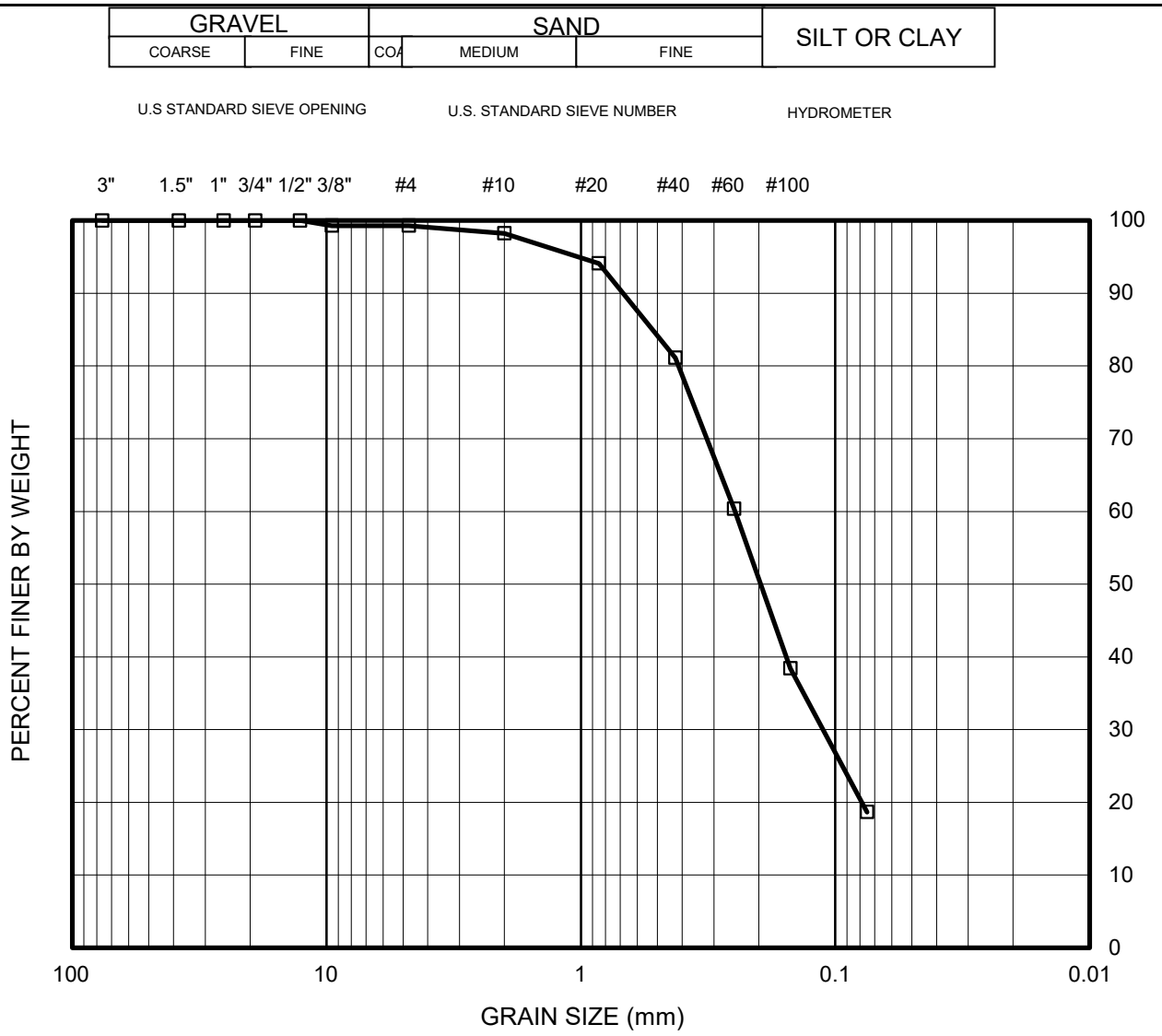
Gravel:	1.7%
Sand:	61.4%
Fine:	36.9%

Project Name:	SACC at OIAA
Client Job No.:	SC6101
Client Name:	Cotton, Shires and Associates, Inc.
EGLAB Project No.:	22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-2c

Project SC6101



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B86	R2	6.0	Ring	SM	N/A	N/A

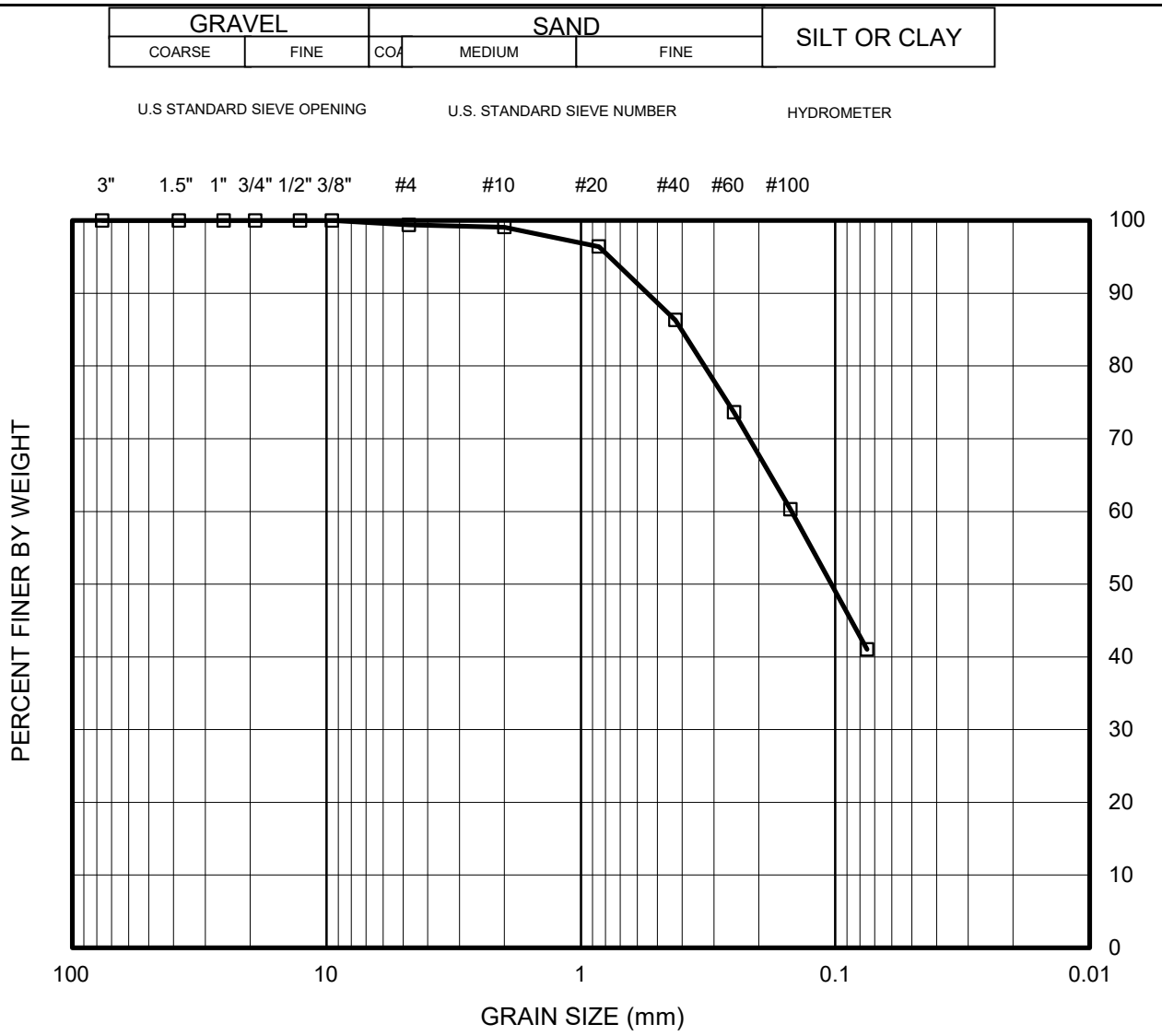
Gravel:	0.7%
Sand:	80.6%
Fine:	18.7%

Project Name: SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-2d

Project SC6101



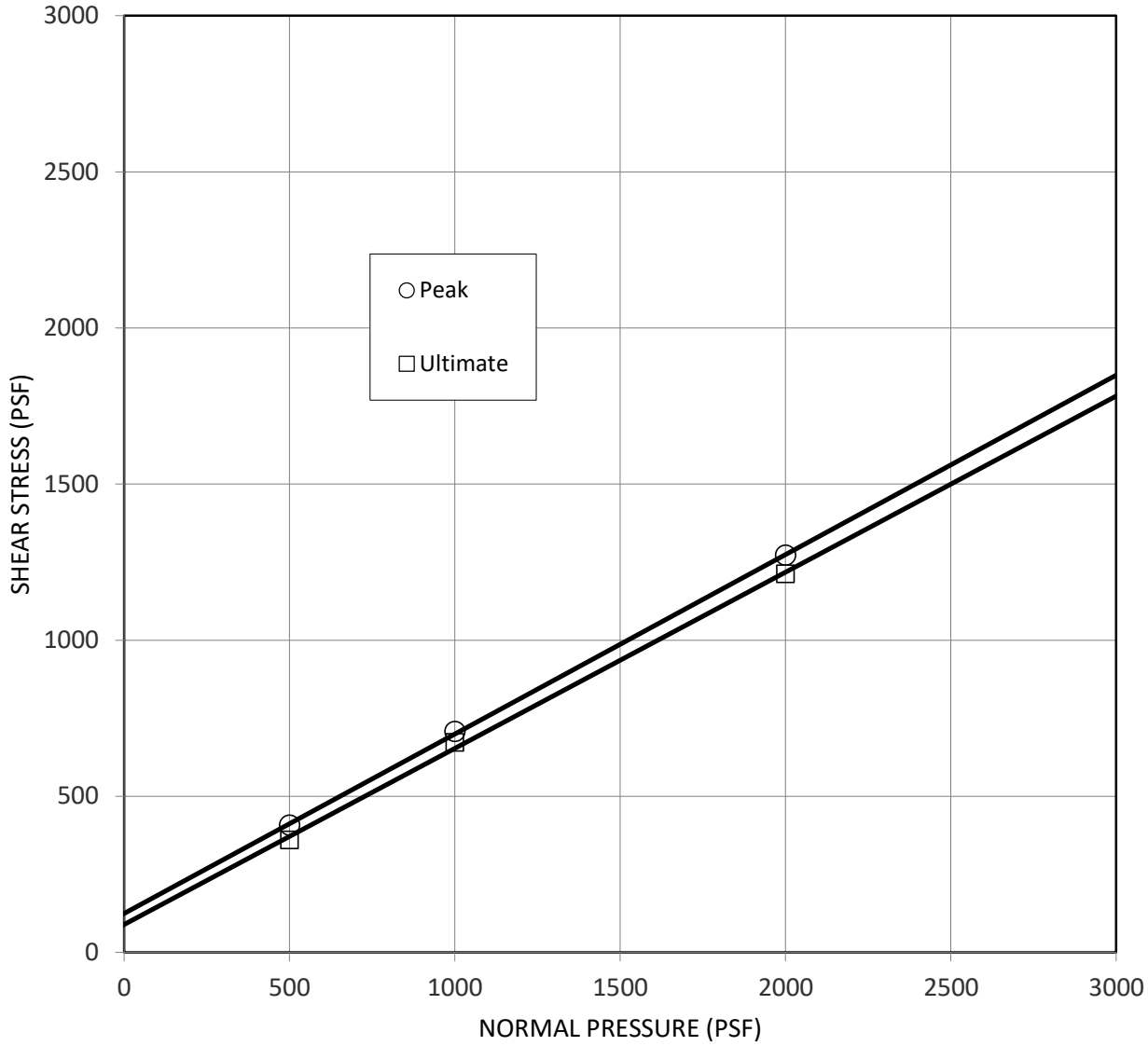
SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B87	R1	3.0	Ring	SM	N/A	N/A

Gravel:	0.6%
Sand:	58.4%
Fine:	41.0%

Project Name:
SACC at OIAA
Client Job No.: SC6101
Client Name: Cotton, Shires and Associates, Inc.
EGLAB Project No.: 22-022-001

GRAIN SIZE DISTRIBUTION CURVE
(ASTM D422)

FIGURE B-2e



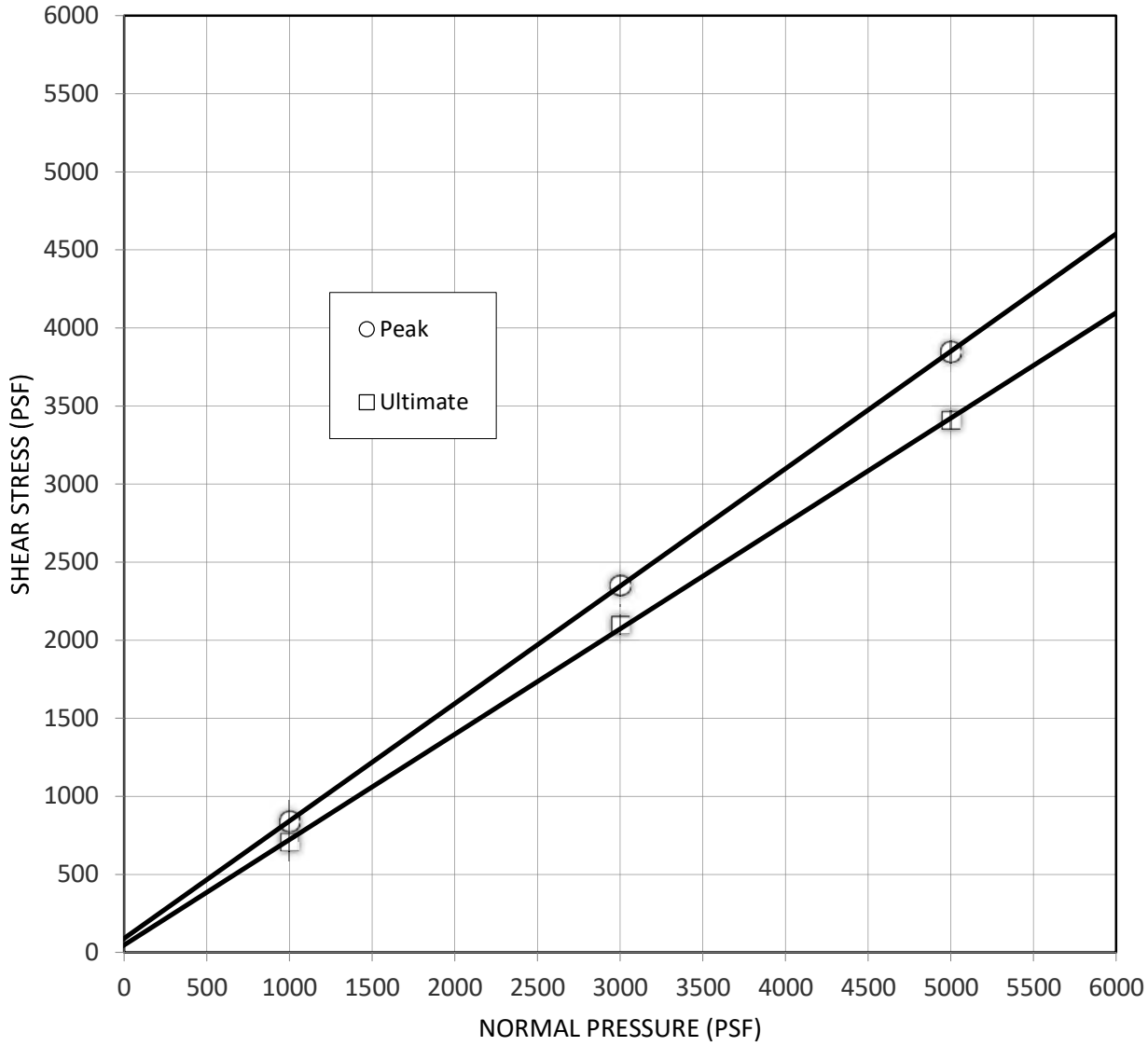
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B37	R2	6.0	Ring	SM	○	126	30
					□	90	29

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
500	10.0	19.9
1000	10.0	19.5
2000	10.0	18.5

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3a**



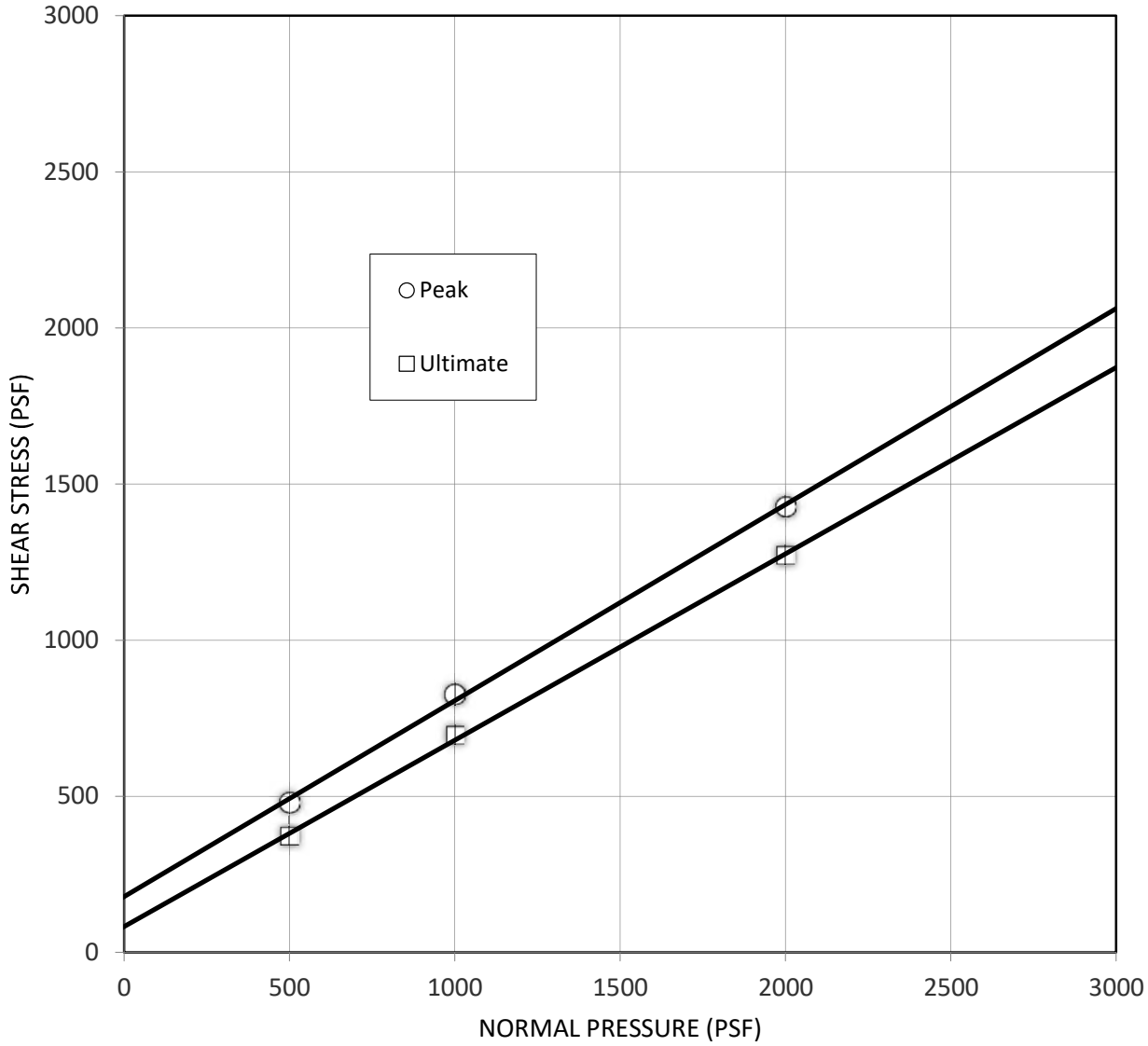
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B38	R6	26.0	Ring	SM	○	91	37
					□	47	34

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
1000	10.1	15.4
3000	10.1	15.0
5000	10.1	14.5

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3b**



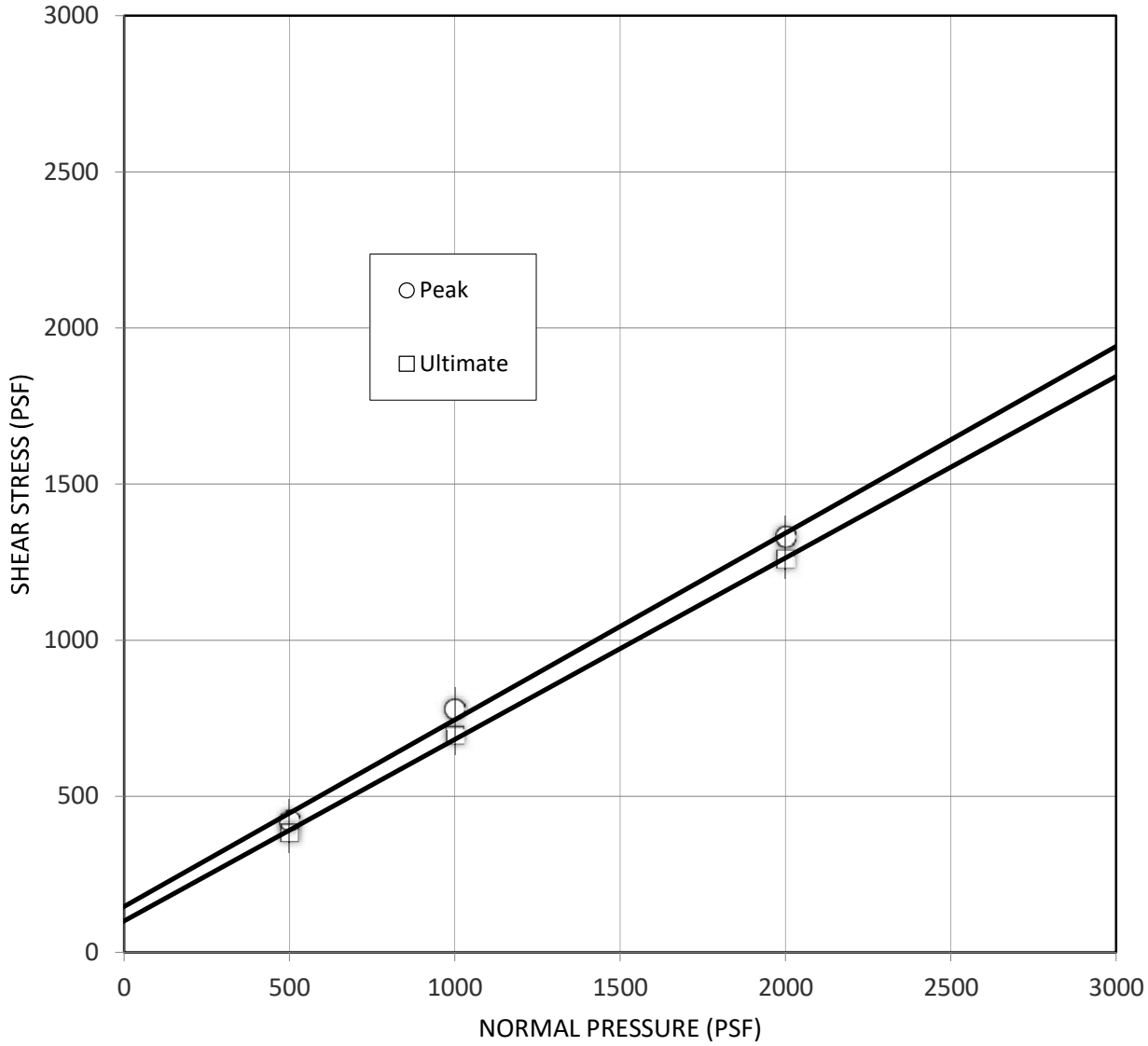
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B39	R4	11.0	Ring	SM	○	180	32
					□	84	31

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
500	8.9	23.3
1000	8.9	22.1
2000	8.9	20.6

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3c**



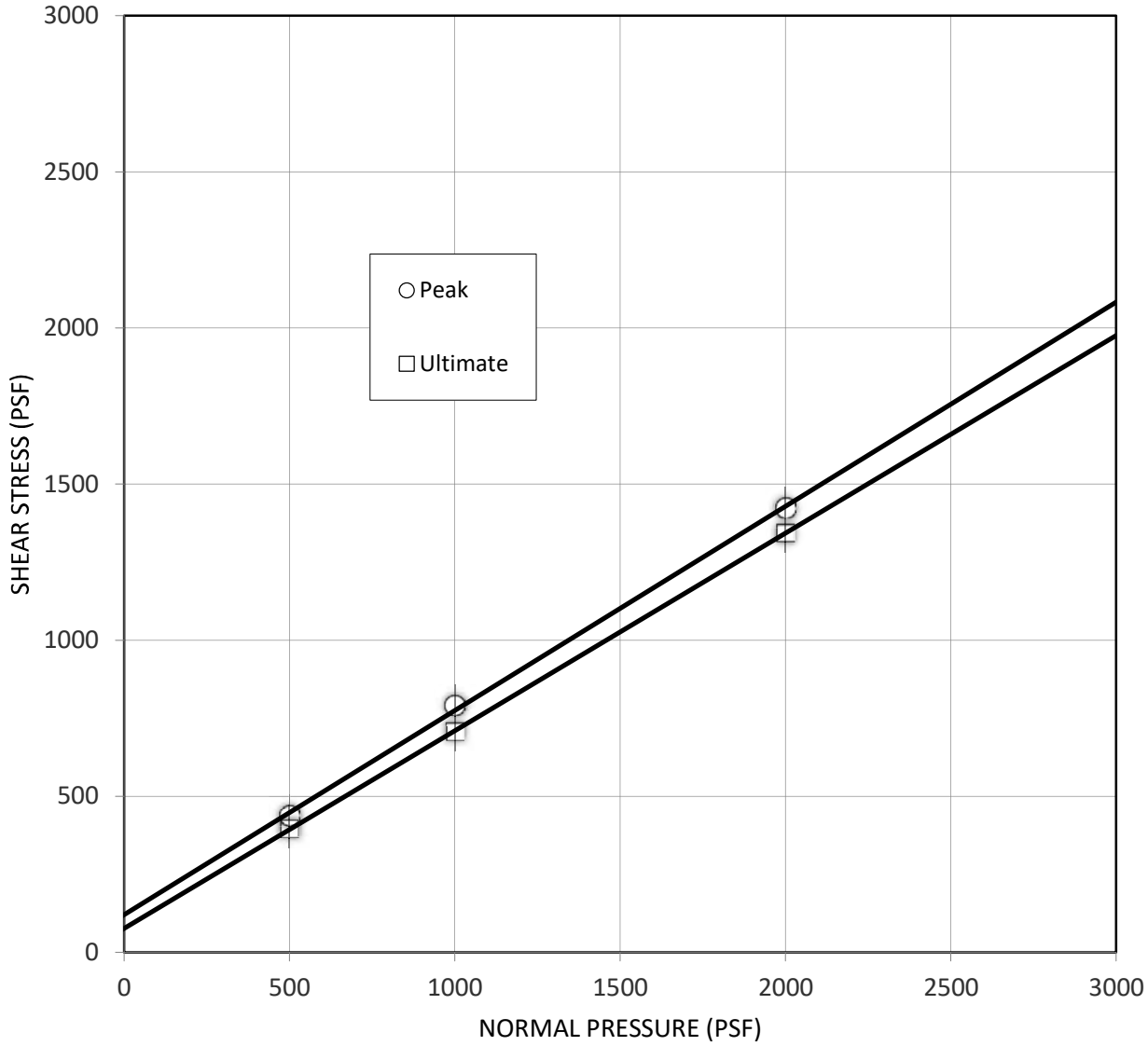
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B61	R2	6.0	Ring	SP-SM	○	148	31
					□	102	30

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
500	5.7	20.8
1000	5.7	20.3
2000	5.7	20.0

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3d**



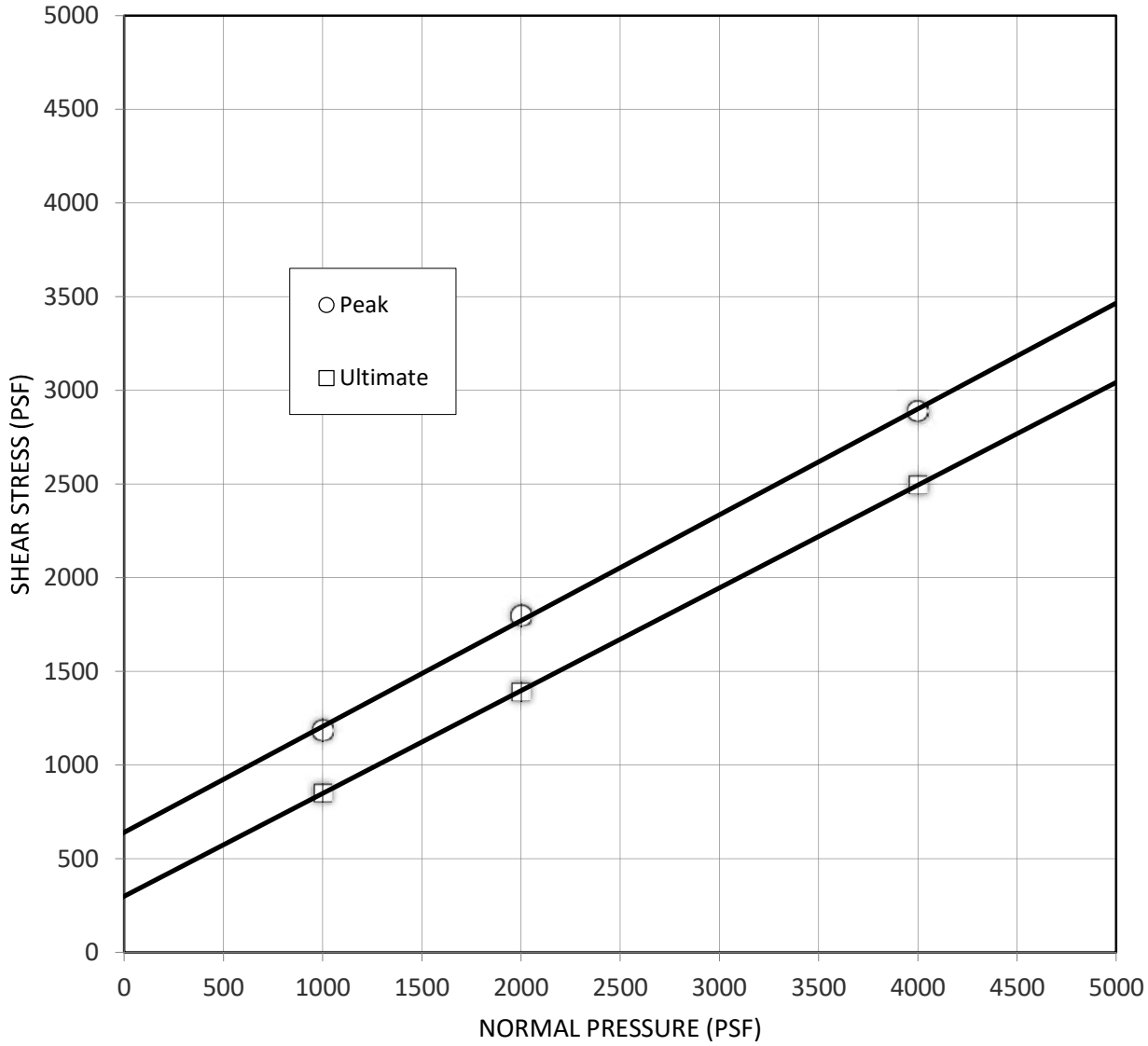
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B61	R4	11.0	Ring	SM	○	122	33
					□	78	32

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
500	5.4	17.5
1000	5.4	16.2
2000	5.4	15.6

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3e**



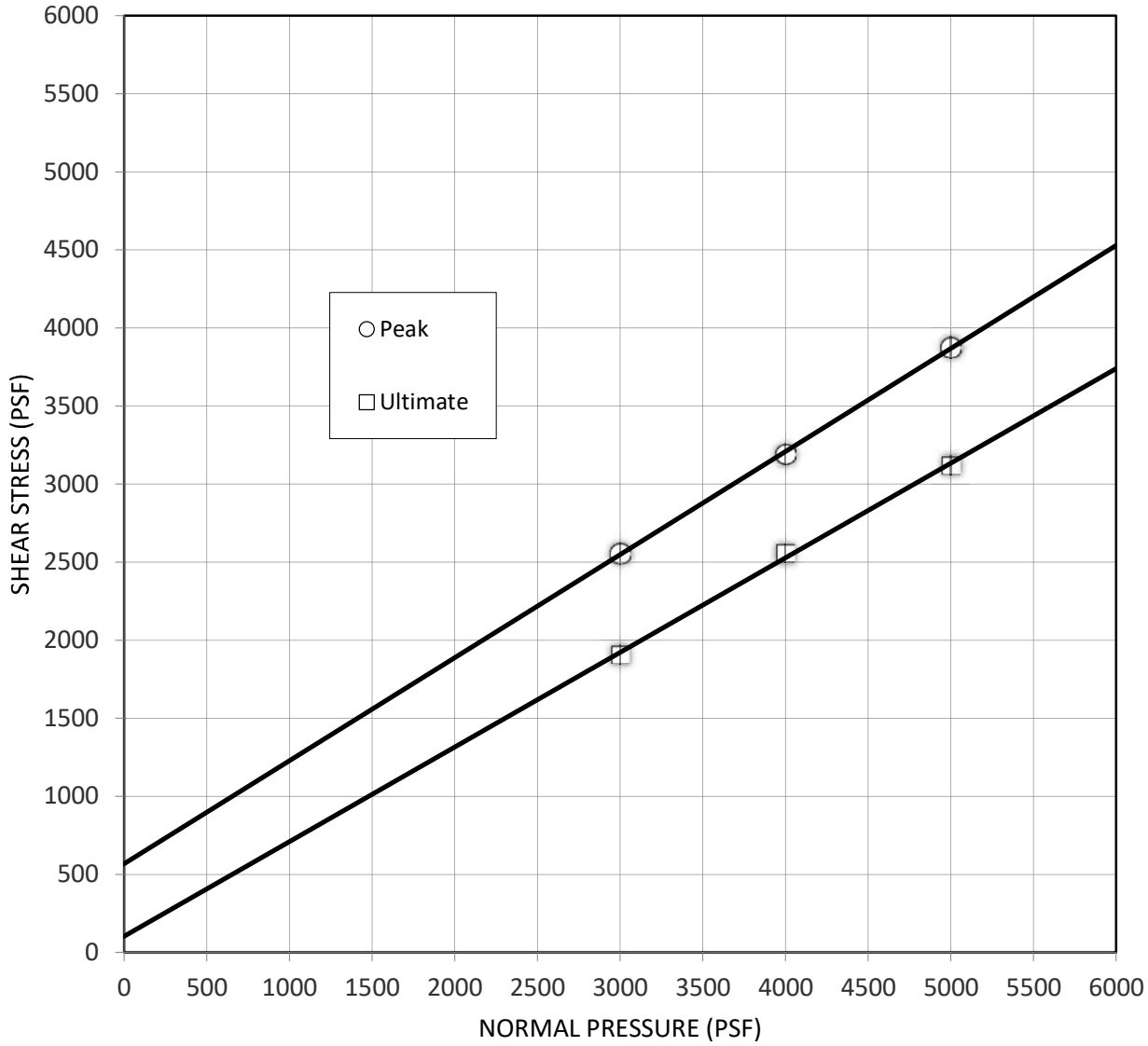
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B68	R5	21.0	Ring	SP	○	642	29
					□	300	29

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
1000	14.6	21.0
2000	14.6	17.8
4000	14.6	17.5

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3f**



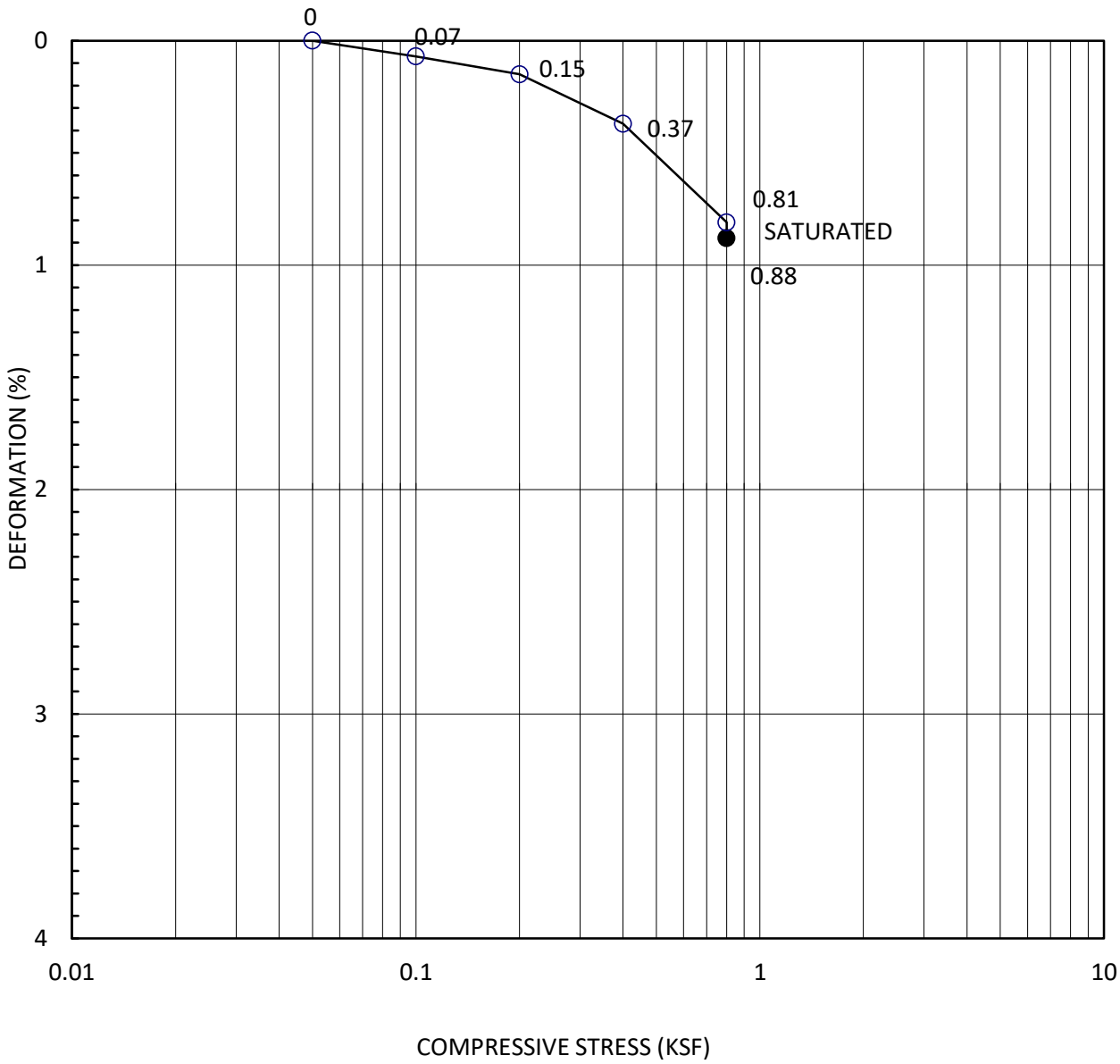
Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B68	R6	31.0	Ring	SM	○	568	33
					□	104	31

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)
3000	5.7	18.1
4000	5.7	17.9
5000	5.7	17.5

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Project No.: 22-022-001

DIRECT SHEAR

(ASTM D3080) **FIGURE B-3g**



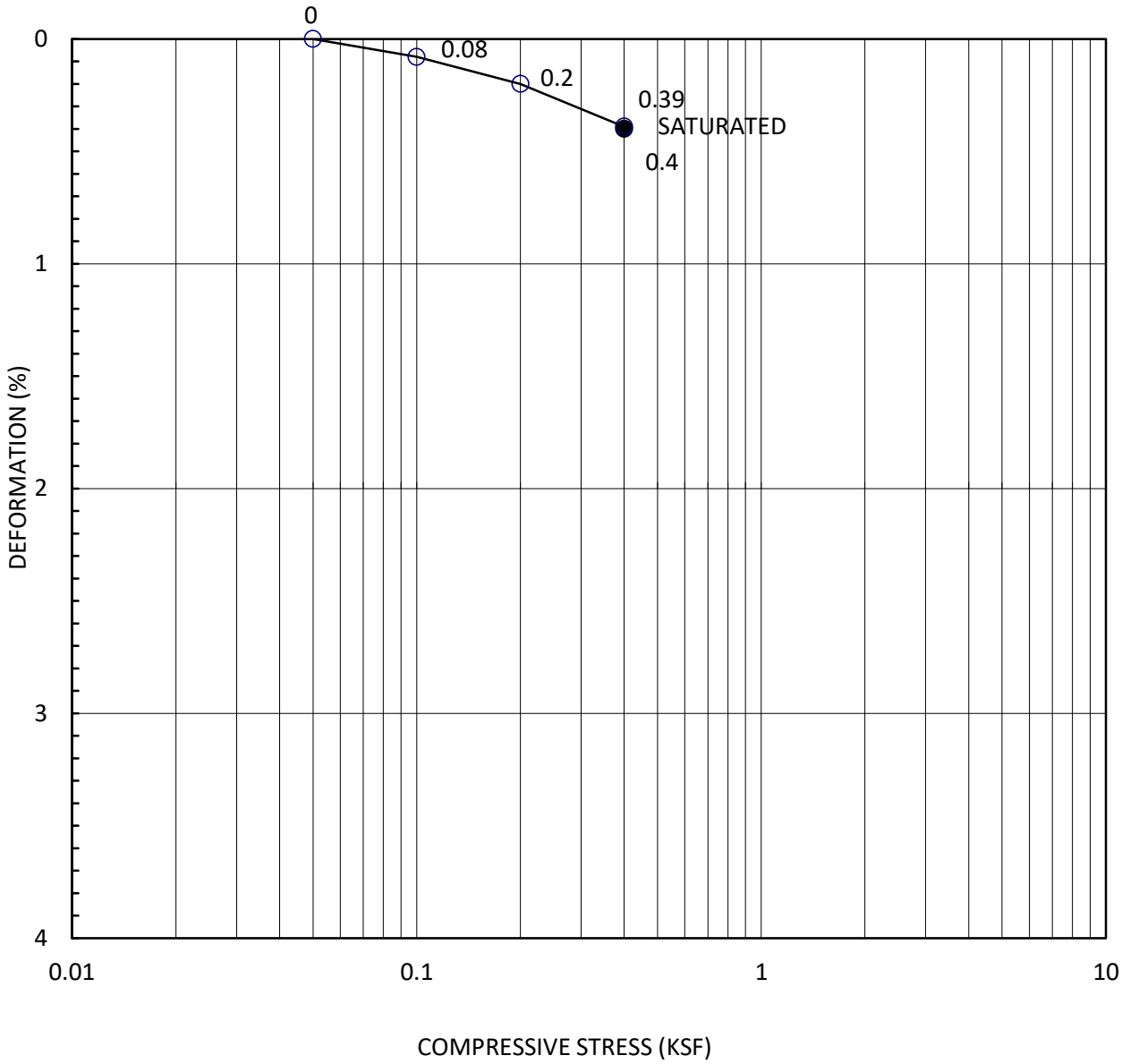
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B1	R2	6.0	SM	14.9	113.9	0.479

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4a



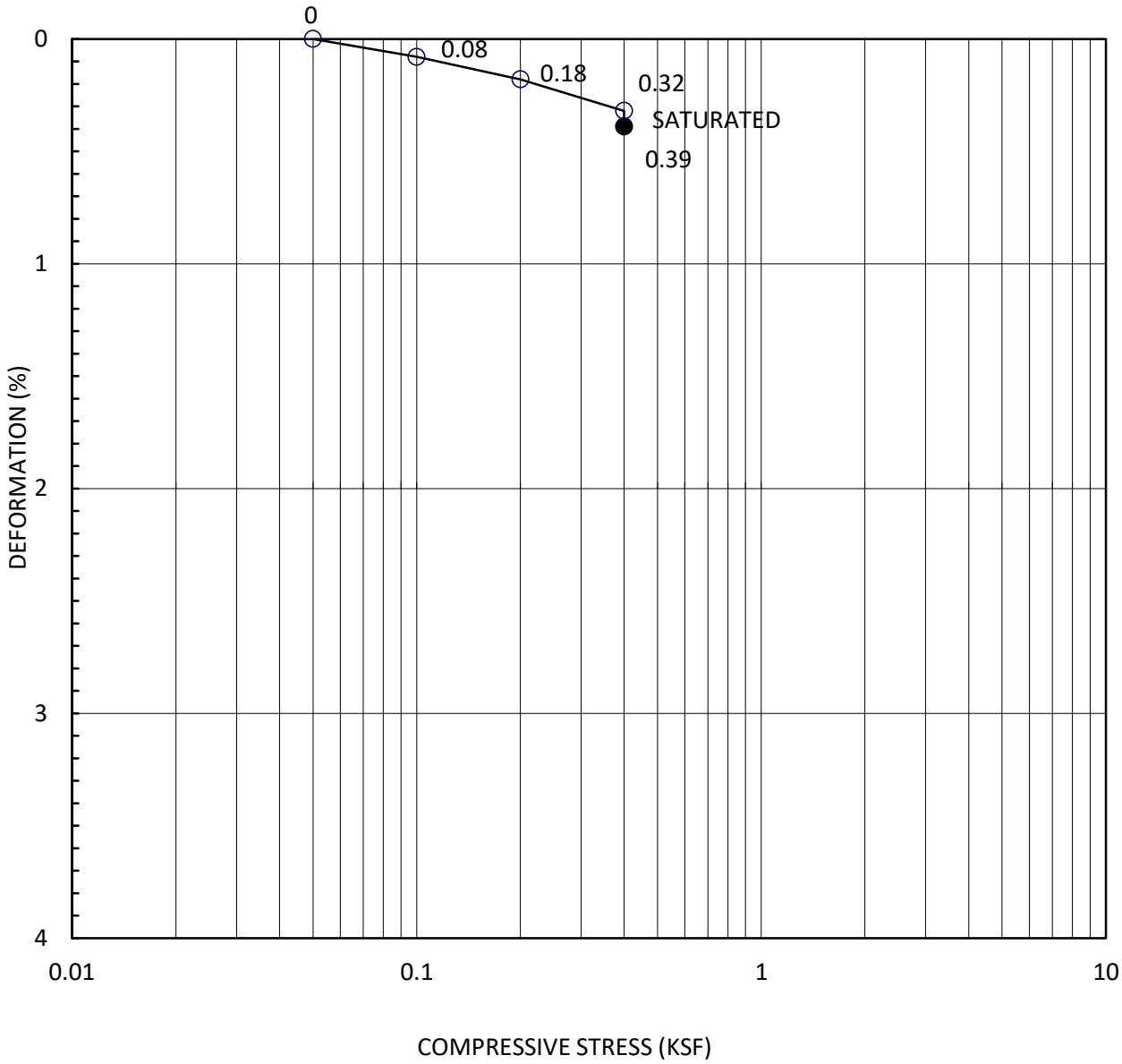
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B4	R1	3.0	ML	13.2	110.3	0.527

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4b



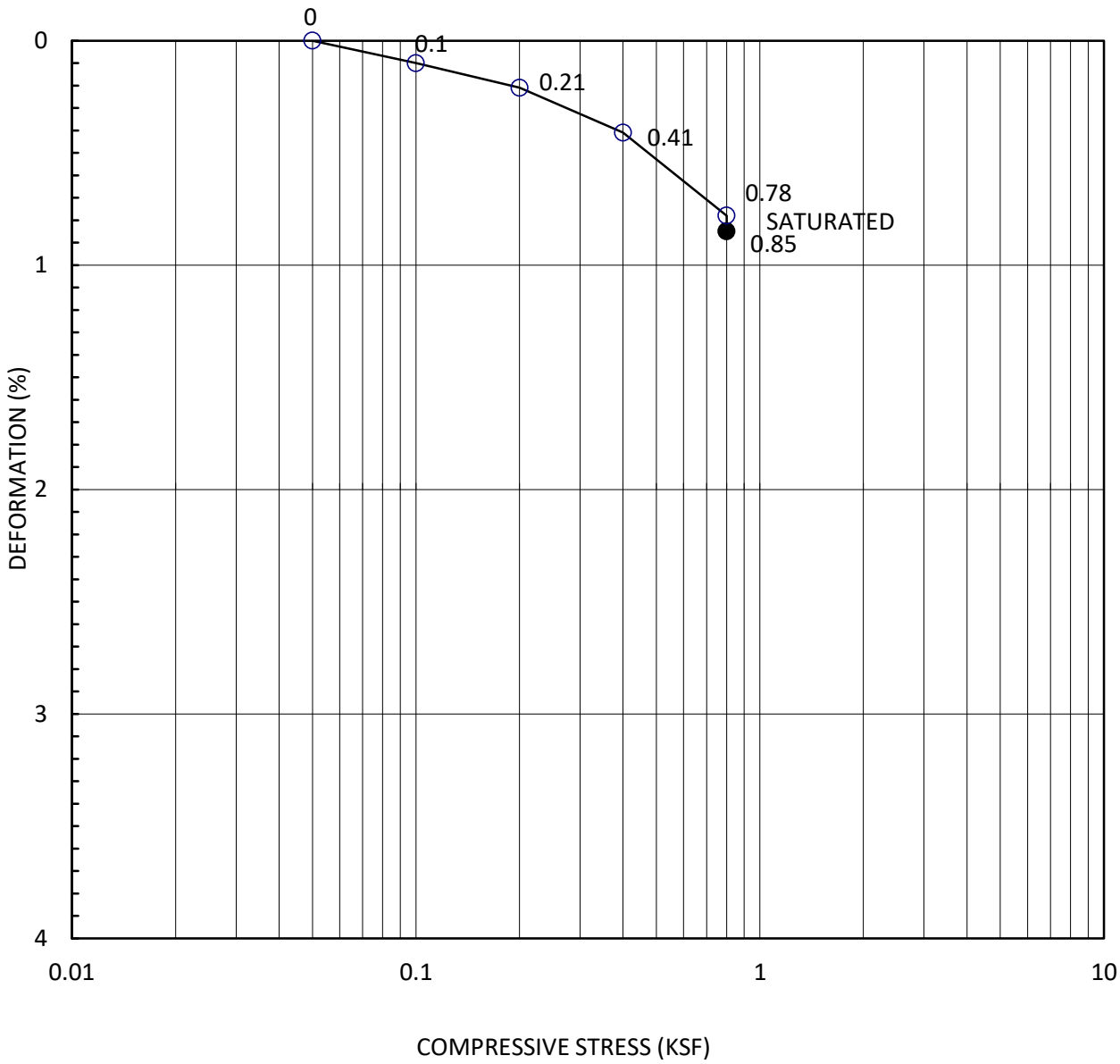
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B12	R1	3.0	SM	6.7	107.2	0.571

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4c



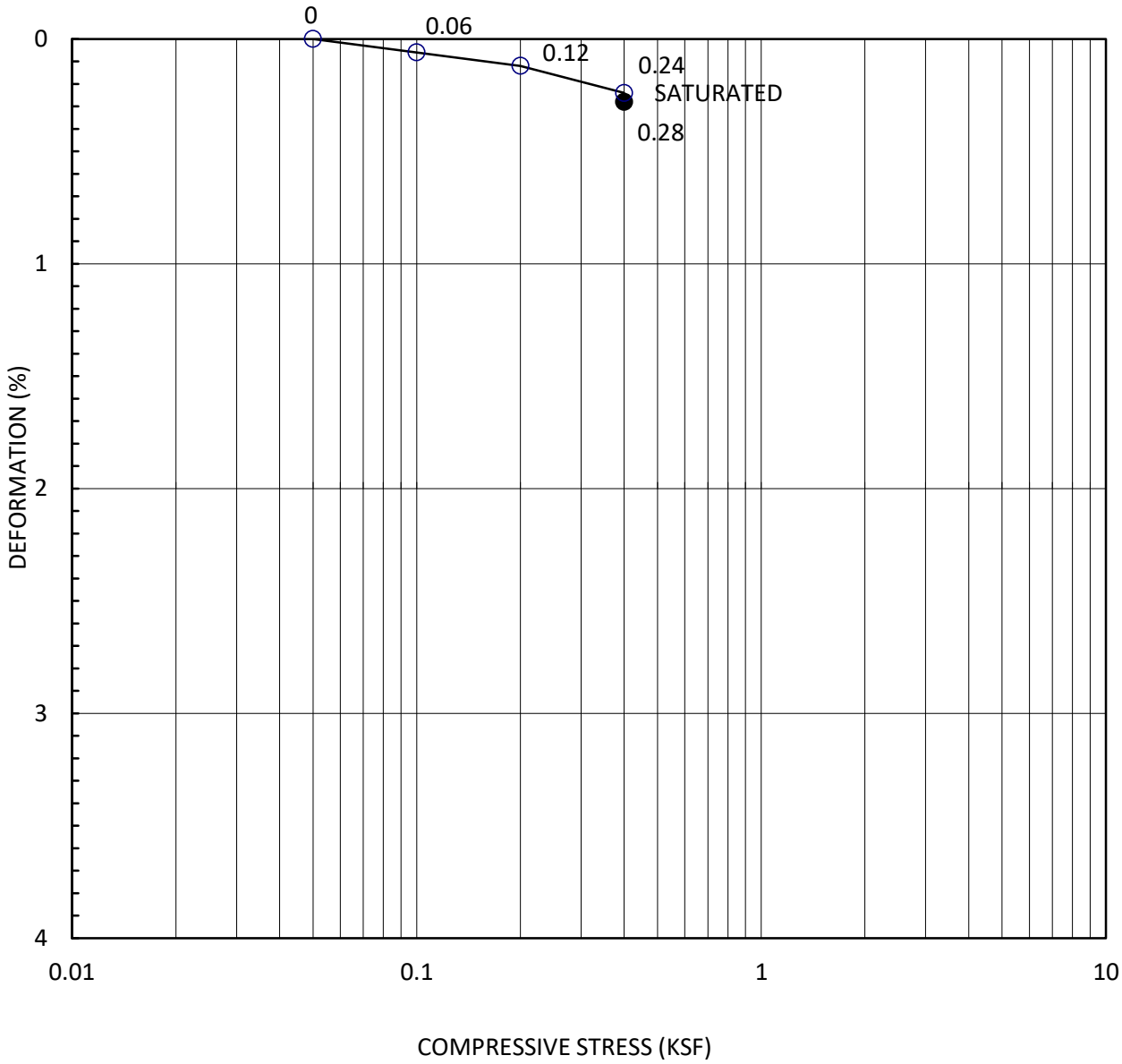
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B19	R2	6.0	SM	13.7	114.5	0.472

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4d



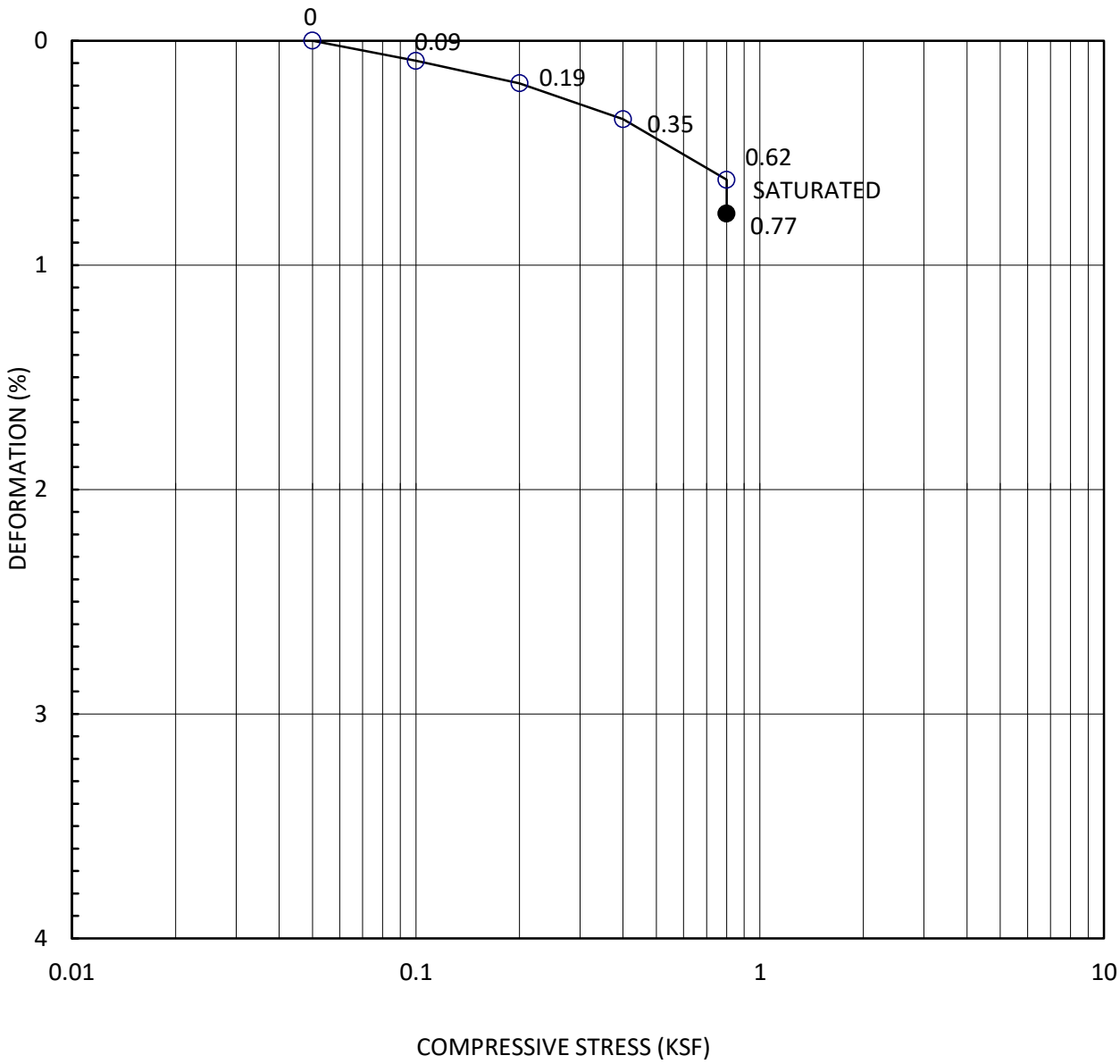
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B35	R1	3.0	SM	6.9	110.8	0.520

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4e



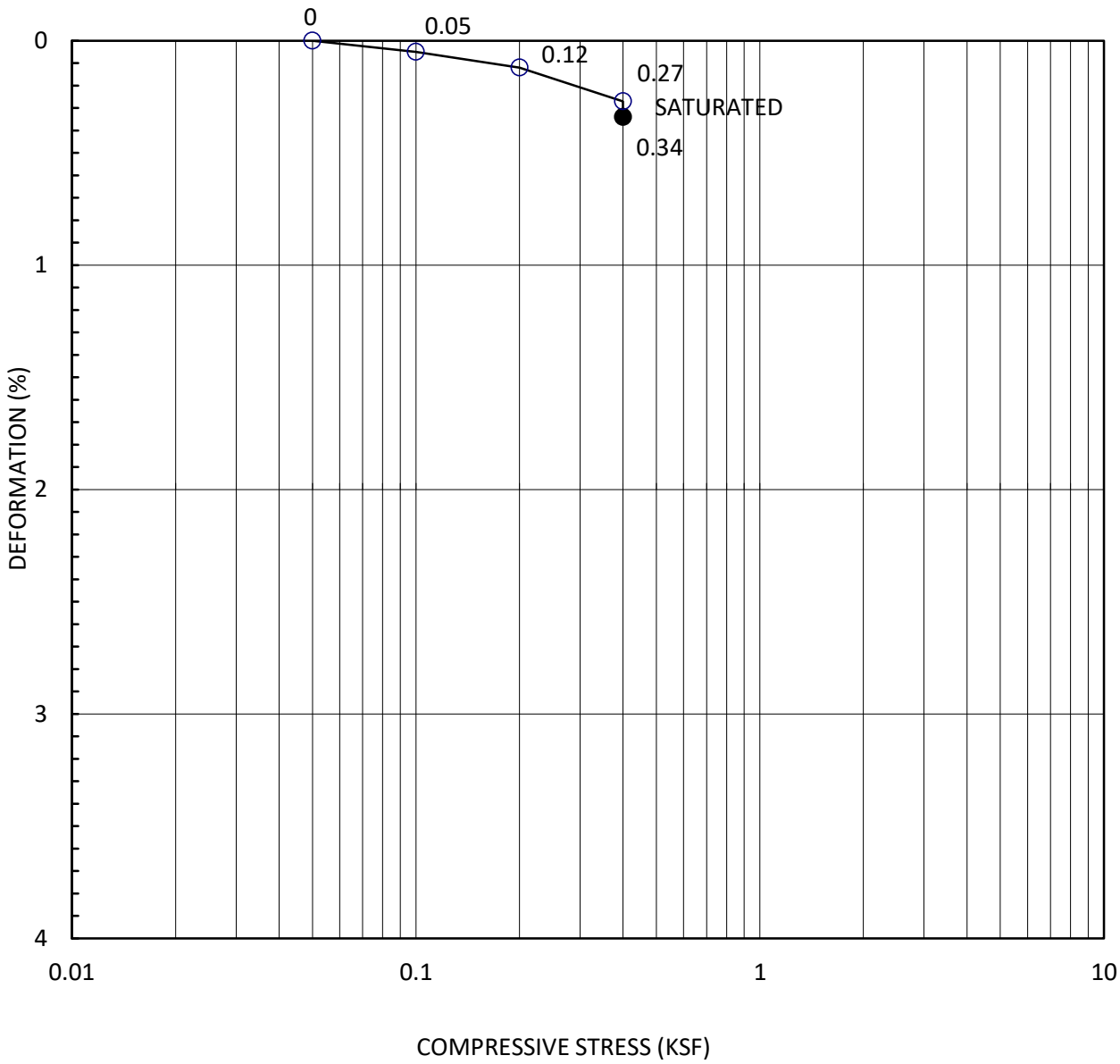
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B58	R2	6.0	SM	7.5	108.0	0.560

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4f



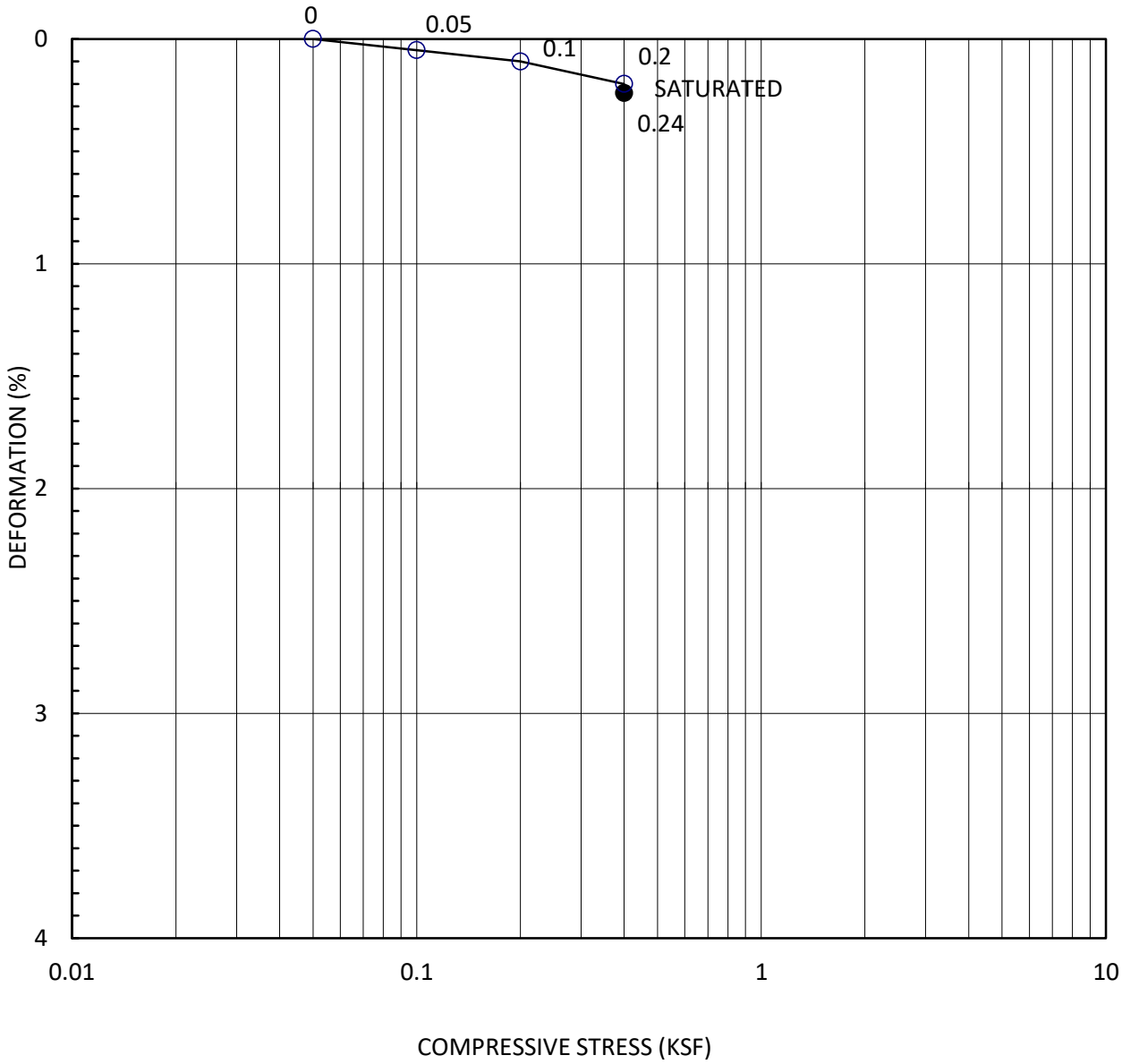
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B76	R1	3.0	SM	7.6	112.8	0.493

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4g



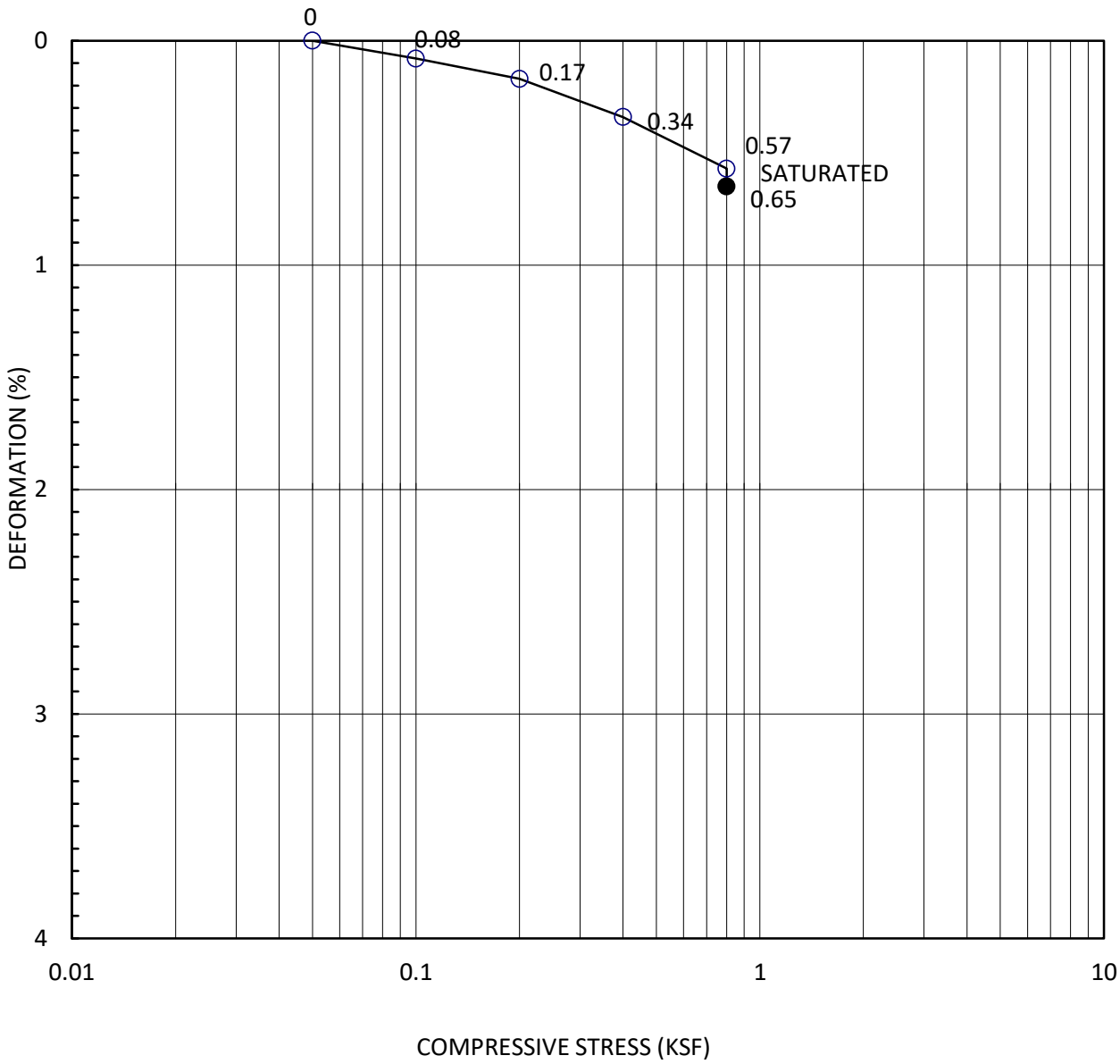
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B79	R1	3.0	SP-SM	3.9	109.5	0.538

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4h



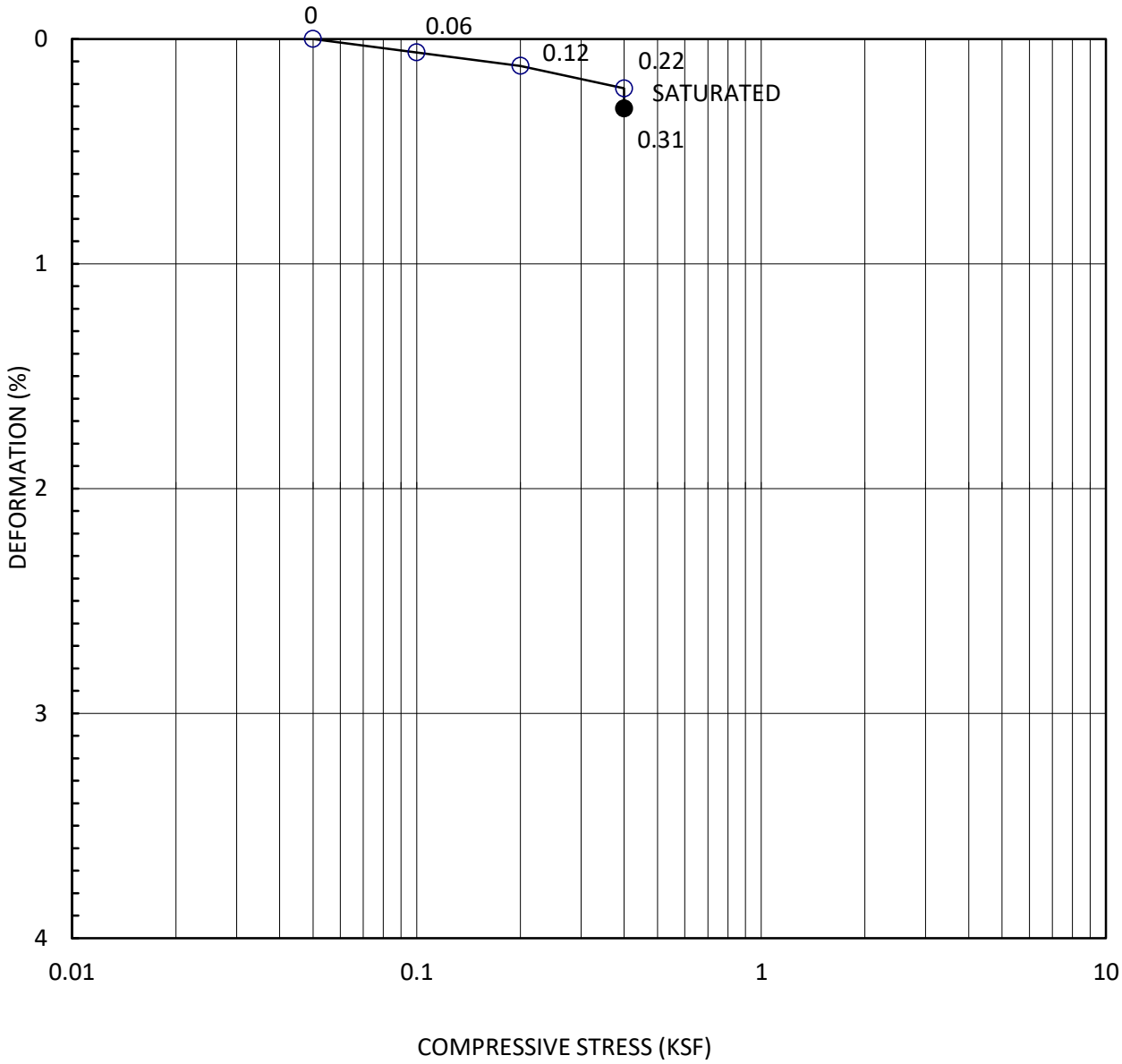
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B83	R2	6.0	SM	10.3	111.4	0.513

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

FIGURE B-4i



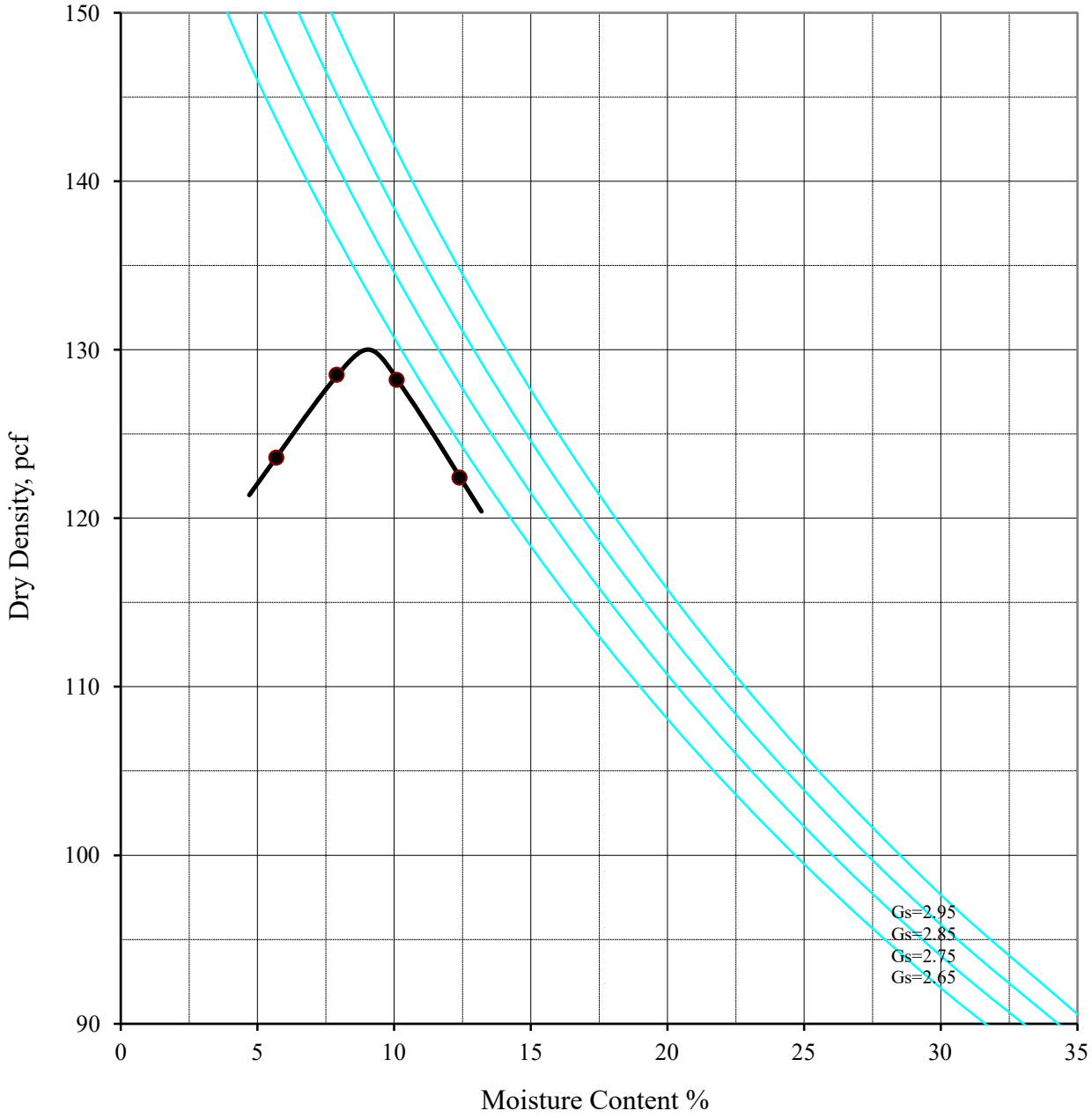
Symbol	Boring No.	Sample No.	Depth (ft.)	Soil Type	Initial Moisture Content	Init. Dry Density (pcf)	Init. Void Ratio
○	B86	R1	3.0	SM	8.5	104.4	0.614

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Job No: SC6101
EGLAB Project No: 22-022-001

COLLAPSE POTENTIAL

(ASTM D5333)

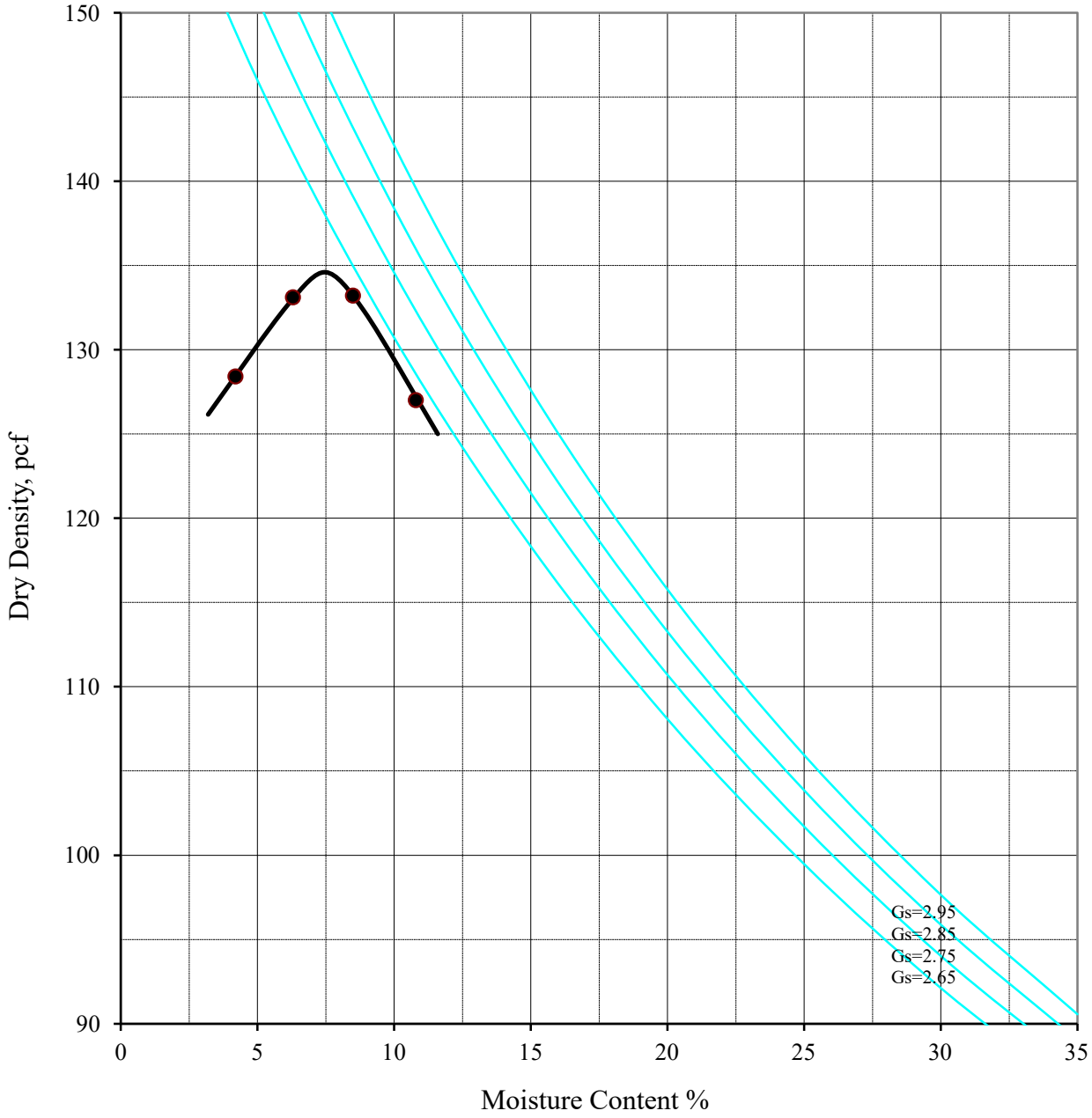
FIGURE B-4j



Method "A"

	Boring No: B10
Maximum Dry Density = **130.0** pcf	Sample: Bulk
Optimum Moisture Content = **9.1** %	Depth : 1.0-5.0 feet
	Description : Silty sand (SM)
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
(ASTM D1557)	EGLAB Project No.: 22-022-001
	Date :

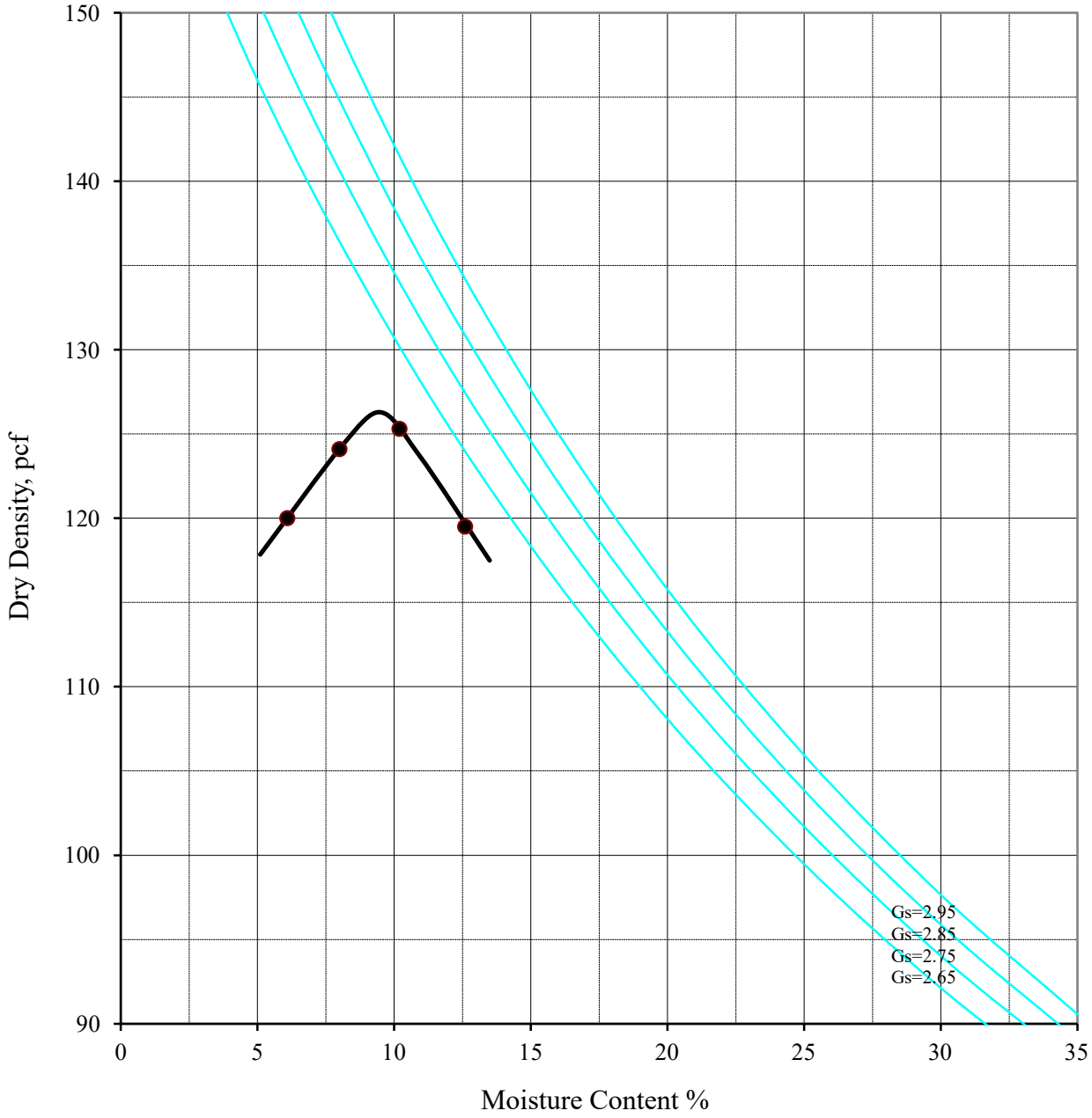
FIGURE B-5a



Method "A"

	Boring No: B15
Maximum Dry Density = **134.6** pcf	Sample: Bulk
Optimum Moisture Content = **7.5** %	Depth : 1.0-5.0 feet
	Description : Silty sand (SM)
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
(ASTM D1557)	EGLAB Project No.: 22-022-001
	Date :

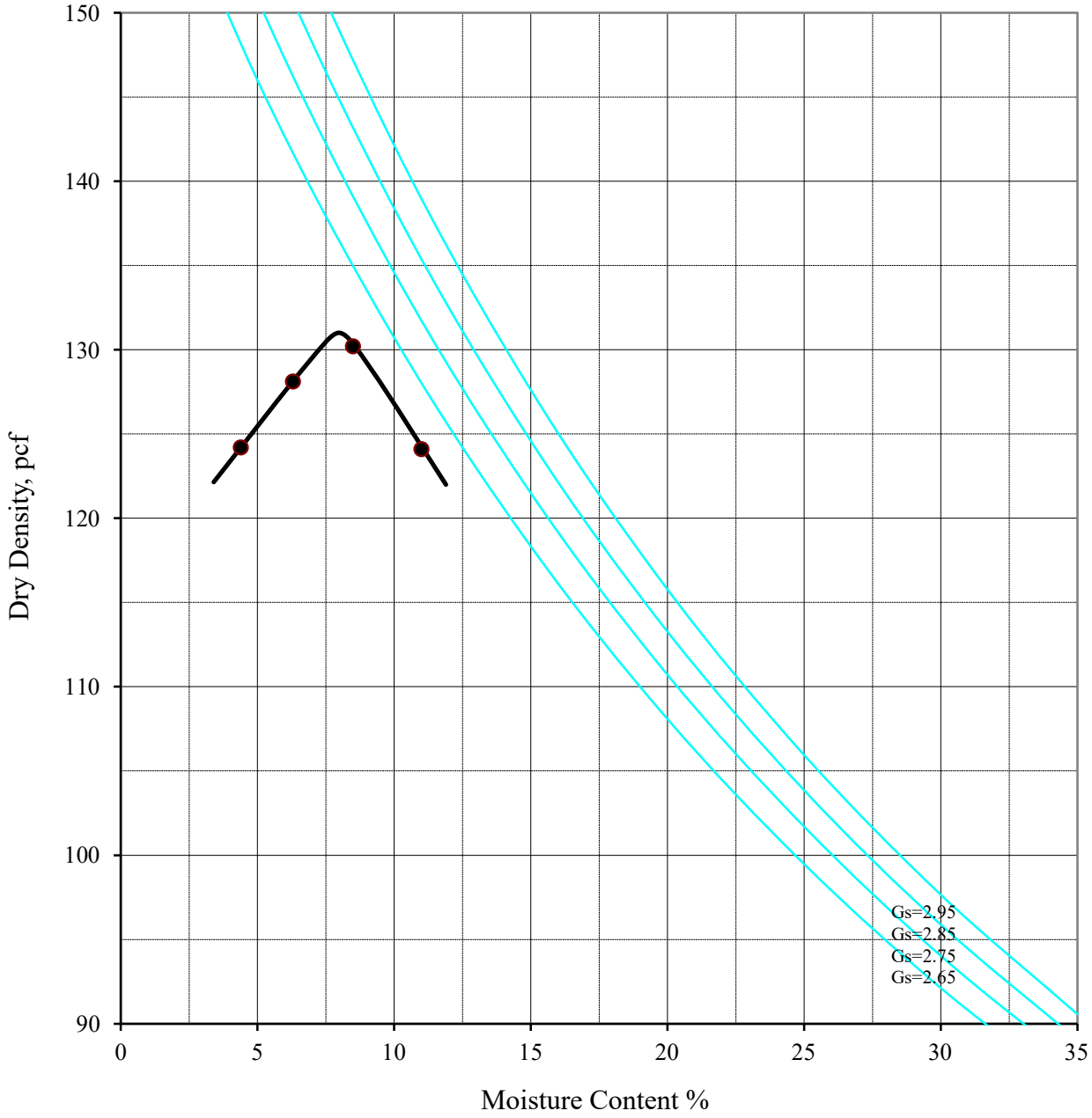
FIGURE B-5b



Method "A"

	Boring No: B41
Maximum Dry Density = **126.3** pcf	Sample: Bulk
	Depth : 1.0-6.0 feet
Optimum Moisture Content = **9.5** %	Description : Silty sand (SM)
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
	EGLAB Project No.: 22-022-001
(ASTM D1557)	Date :

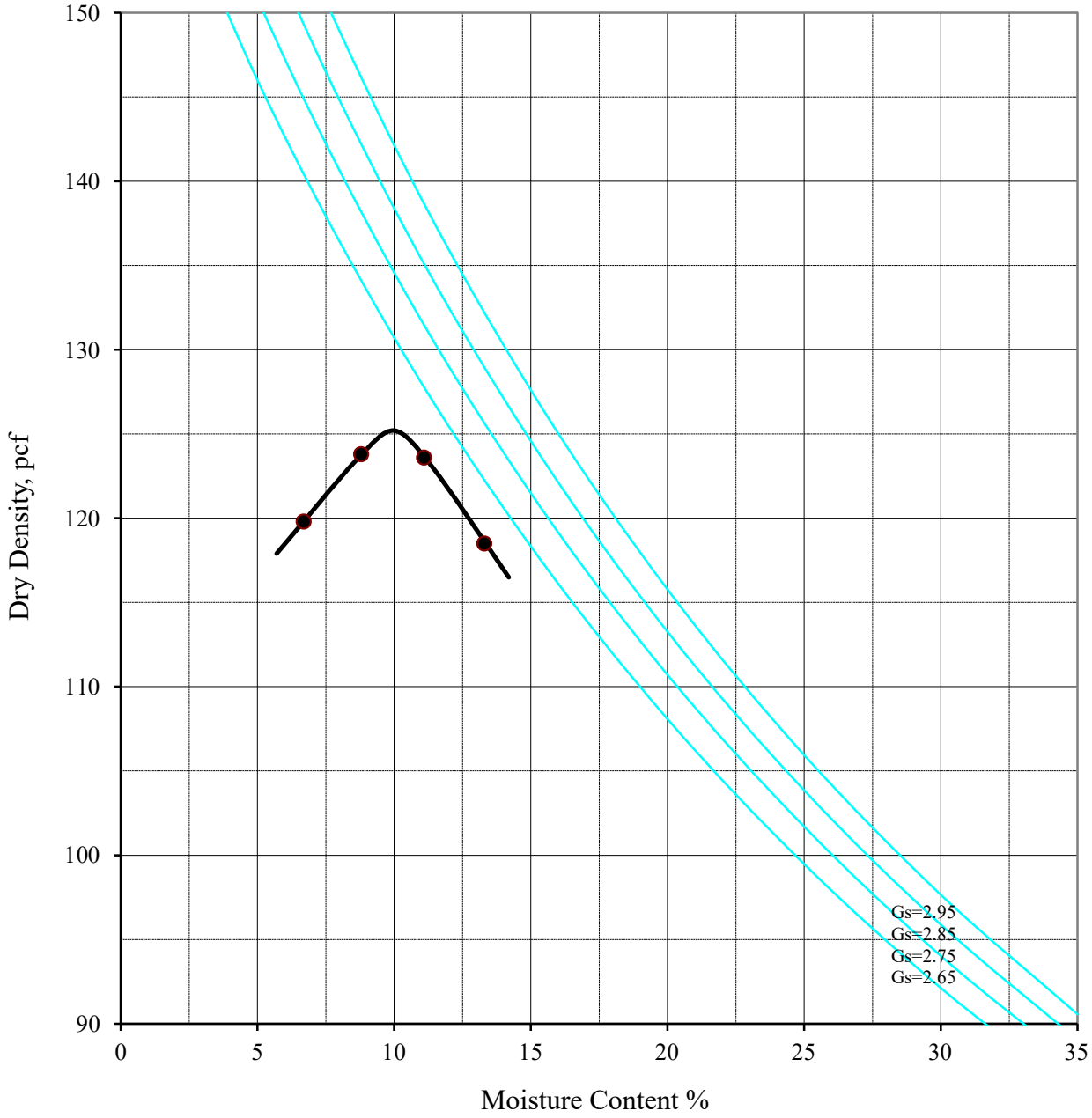
FIGURE B-5c



Method "A"

	Boring No: B47
Maximum Dry Density = **131.0** pcf	Sample: Bulk
	Depth : 1.0-5.0 feet
Optimum Moisture Content = **8.0** %	Description : Silty sand (SM), trace gravel
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
	EGLAB Project No.: 22-022-001
(ASTM D1557)	Date :

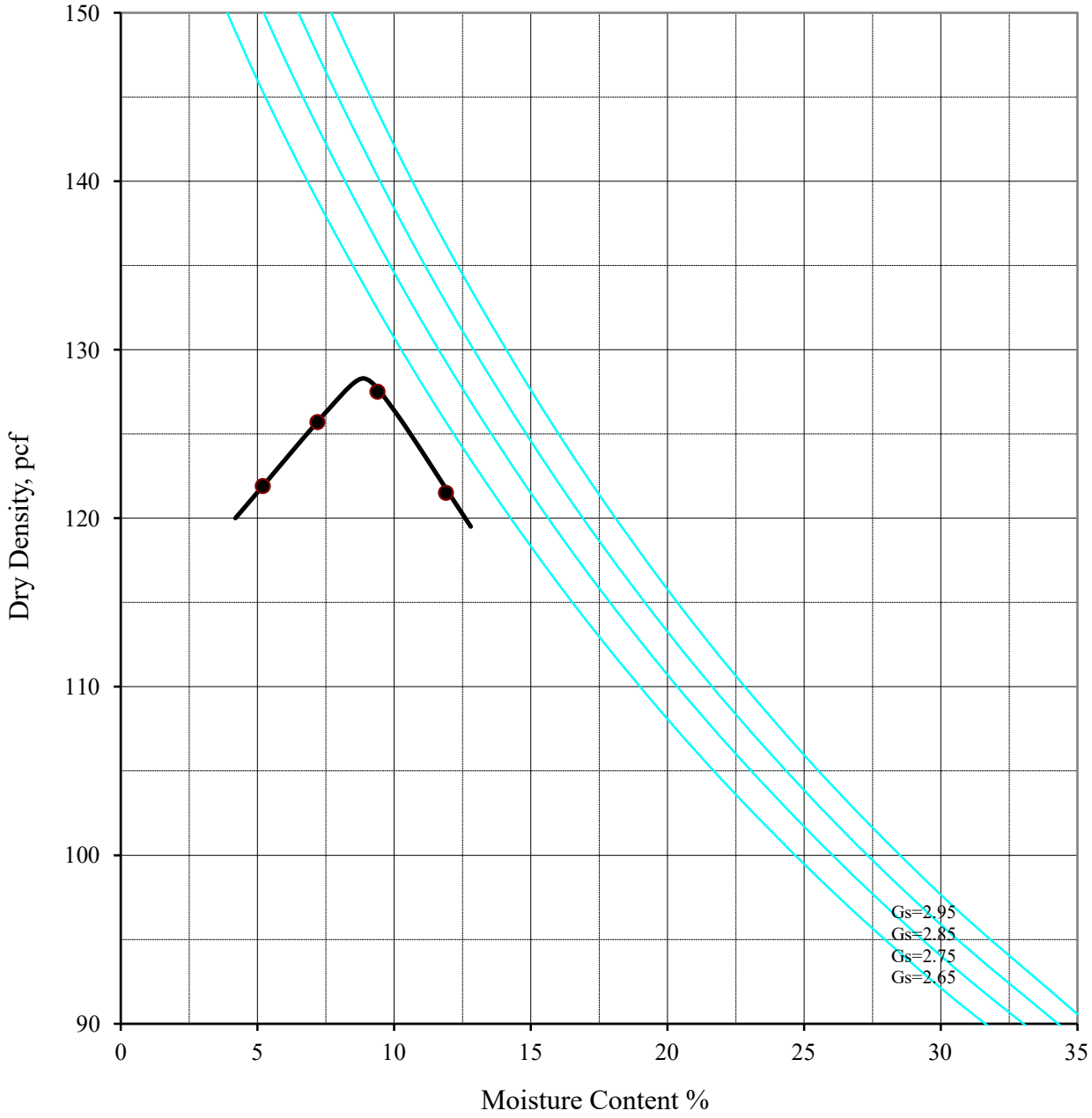
FIGURE B-5d



Method "A"

	Boring No: B55
Maximum Dry Density = **125.2** pcf	Sample: Bulk
	Depth : 1.0-5.0 feet
Optimum Moisture Content = **10.0** %	Description : Silty sand (SM), some gravel
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
	EGLAB Project No.: 22-022-001
(ASTM D1557)	Date :

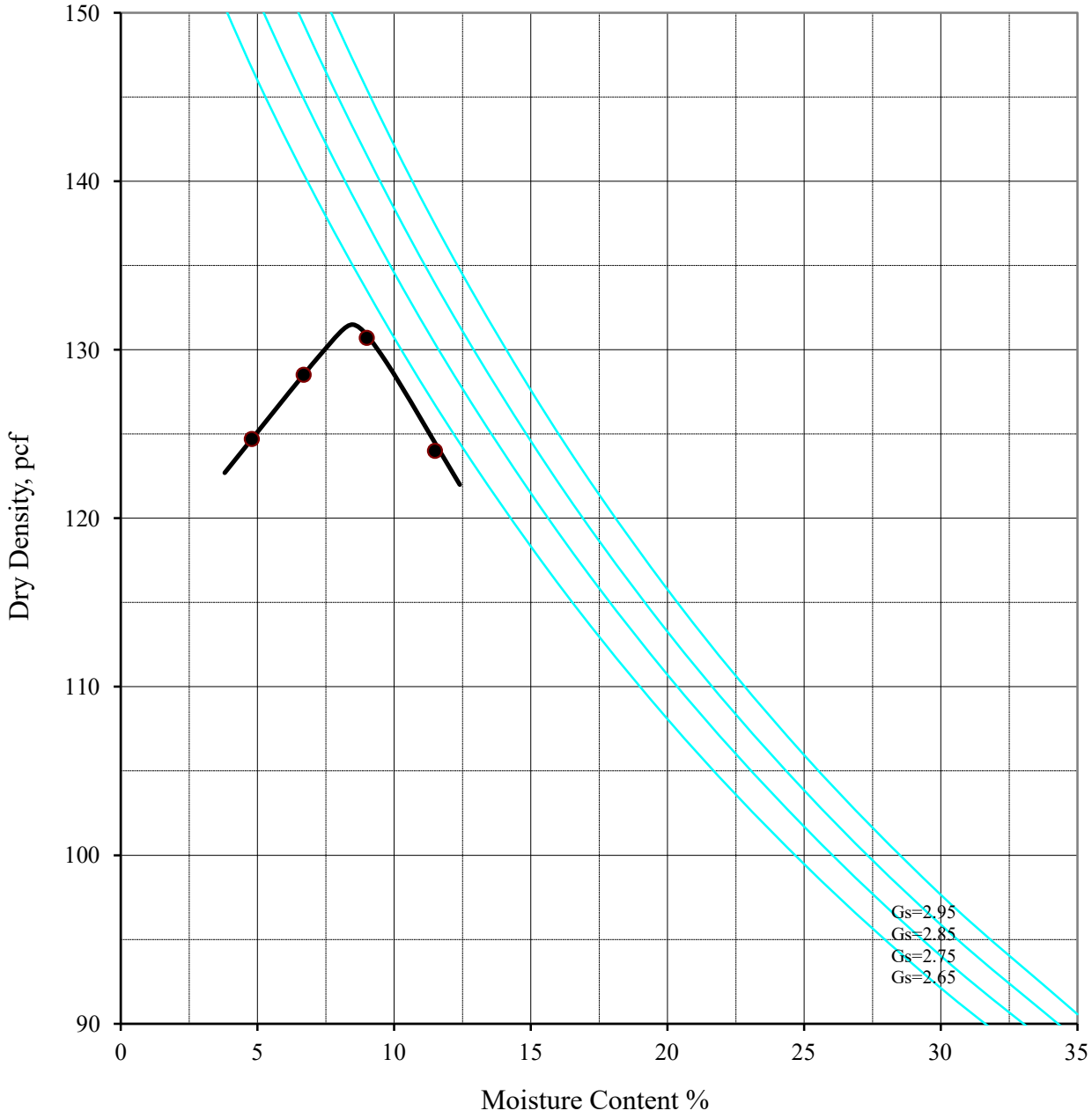
FIGURE B-5e



Method "A"

	Boring No: B57
Maximum Dry Density = **128.3** pcf	Sample: Bulk
	Depth : 1.0-6.0 feet
Optimum Moisture Content = **8.9** %	Description : Silty sand (SM), trace gravel
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
	EGLAB Project No.: 22-022-001
(ASTM D1557)	Date :

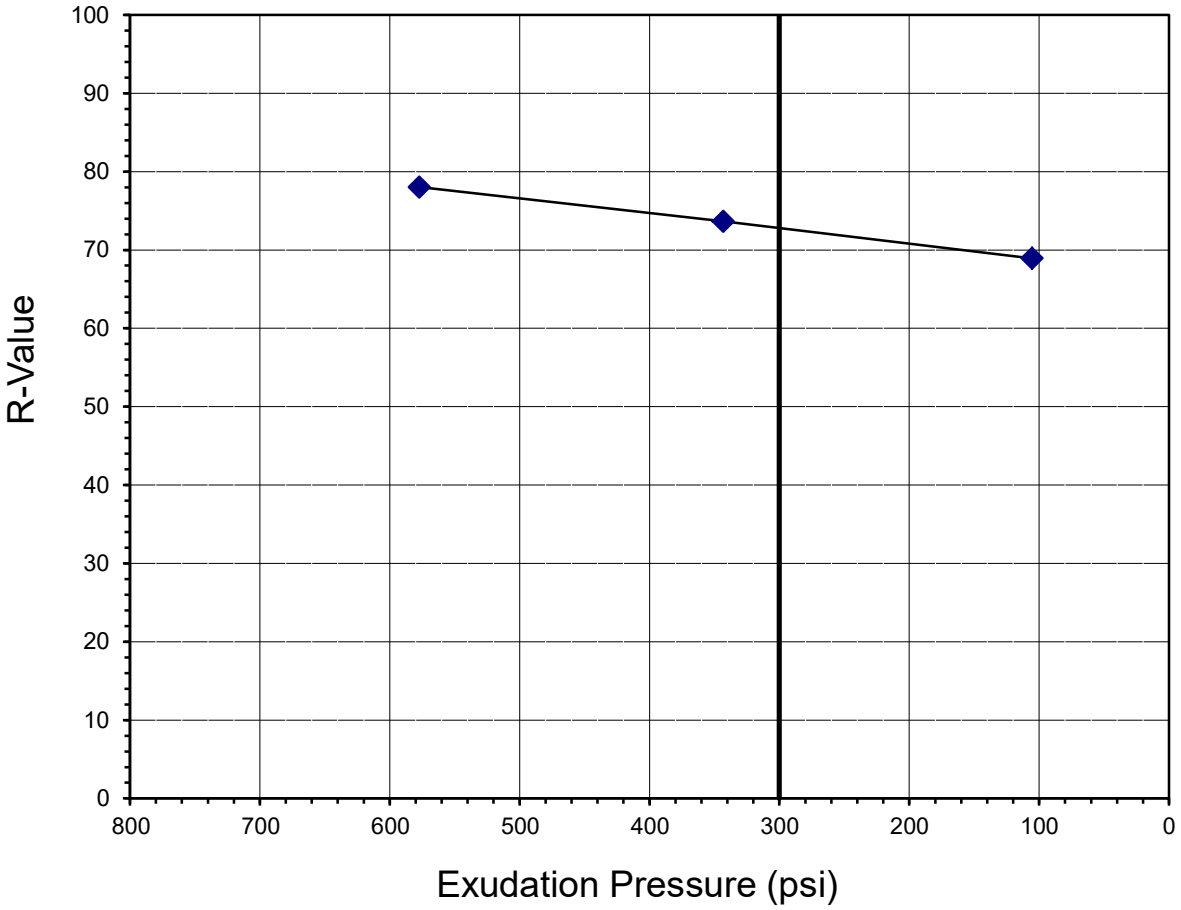
FIGURE B-5f



Method "A"

	Boring No: B85
Maximum Dry Density = **131.5** pcf	Sample: Bulk
	Depth : 1.0-5.0 feet
Optimum Moisture Content = **8.5** %	Description : Silty sand (SM), trace gravel and clay
	Project Name: SACC at OIAA
	Client Name: Cotton, Shires & Associates, Inc.
Modified Proctor	Job No.: SC6101
	EGLAB Project No.: 22-022-001
(ASTM D1557)	Date :

FIGURE B-5g



Test No.	Compaction Pressure (psi)	Density (pcf)	Moisture (%)	Expansion Pressure (psi)	Horizontal Pressure (psi) @ 160 psi	Sample Height (in)	Exudation Pressure (psi)	R-Value	R-Value Correction
1	350	119.7	11.0	0.00	34	2.58	343	72	74
2	350	119.2	11.4	0.00	38	2.51	105	69	69
3	350	120.2	10.6	0.00	27	2.51	577	78	78

Test Name and Method:
Resistance R-Value and Expansion Pressure - Cal Test 301

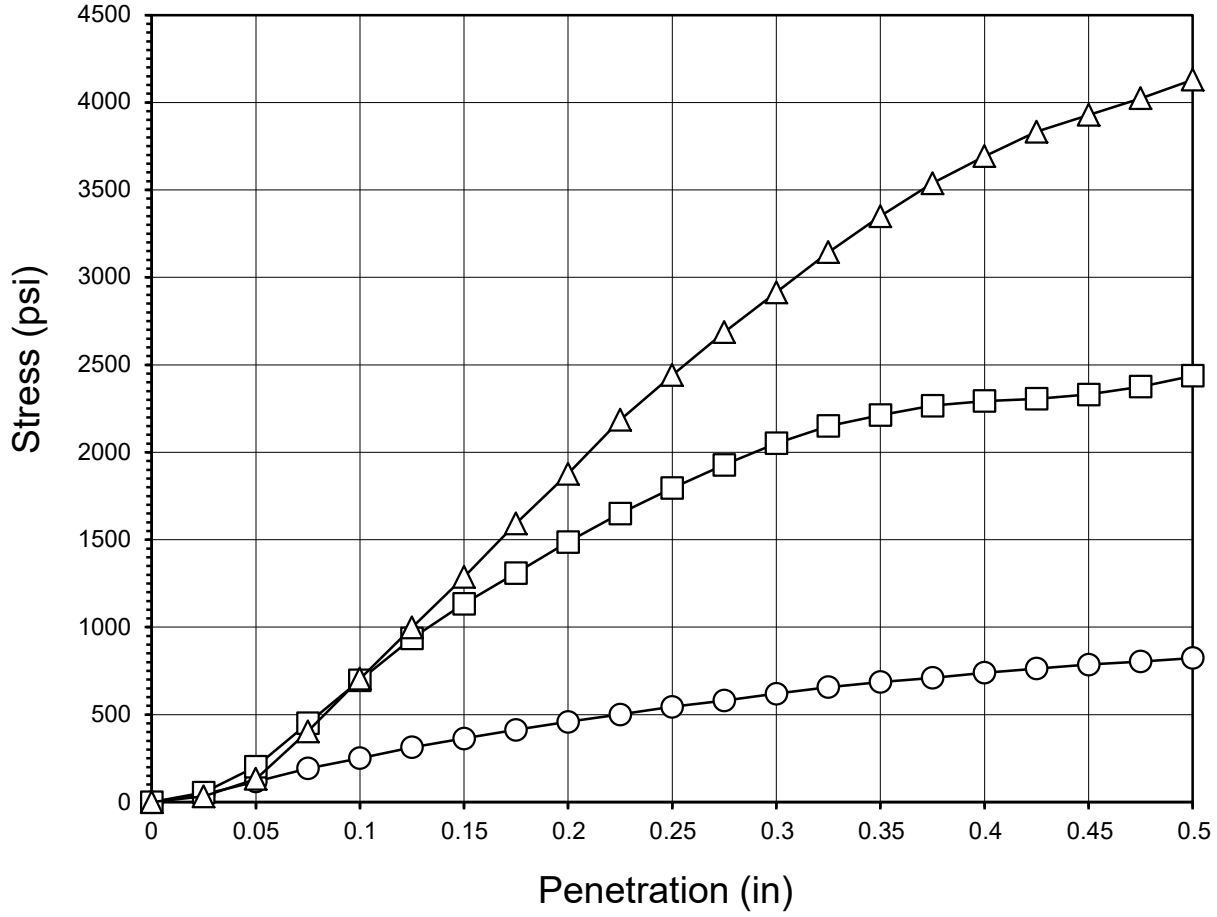
Boring No.: B41
Sample No.: Bulk
Depth: (ft) 1.0-6.0
Sample Type: Bulk
Sample Description: Silty sand (SM)
Test Date: 2/21/22

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No.: SC6101
EGLAB Job No.: 22-022-001

Test Results: R-Value at 300 psi
Exudation Pressure: **73**

R-VALUE TEST REPORT

FIGURE B-6



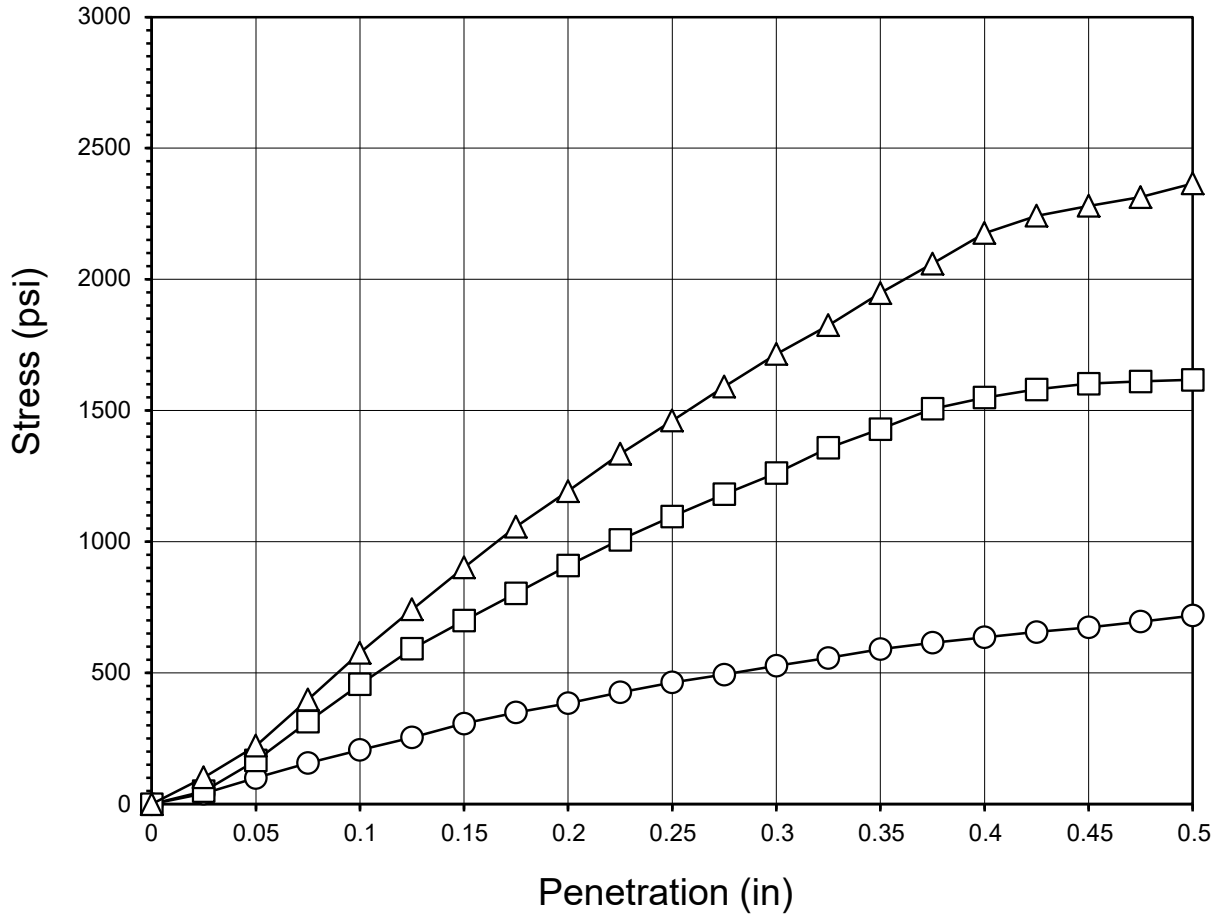
Symbol	Boring No.	Depth (ft)	Sample Number	Moisture Content (%)	As-Molded Dry Density (pcf)	Swell (%)	After Test Moisture (%)	CBR (0.1 in / 0.2 in Penetration)	
○	B15	1.0-5.0	Bulk	7.5	124	0.40	11	27.68	31.80
□	B15	1.0-5.0	Bulk	7.5	130	0.30	10	98.76	112.62
△	B15	1.0-5.0	Bulk	7.5	134	0.10	9	116.30	155.69

Sample Description: (SM) Silty sand, trace gravel

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No: SC6101
EGL Project No: 22-022-001

CALIFORNIA BEARING RATIO
(ASTM D1883)

FIGURE B-7a



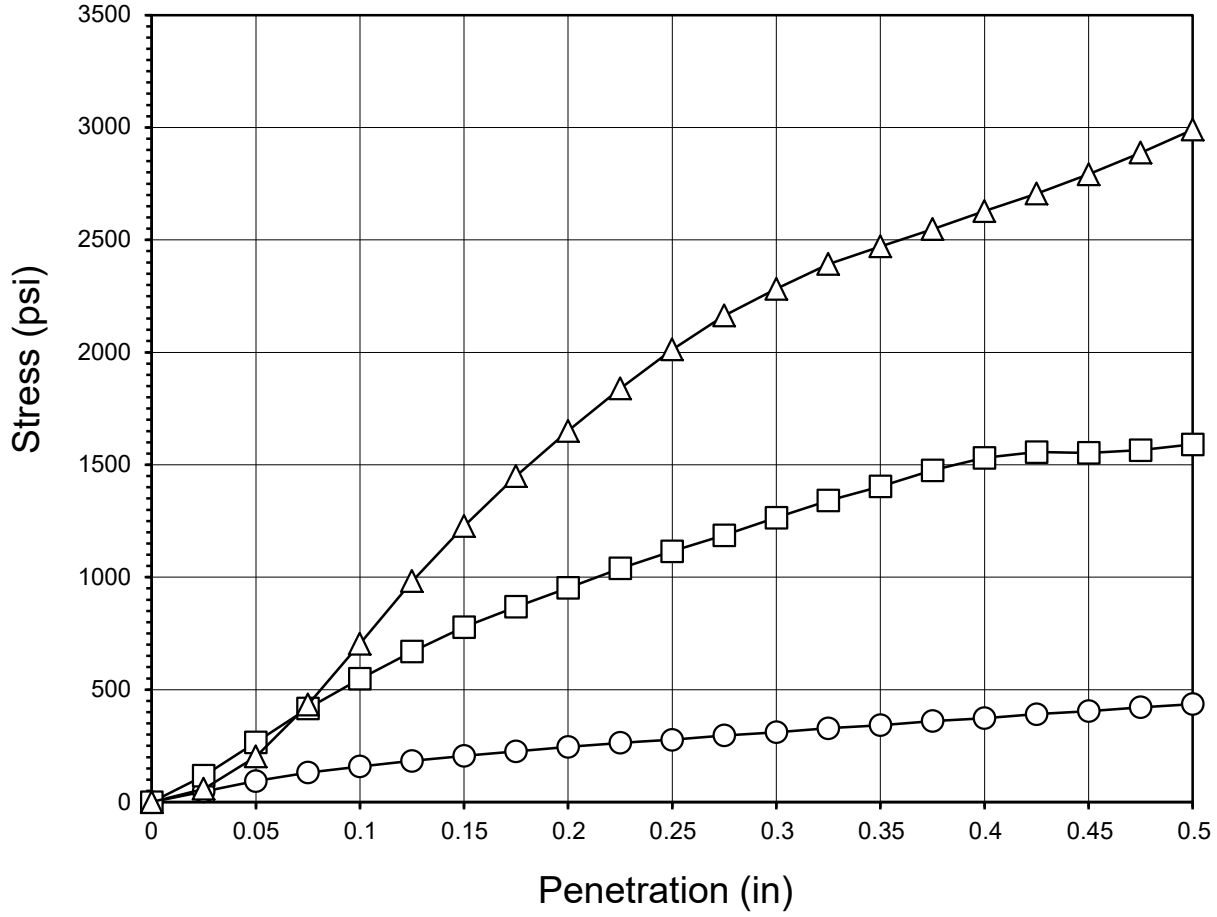
Symbol	Boring No.	Depth (ft)	Sample Number	Moisture Content (%)	As-Molded Dry Density (pcf)	Swell (%)	After Test Moisture (%)	CBR (0.1 in / 0.2 in Penetration)	
○	B57	1.0-6.0	Bulk	8.8	117	0.50	13	22.26	26.60
□	B57	1.0-6.0	Bulk	8.9	123	0.20	11	57.40	66.32
△	B57	1.0-6.0	Bulk	8.9	127	0.10	11	70.55	86.99

Sample Description: (SM) Silty sand, trace gravel

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No: SC6101
EGL Project No: 22-022-001

CALIFORNIA BEARING RATIO
(ASTM D1883)

FIGURE B-7b



Symbol	Boring No.	Depth (ft)	Sample Number	Moisture Content (%)	As-Molded Dry Density (pcf)	Swell (%)	After Test Moisture (%)	CBR (0.1 in / 0.2 in Penetration)	
○	B85	1.0-5.0	Bulk	8.7	119	1.50	14	15.86	16.33
□	B85	1.0-5.0	Bulk	8.9	126	1.70	11	57.98	65.08
△	B85	1.0-5.0	Bulk	8.8	132	2.20	10	108.33	127.55

Sample Description: (SM) Silty sand, trace gravel and clay

Project Name:
SACC at OIAA
Client: Cotton, Shires & Associates, Inc.
Project No: SC6101
EGL Project No: 22-022-001

CALIFORNIA BEARING RATIO
(ASTM D1883)

FIGURE B-7c

SUMMARY OF PERMEABILITY TEST RESULTS

PROJECT NAME: SACC at OIAA

EGLAB JOB NO.: 22-098-001

PROJECT NO.: SC6101

CLIENT: Cotton, Shires & Associates, Inc.

SUMMARIZED BY: JT

BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (pcf)	EFFECTIVE CONFINED PRESSURE (psi)	SATURATED HYDRAULIC CONDUCTIVITY ASTM D5084 (cm/sec)
B9	R2	6.0	6.7	106.9	3.2	1.1E-04
B9	R3	8.0	6.0	104.2	4.1	2.2E-04
B13	R1	3.0	6.3	103.3	3.0	2.5E-04
B13	R2	6.0 (Bottom)	8.2	94.8	3.0	6.3E-05

APPENDIX C
SITE-SPECIFIC GROUND MOTION RESPONSE ANALYSIS

APPENDIX C – SITE-SPECIFIC GROUND MOTION RESPONSE ANALYSIS

INTRODUCTION

CSA was requested to conduct site-specific ground motion response analysis for the proposed cargo sort facility warehouse. Based on our interpretation of the 2019 CBC/ASCE 7-16 code (ASCE 7-16, Chapter 20), structures on site class D sites with S_1 greater or equal to 0.2 require a site-specific ground motion hazard analysis (GMHA). However, there is an exception where a GMHA is not required if the structural design uses a seismic response coefficient, Cs, determined by Eq. 12.8-3 and 12.8-4 and multiplying by a factor of 1.5. This approach adds conservatism and increases the seismic design loads. We understand the planned warehouse will have fundamental period of 1.6 seconds. This appendix presents the methodology and results of our GMHA per ASCE 7-16, Chapter 21.

Per ASCE 7-16, ground motions should be calculated using probabilistic seismic hazard assessment (PSHA) based Maximum Considered Earthquake (MCE_R) and deterministic seismic hazard assessment (DSHA) based Maximum Considered Earthquake (MCE_R), and the selected spectral response acceleration (S_{aM}) shall be the lesser of the probabilistic and deterministic response spectra at any point.

CODE-BASED RESPONSE SPECTRA

We have included the ASCE/SEI 7-16 seismic design parameters (for location latitude, longitude: 34.0506, -117.6050) for reference in Table C-1.

TABLE C-1 - Seismic Design Parameters

Parameter	Value
Site Classification	D
Mapped Spectral Acc. 0.2 Sec. (g)	S_S = 1.578
Mapped Spectral Acc. 1 Sec. (g)	S_1 = 0.578
Fa – Site Coefficient	1.0
F_V – Site Coefficient	1.7
S_{MS} = Fa*Ss	1.578
S_{M1} = F_V*S_1	0.983
S_{DS} = 2/3*S_{MS}	1.052
S_{D1} = 2/3*S_{M1}	0.655
T_L	12
F_{PGA}	0.659
Ie	1
Cv	1.416
PGA_M	0.725

This design presented in Table C-1 produce the design and MCE response spectra presented in Graph C-1. The use of these parameters is only permitted if the seismic response coefficient, Cs, is multiplied by a factor of 1.5 for periods greater than $T_S = S_{D1}/S_{DS} = 0.62$.

GRAPH C-1 – Code Based Design and MCE Response Spectra

GROUND MOTION HAZARD ANALYSIS

Following Section 11.4.8 of ASCE 7-16, we completed a GMHA in accordance with Chapter 21, Section 21.2. As part of performing the GMHA, we developed a target MCE_R response spectrum. We evaluated both Probabilistic MCE_R spectral response accelerations utilizing Method 1 (ASCE7-16 Ch. 21.2.1.1), and Deterministic MCE_R spectral response accelerations to generate our target response spectrum for ground motion matching.

We utilized the USGS Unified Hazard Tool (UHT) based on UCERF 3 Data Set, and the Building Seismic Safety Council (BSSC) Scenario Catalog 2014 event set (BSSC 2014), which provides several nearby seismic scenarios.

Our analysis utilized the following Next Generation Attenuation West 2 (NGA-West 2) relationships: Abrahamson & Silva & Kamai (2014), Boore & Stewart & Seyhan & Atkinson (2014), Campbell & Bozorgnia (2014), and Chiou & Youngs (2014). We did not use the Idriss (2014) model because the site shear wave velocity profile is below the Idriss model limit (i.e., Idriss model is only valid when $V_{S30} > 450$ m/s). The spectral acceleration profiles for the various scenarios are presented in Graph C-3 below, with the largest acceleration calculated for the characteristic earthquakes used to determine the site specific MCE_R.

We applied rotation factors (scale factors) based on Shahi and Baker (2014) as opposed to the factors specified in ASCE 7-16 Chapter 21, Section 21.2, to calculate the maximum rotated component of the response spectra (RotD100). The rotation factors are shown in Table C-3 and Table C-4.

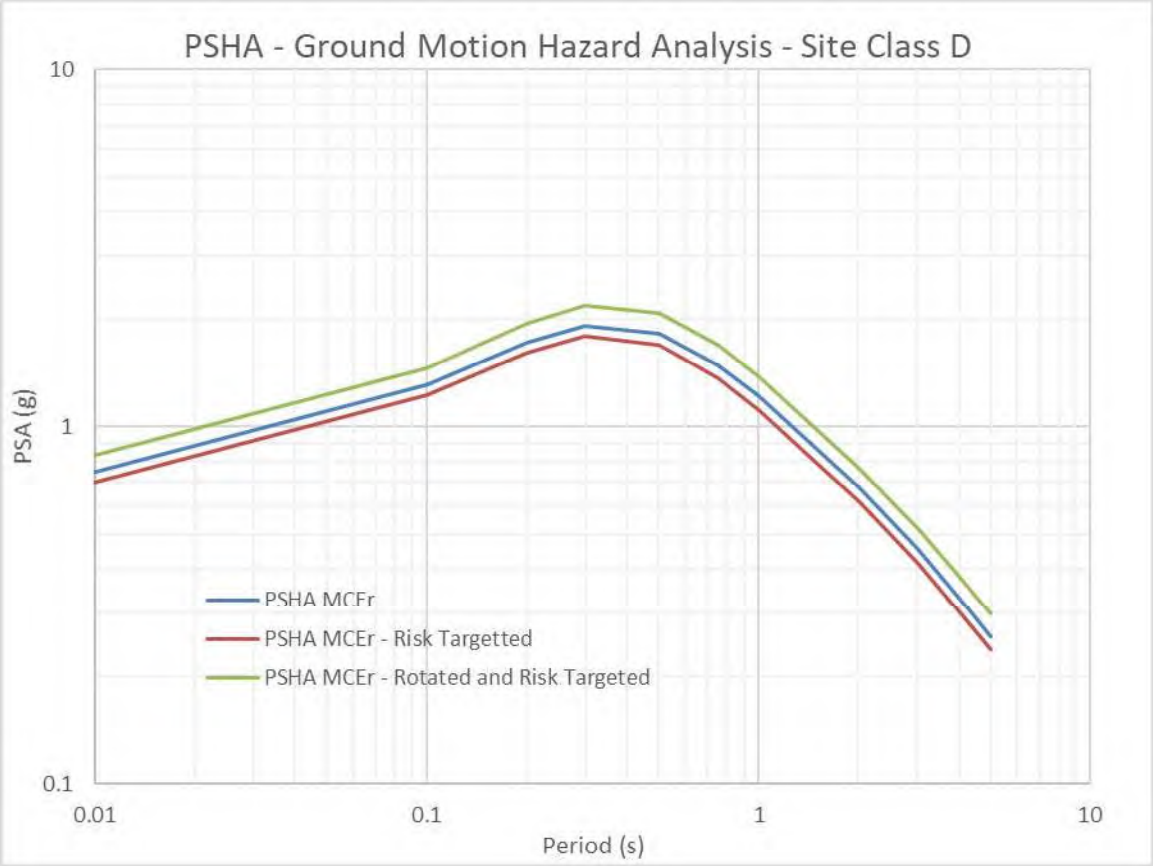
PROBABILISTIC SEISMIC HAZARD ASSESSMENT

We conducted a PSHA as outlined in ASCE 7-16 Section 21.2.1.1 (method 1). ASCE 7-16 Section 21.2.1 defines the Probabilistic MCE_R as "*the spectral response accelerations in the direction of maximum horizontal response represented by a 5% damped acceleration response spectrum that is expected to achieve a 1% probability of collapse within a 50-year period.*" The probabilistic MCE spectrum was provided using the UHT referenced above for a site class D site (Vs_{30} = 259 m/s). Results from the UHT including input parameters and deaggregation of the seismic sources are attached to this appendix. The probabilistic MCE spectrum was multiplied by Risk Coefficients (C_R) to determine the probabilistic MCE_R. The C_R values, C_{Rs} and C_{R1}, are based on ASCE 7-16 Section 21.2.1.1 (Method 1) and determined using ASCE 7-16 Figures 22-18 and 22-19, respectively. The values for C_{Rs} and C_{R1} are 0.938 and 0.915, respectively. Risk coefficients for various periods are shown in Table C-2. The resulting probabilistic MCE_R values are shown in Table C-2 and presented graphically in Graph C-2.

TABLE C-2 – Probabilistic MCE_R Values

Period	PSHA MCE_R from UHT Spectral Accel.	Risk Coefficient, Cr	Shahi and Baker RotD100/RotD50 scale factors	PSHA MCE_R Rotated and Risk Targeted
0.01	0.7479	0.938	1.19	0.835
0.1	1.3088	0.938	1.19	1.461
0.2	1.7197	0.938	1.21	1.952
0.3	1.9154	0.935	1.22	2.185
0.5	1.8195	0.929	1.23	2.080
0.75	1.4846	0.922	1.24	1.698
1	1.2176	0.915	1.24	1.381
2	0.6757	0.915	1.24	0.767
3	0.4549	0.915	1.25	0.520
4	0.3324	0.915	1.26	0.383
5	0.2583	0.915	1.26	0.298

GRAPH C-2 – Probabilistic MCER



DETERMINISTIC SEISMIC HAZARD ASSESSMENT

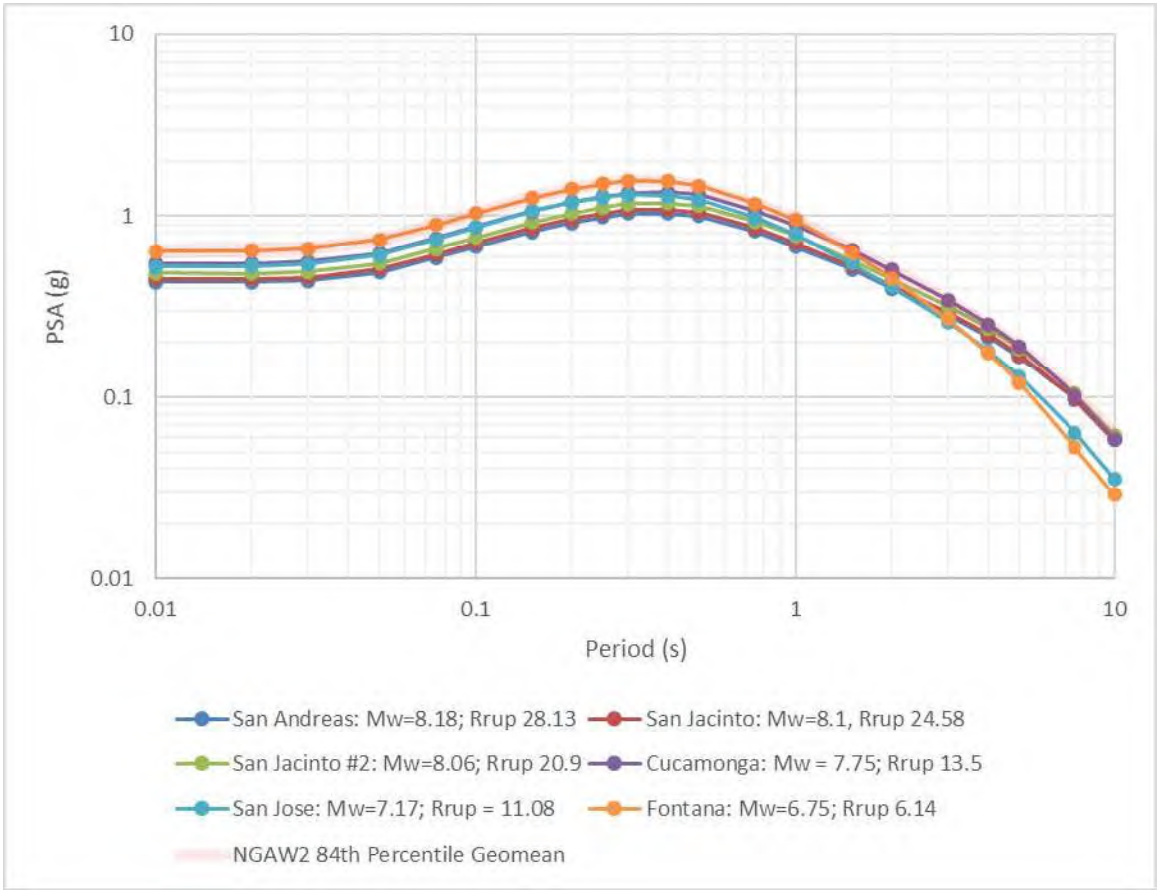
We conducted a DSHA as outlined in ASCE 7-16 Section 21.2.2, and ASCE 7-16 Supplement No. 1. ASCE 7-16 Section 21.2.2 defines the Deterministic MCER as "*the deterministic spectral response acceleration at each period shall be calculated as an 84-th-percentile 5% damped spectral response acceleration in the direction of maximum horizontal response computed at that period. The largest such acceleration calculated for the characteristic earthquakes on all known active faults within the region shall be used.*" The deterministic design event was determined using the results of the deaggregation using the UHT and the BSSC2014 Scenario Catalog. The controlling scenarios are summarized in Table C-3 below. The pertinent parameters used to develop the deterministic MCE spectrum with the NGA-West 2 GMPEs are: Moment Magnitude (Mw); Rrup, Rjb and Rx; V_{S30} = 293.5 m/s; default parameters were utilized for the remaining inputs. The median-plus-one-standard deviation estimates from the NGA-West2 GMPEs for each of the scenarios in Table C-3 are presented in Graph C-3. A printout of the NGA-West2 spreadsheet with all input parameters is provided in the appendices.

Supplement No. 1 of ASCE 7-16 has modified additional criteria for establishing the deterministic MCE_R spectrum. When the largest spectral response acceleration of the resulting deterministic ground motion response spectrum is less than $1.5F_a$, then the largest 84th percentile rotated response spectrum shall be scaled by a single factor such that the maximum response spectral acceleration equals $1.5F_a$. For Site Classes A, B, C, and D, F_a is determined using Table 11.4.1 with the value of S_s taken as 1.5; for Site Class E, F_a shall be taken as 1.0.

TABLE C-3 - Seismic Scenarios

Fault Name	Scenario	Distance, R (km)	Moment Magnitude, Mw	Reference	Controls
San Andreas	PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	28.13	8.18	BSSC2014	--
San Jacinto	San Bernardino	24.58	8.1	UCERF3	--
San Jacinto	Lytle Creek	20.93	8.06	UCERF3	T > 5
Cucamonga		13.48	7.75	UCERF3	1.5 ≤ T ≤ 5
San Jose		11.08	7.17	UCERF3	--
Fontana		6.14	6.75	BSSC2014	T < 1.5

GRAPH C-3 – Deterministic NGA-W2 GMPE

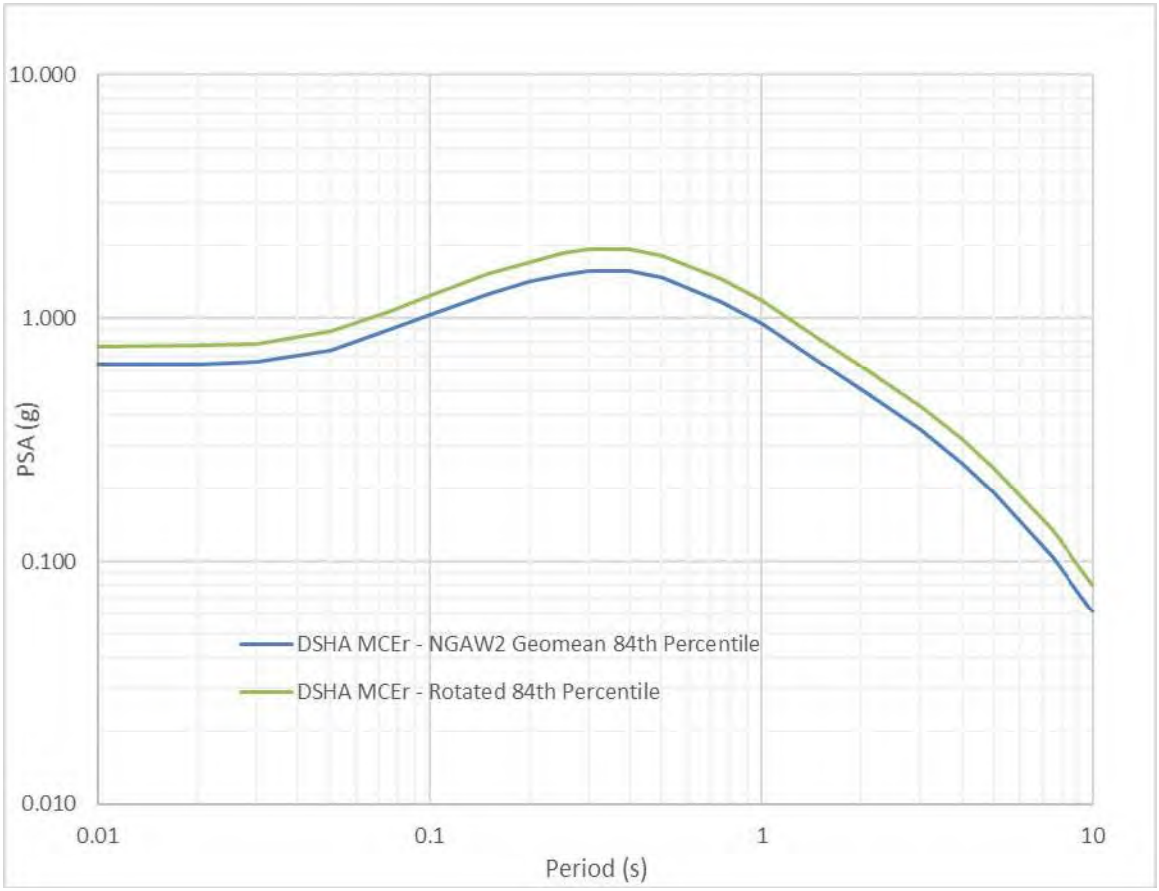


The largest maximum spectral acceleration from the 84th percentile rotated response spectrum is greater than $1.5F_a$, so no scale factor is required. The resulting deterministic MCE_R values are shown in Table C-4 and presented graphically in Graph C-4.

TABLE C-4 – Deterministic MCE_R Values

Period	NGAW2 84th Percentile Geomean	Shahi and Baker RotD100/RotD50	DSHA MCE_R Rotated 84th Percentile
0.01	0.643	1.19	0.765
0.02	0.646	1.19	0.769
0.03	0.661	1.19	0.786
0.05	0.740	1.19	0.880
0.075	0.893	1.19	1.063
0.1	1.036	1.19	1.233
0.15	1.263	1.2	1.516
0.2	1.412	1.21	1.708
0.25	1.513	1.22	1.846
0.3	1.570	1.22	1.915
0.4	1.556	1.23	1.914
0.5	1.475	1.23	1.814
0.75	1.174	1.24	1.456
1	0.953	1.24	1.181
1.5	0.654	1.24	0.811
2	0.505	1.24	0.626
3	0.347	1.25	0.433
4	0.254	1.26	0.320
5	0.192	1.26	0.242
7.5	0.105	1.28	0.134
10	0.062	1.29	0.080

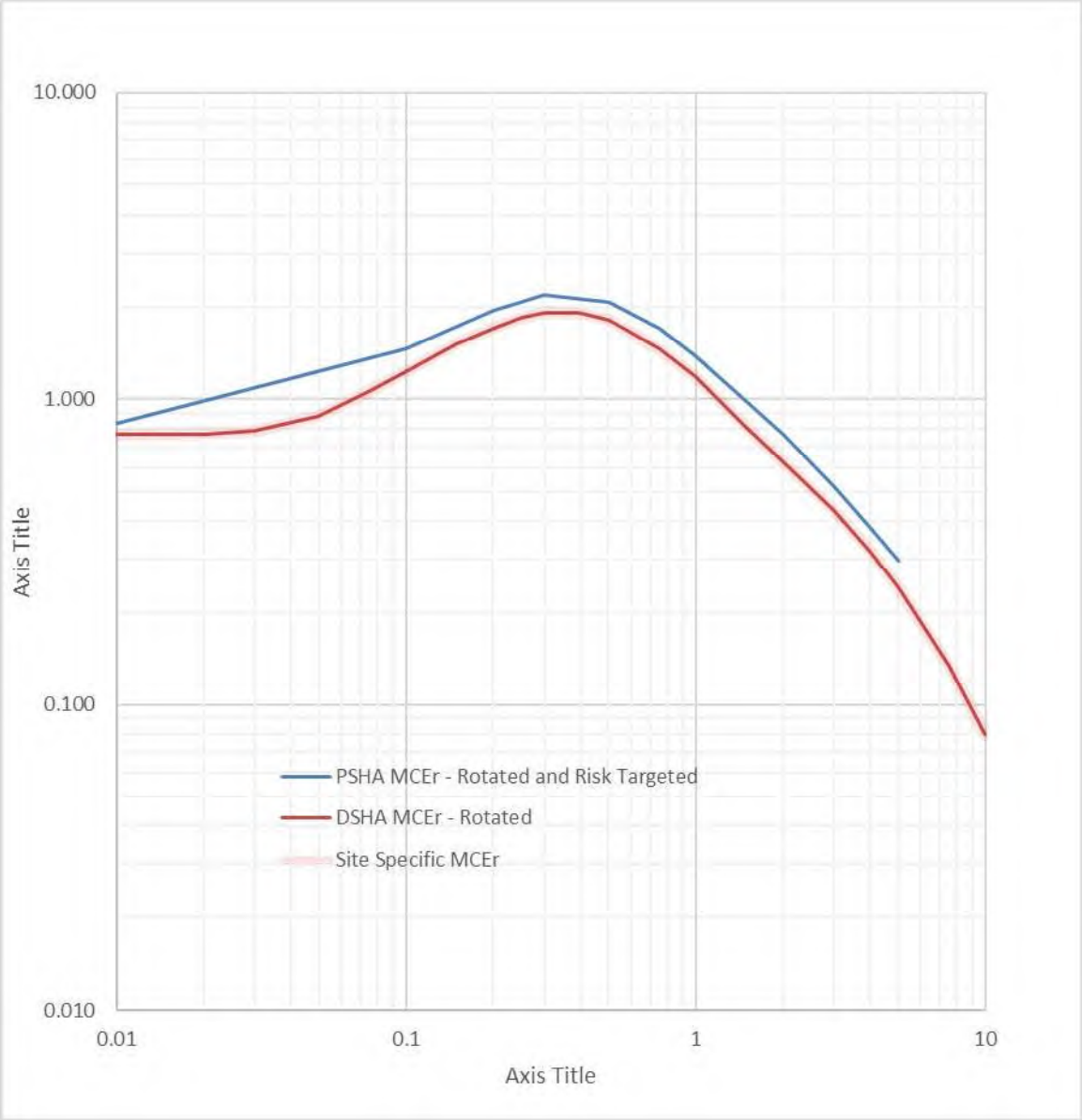
GRAPH C-4 – Deterministic MCE$_R$



SITE-SPECIFIC MCE$_R$

The site-specific MCE$_R$ is defined by ASCE 7-16 Section 21.2.3 as "*spectral response acceleration at any period, S_{aM}, shall be taken as the lesser of the spectral response accelerations from the probabilistic ground motions of Section 21.2.1 and the deterministic ground motions of Section 21.2.2.*" In this case, the DSHA is lower throughout, as shown in Graph C-5.

GRAPH C-5 – Site Specific Deterministic and Probabilistic MCER Response Spectra



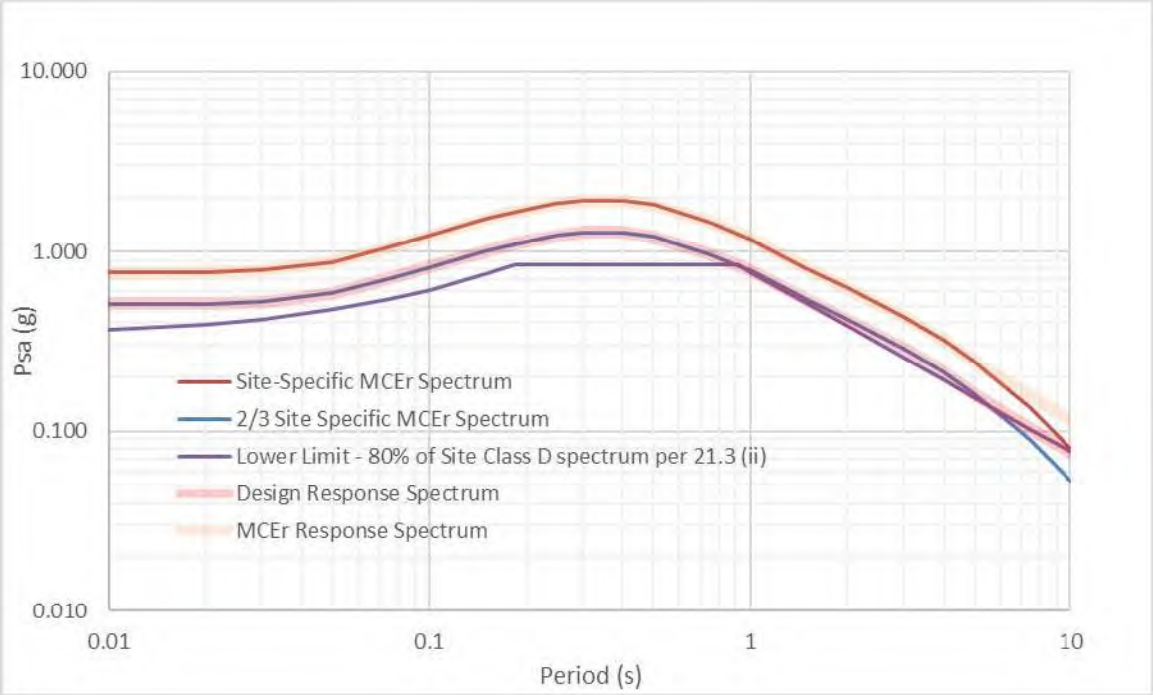
DESIGN RESPONSE SPECTRUM

The design response spectrum is defined in ASCE 7-16 Section 21.3 as two-thirds of the site-specific MCER, and for sites classified as Site Class D requiring site-specific analysis in accordance with 11.4.8, the design spectral response acceleration at any period shall not be less than 80% of S_a determined in accordance with Section 11.4.6 using the F_a and F_v values specified in 21.3 (ii). Table C-5 below provides the site-specific MCER at the ground surface and reduced by two-thirds. We also show the 80% Site Class D response spectrum in accordance with 21.3(ii). Graph C-6 presents the design response spectrum.

TABLE C-5 – Design Response Spectrum

Period	80% of General Design Spectrum from 21.3(ii)	2/3 DSHA MCEr	Design Response Spectrum	MCEr Response Spectrum
0.01	0.364	0.510	0.510	0.765
0.02	0.392	0.512	0.512	0.769
0.03	0.419	0.524	0.524	0.786
0.05	0.474	0.587	0.587	0.880
0.075	0.543	0.708	0.708	1.063
0.1	0.612	0.822	0.822	1.233
0.15	0.750	1.010	1.010	1.516
0.183	0.842	1.108	1.108	1.662
0.2	0.842	1.139	1.139	1.708
0.25	0.842	1.230	1.230	1.846
0.3	0.842	1.277	1.277	1.915
0.4	0.842	1.276	1.276	1.914
0.5	0.842	1.209	1.209	1.814
0.75	0.842	0.971	0.971	1.456
0.916	0.842	0.829	0.842	1.262
1	0.771	0.788	0.788	1.181
1.5	0.514	0.541	0.541	0.811
2	0.385	0.417	0.417	0.626
3	0.257	0.289	0.289	0.433
4	0.193	0.213	0.213	0.320
5	0.154	0.161	0.161	0.242
7.5	0.103	0.089	0.103	0.154
10	0.077	0.053	0.077	0.116

GRAPH C-6 – Design Response Spectra



DESIGN ACCELERATION PARAMETERS

Design acceleration parameters (S_{DS} and S_{D1}) were computed in accordance with ASCE 7-16 Section 21.4. S_{DS} is defined as 90% of the maximum spectral acceleration, S_a, obtained from the site-specific spectrum, at any period within the range from 0.2 to 5 seconds, inclusive. S_{D1} shall be taken as the maximum value of the product, T^*S_a, for periods from 1 to 2 seconds, for sites with V_{S30} >1,200 ft/s, and for periods from 1 to 5 seconds for sites with $V_{S30} \leq$ 1,200 ft/s. The parameters S_{MS} and S_{M1} shall be taken as 1.5 times S_{DS} and S_{D1}, respectively. These values shall not be less than 80% of the values presented in Table C-1 above. Table C-6 below contains the Design Acceleration Parameters:

TABLE 6 – Design Acceleration Values

Parameter	Value
S_{DS}	1.149
S_{D1}	0.867
S_{MS}	1.724
S_{M1}	1.301

MAXIMUM CONSIDERED EARTHQUAKE GEOMETRIC MEAN (MCE_G) PGA

The site-specific PGA_M shall be taken as the lesser of the probabilistic and deterministic geometric mean PGAs of Section 21.5.1 and 21.5.2, and shall not be less than 80% of the PGA_M determined from Eq. 11.8-1. The probabilistic PGA is 0.748g, the deterministic PGA is 0.639g, and 80% of the PGA_M from Section 11.8-1 is 0.580g. Thus, the site-specific PGA_M is 0.639g.

OSHPD

Latitude, Longitude: 34.050583, -117.604975

Date	4/27/2022, 8:10:31 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.578	MCE_R ground motion. (for 0.2 second period)
S_1	0.578	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.578	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.052	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.659	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.725	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	1.578	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.683	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.657	Factored deterministic acceleration value. (0.2 second)
S1RT	0.578	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.632	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.671	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.938	Mapped value of the risk coefficient at short periods
C_{R1}	0.915	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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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 (u…

Spectral Period

1.00 Second Spectral Acceleration

Latitude

Decimal degrees

34.050583

Time Horizon

Return period in years

2475

Longitude

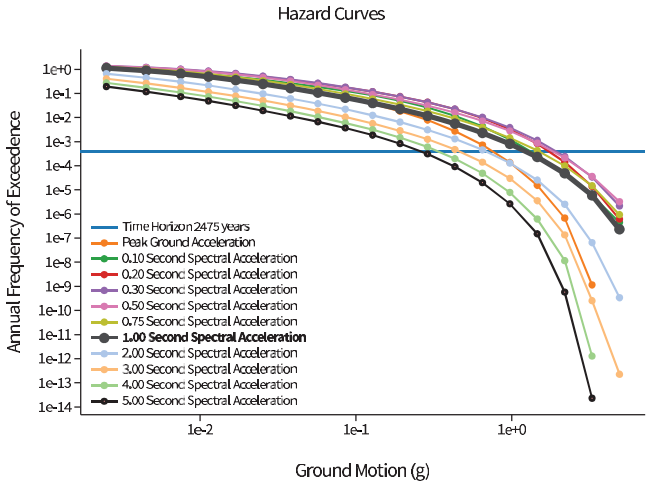
Decimal degrees, negative values for western longitudes

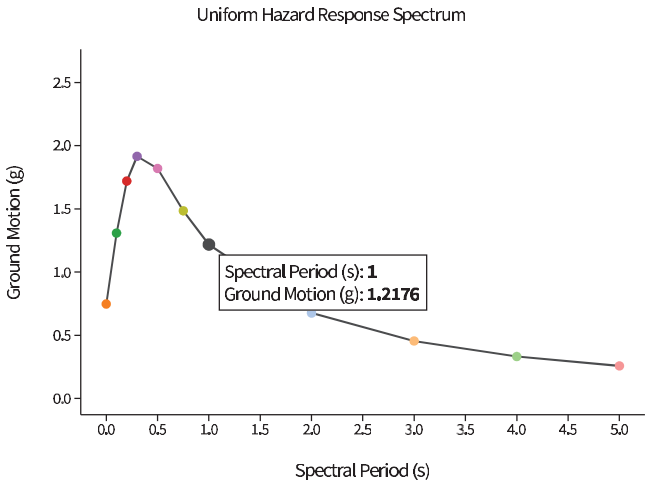
-117.604975

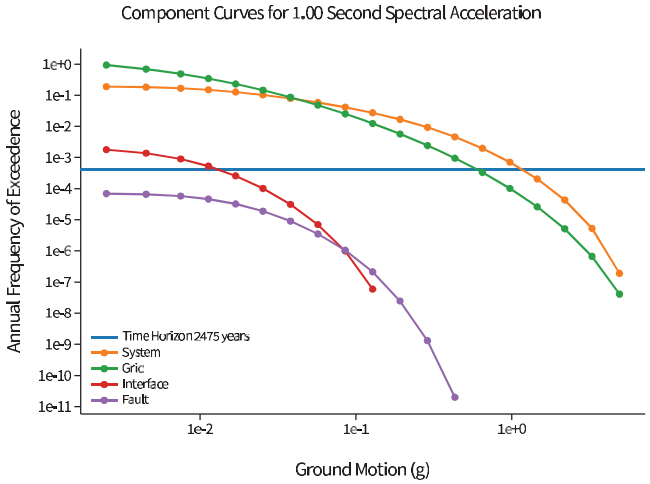
Site Class

259 m/s (Site class D)

Hazard Curve





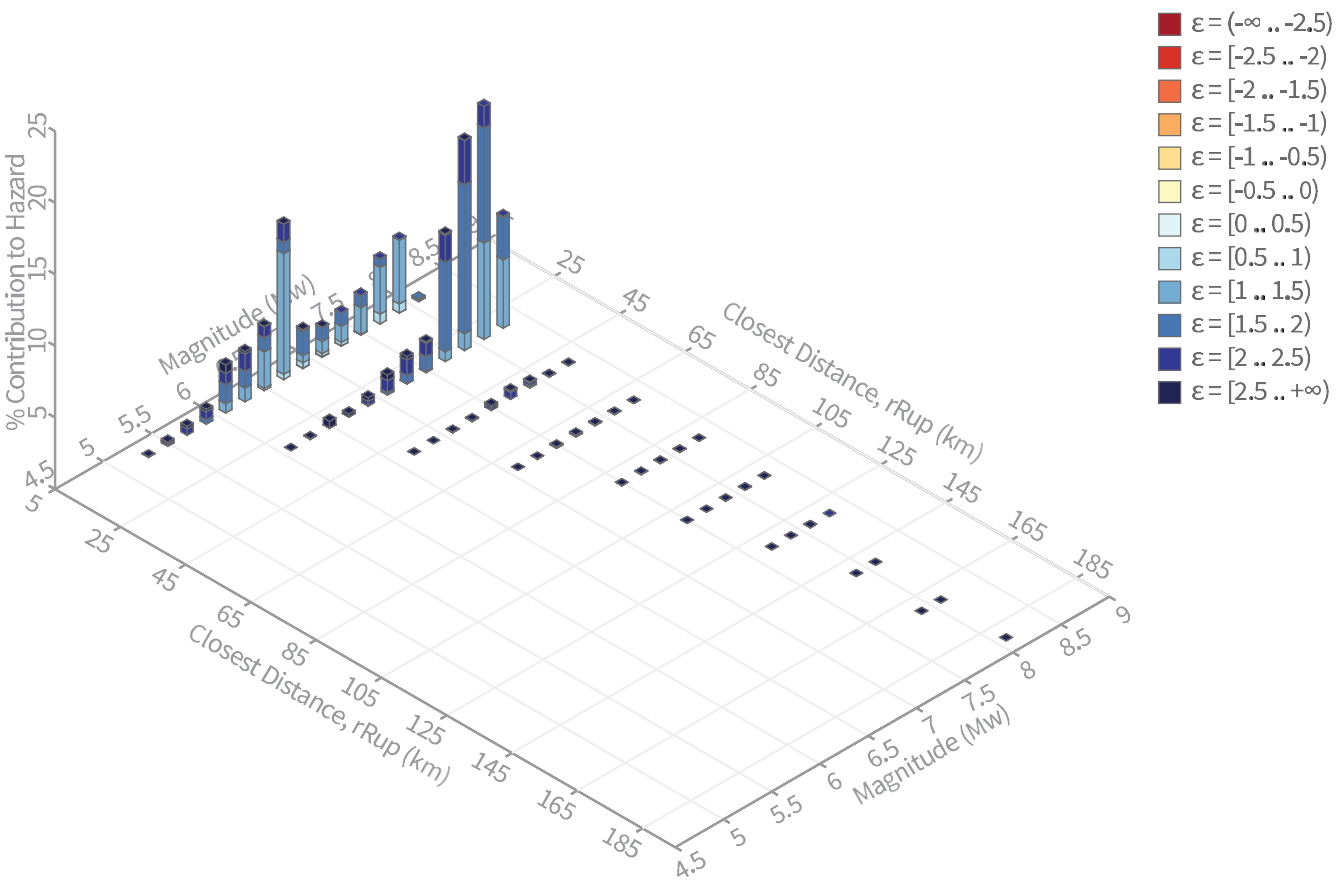


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
1.0 s SA ground motion: 1.2175557 g

Recovered targets

Return period: 2844.826 yrs
Exceedance rate: 0.00035151534 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.11 %

Mean (over all sources)

m: 7.46
r: 19.63 km
ε_0: 1.64 σ

Mode (largest m-r bin)

m: 8.1
r: 25.76 km
ε_0: 1.61 σ
Contribution: 16.26 %

Mode (largest m-r-ε_0 bin)

m: 7.91
r: 26.91 km
ε_0: 1.71 σ
Contribution: 10.39 %

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							44.49
San Andreas (San Bernardino N) [2]		28.13	7.96	1.79	117.421°W	34.253°N	36.94	10.34
San Jacinto (San Bernardino) [0]		24.58	8.09	1.59	117.445°W	34.227°N	36.85	7.55
Fontana (Seismicity) [2]		6.14	6.61	1.21	117.558°W	34.015°N	132.50	4.88
Cucamonga [3]		13.48	7.73	1.25	117.671°W	34.158°N	333.25	4.21
Whittier alt 1 [1]		20.65	7.57	1.72	117.683°W	33.868°N	199.46	2.87
San Jacinto (Lytle Creek connector) [1]		20.93	8.06	1.49	117.438°W	34.178°N	47.29	2.19
San Jose [0]		11.08	7.09	1.45	117.692°W	34.118°N	312.94	1.76
Chino alt 1 [0]		13.38	6.69	2.06	117.738°W	34.004°N	247.07	1.50
Cucamonga [2]		13.48	7.50	1.43	117.671°W	34.158°N	333.25	1.03
UC33brAvg_FM32	System							43.49
San Andreas (San Bernardino N) [2]		28.13	7.96	1.79	117.421°W	34.253°N	36.94	10.55
San Jacinto (San Bernardino) [0]		24.58	8.09	1.59	117.445°W	34.227°N	36.85	7.40
Cucamonga [3]		13.48	7.75	1.24	117.671°W	34.158°N	333.25	4.29
Fontana (Seismicity) [2]		6.14	6.61	1.21	117.558°W	34.015°N	132.50	3.99
Whittier alt 2 [1]		21.22	7.61	1.72	117.681°W	33.867°N	198.96	2.85
San Jacinto (Lytle Creek connector) [1]		20.93	8.05	1.49	117.438°W	34.178°N	47.29	2.12
Chino alt 2 [0]		13.19	6.93	1.84	117.734°W	34.001°N	245.12	2.00
San Jose [0]		11.08	7.09	1.46	117.692°W	34.118°N	312.94	1.69
Cucamonga [2]		13.48	7.50	1.44	117.671°W	34.158°N	333.25	1.01
UC33brAvg_FM31 (opt)	Grid							6.17
PointSourceFinite: -117.605, 34.100		6.28	6.30	1.49	117.605°W	34.100°N	0.00	1.90
PointSourceFinite: -117.605, 34.100		6.28	6.30	1.49	117.605°W	34.100°N	0.00	1.90
UC33brAvg_FM32 (opt)	Grid							5.85
PointSourceFinite: -117.605, 34.100		6.29	6.29	1.50	117.605°W	34.100°N	0.00	1.86
PointSourceFinite: -117.605, 34.100		6.29	6.29	1.50	117.605°W	34.100°N	0.00	1.86

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 (u…

Spectral Period

2.00 Second Spectral Acceleration

Latitude

Decimal degrees

34.050583

Time Horizon

Return period in years

2475

Longitude

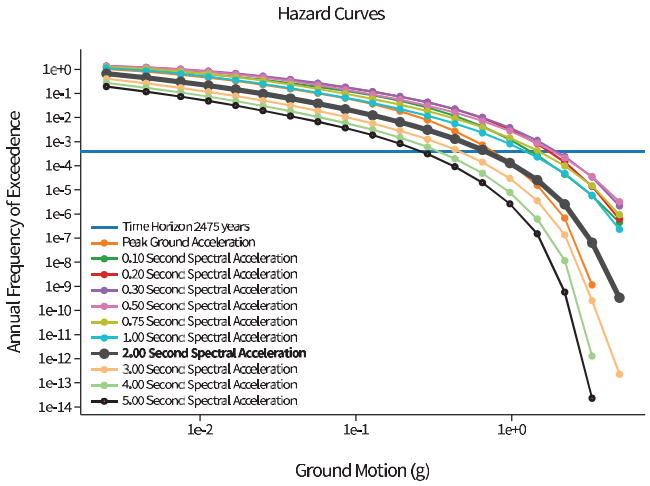
Decimal degrees, negative values for western longitudes

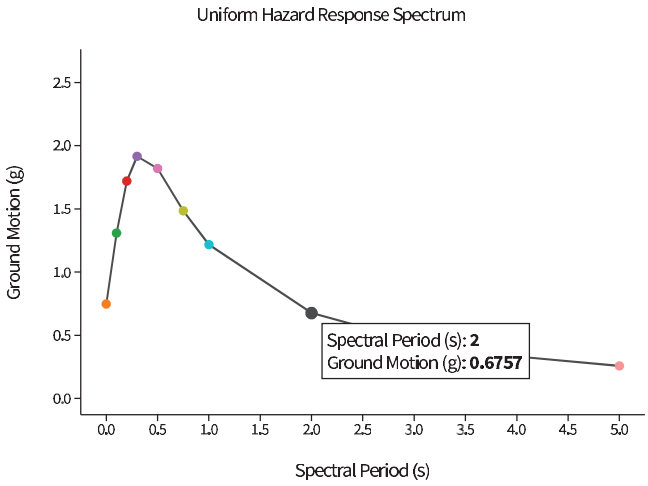
-117.604975

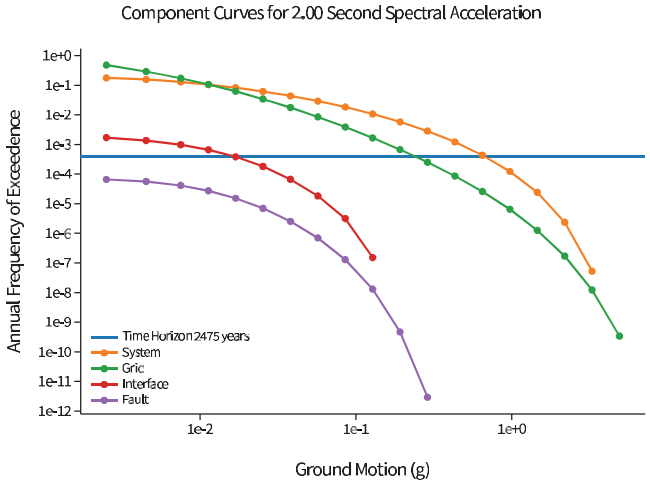
Site Class

259 m/s (Site class D)

Hazard Curve





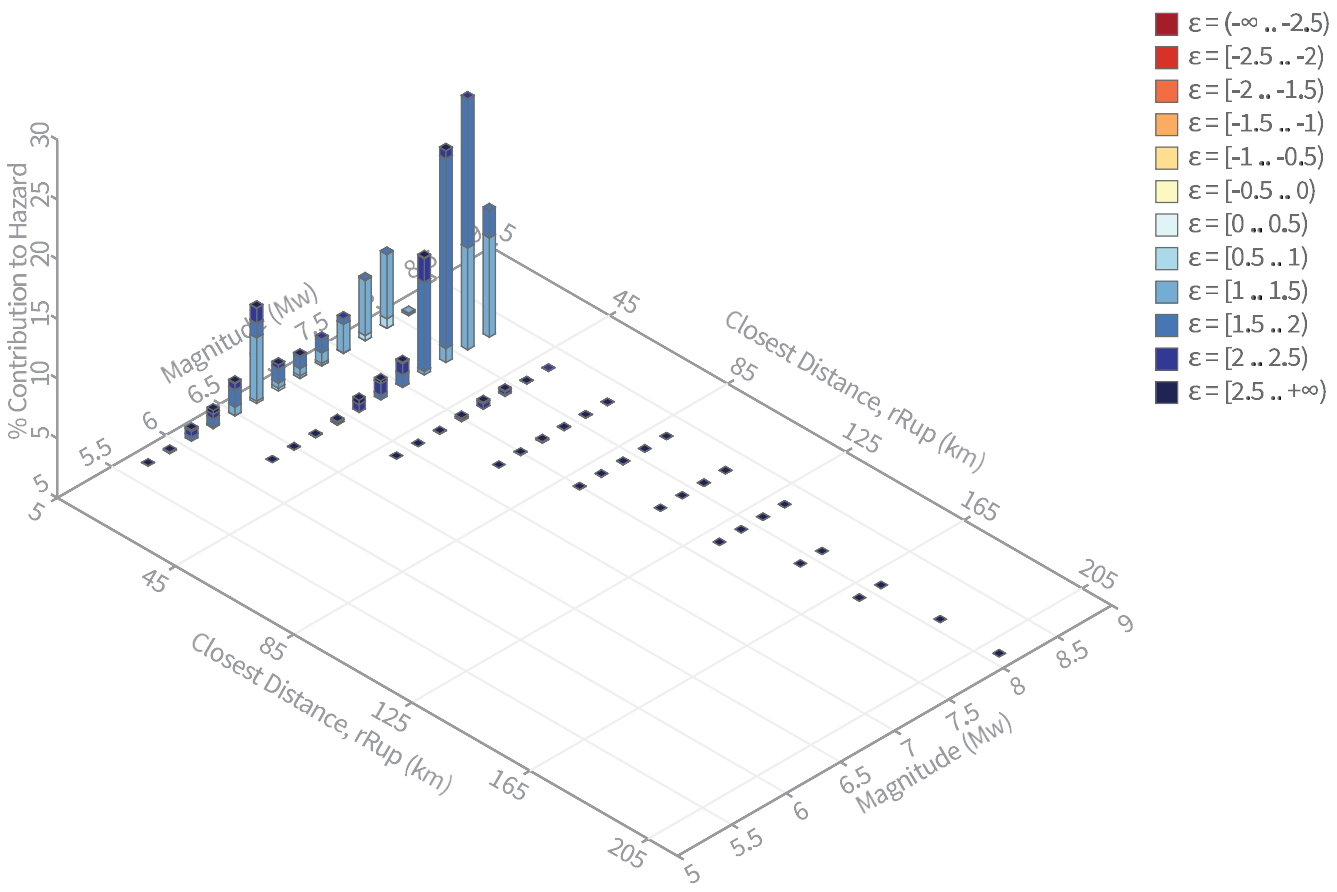


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
2.0 s SA ground motion: 0.67571896 g

Recovered targets

Return period: 2838.0487 yrs
Exceedance rate: 0.00035235477 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.11 %

Mean (over all sources)

m: 7.68
r: 21.28 km
ε_0: 1.59 σ

Mode (largest m-r bin)

m: 8.1
r: 25.73 km
ε_0: 1.54 σ
Contribution: 21.02 %

Mode (largest m-r-ε_0 bin)

m: 7.91
r: 26.92 km
ε_0: 1.75 σ
Contribution: 15.89 %

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							47.30
San Andreas (San Bernardino N) [2]		28.13	7.99	1.73	117.421°W	34.253°N	36.94	12.55
San Jacinto (San Bernardino) [0]		24.58	8.10	1.50	117.445°W	34.227°N	36.85	9.78
Cucamonga [3]		13.48	7.75	1.18	117.671°W	34.158°N	333.25	4.80
Fontana (Seismicity) [2]		6.14	6.62	1.37	117.558°W	34.015°N	132.50	3.59
Whittier alt 1 [1]		20.65	7.62	1.67	117.683°W	33.868°N	199.46	2.99
San Jacinto (Lytle Creek connector) [1]		20.93	8.06	1.38	117.438°W	34.178°N	47.29	2.83
San Jose [0]		11.08	7.17	1.44	117.692°W	34.118°N	312.94	1.53
Cucamonga [2]		13.48	7.54	1.38	117.671°W	34.158°N	333.25	1.09
UC33brAvg_FM32	System							47.04
San Andreas (San Bernardino N) [2]		28.13	7.99	1.73	117.421°W	34.253°N	36.94	12.81
San Jacinto (San Bernardino) [0]		24.58	8.10	1.51	117.445°W	34.227°N	36.85	9.57
Cucamonga [3]		13.48	7.77	1.17	117.671°W	34.158°N	333.25	4.92
Whittier alt 2 [1]		21.22	7.65	1.67	117.681°W	33.867°N	198.96	3.03
Fontana (Seismicity) [2]		6.14	6.61	1.37	117.558°W	34.015°N	132.50	2.93
San Jacinto (Lytle Creek connector) [1]		20.93	8.06	1.39	117.438°W	34.178°N	47.29	2.74
Chino alt 2 [0]		13.19	7.09	1.78	117.734°W	34.001°N	245.12	1.52
San Jose [0]		11.08	7.17	1.45	117.692°W	34.118°N	312.94	1.47
Cucamonga [2]		13.48	7.54	1.39	117.671°W	34.158°N	333.25	1.07
UC33brAvg_FM31 (opt)	Grid							2.95
UC33brAvg_FM32 (opt)	Grid							2.71

PACIFIC EARTHQUAKE ENGINEERING RESEARCH CENTER

WEIGHTED AVERAGE of 2014 NGA WEST-2 GMPEs

Last updated: 04 14 15

by Emel Seyhan, PhD, PEER & UCLA -- email: emel.seyhan@gmail.com, peer_center@berkeley.edu

This excel file will be updated as necessary on the PEER website to fix any typos or other errors. Please check the website frequently for new versions at: http://peer.berkeley.edu/ngawest2/databases/

Legend	Pre-defined option	Main input variable	Calculated variable	Input var. flag	Internal variable

GMPE averaging	Geometric

Weighted average of the natural logarithm of the spectral values

GMPEs	ASK14	BSSA14	CB14	CY14	I14
Weight	0.25	0.25	0.25	0.25	0

# of std. dev.	1
Damping ratio (%)	5

Modification factors are calculated in Sheet DSF

ASK14 Abrahamson & Silva & Kamai 2014 NGA West-2 Model
BSSA14 Boore & Stewart & Seyhan & Atkinson 2014 NGA West-2 Model
CB14 Campbell & Bozorgnia 2014 NGA West-2 Model
CY14 Chiou & Youngs 2014 NGA West-2 Model
I14 Idriss 2014 NGA West-2 Model

Input variables | **Errors and warnings**

M_w	8.06	
R_{RUP} (km)	20.93	
R_{JB} (km)	20.93	
R_X (km)	20.93	
Ry0 (km)	999	*If unknown use 999*
V_{S30} (m/sec)	293.5	
U (BSSA13)	0	*1: Unspecified fault mech.*
F_{RV}	0	*1: reverse fault*
F_{NM}	0	*1: normal fault*
F_{HW}	0	*1: hanging wall side*
Dip (deg)	90	
Z_{TOR} (km)	999	*If unknown use 999*
Z_{HYP} (km)	999	*If unknown use 999*
$Z_{1.0}$ (km)	999	*If unknown use 999*
$Z_{2.5}$ (km)	999	*If unknown use 999*
W (km)	999	*If unknown use 999*
Vs30Flag	measured	*Choose options for V_{s30} from the list*
F_{AS}	no	*Aftershock effect is not applicable.*
Region	California	*Choose region from the list*

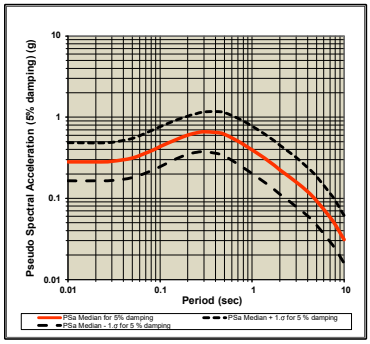
Calculated Variables/Flags

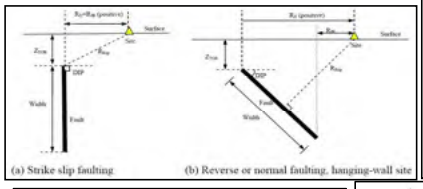
ΔDPP	0 *Always 0 for median calcs.*
PGA_r (g)	0.226
Z_{BOT} (km) (CB14)	15 *Enter for default W calcs*
SS	1 *auto calculated*
$V_{s30Flag}$	1 *measured*
F_{AS}	0 *Aftershock effect is not applicable.*
Region	0 *California*
Option for Sa value	1 *Weighted average of the natural logarithm of the spectral values*

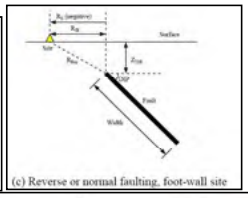
RotD50 Horizontal Component of PGA, PGV and *IMs*

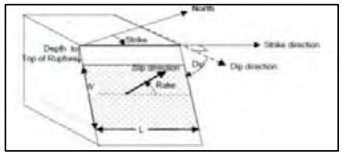
GMP	T (s)	Baseline: 5% Damping: PSa Median for 5% damping	PSa Median + 1.σ for 5% damping	PSa Median - 1.σ for 5% damping	S_d Median for 5% damping	User defined: 5% Damping: PSa Median for 5% damping	PSa Median + 1.σ for 5 % damping	PSa Median - 1.σ for 5 % damping	Sd Median for 5 % damping
	0.01	0.2833285	0.4851066	0.165479	0.000703	0.283328	0.4851066	0.165479	0.000703
	0.02	0.2821474	0.4838222	0.164538	0.002802	0.282147	0.4838222	0.164538	0.002802
	0.03	0.2864756	0.4938291	0.166188	0.0064	0.286189	0.4933353	0.166021	0.006394
	0.05	0.315272	0.5501652	0.180666	0.019566	0.315272	0.5501652	0.180666	0.019566
	0.075	0.3743691	0.6603732	0.212232	0.052274	0.375492	0.6623544	0.212869	0.052431
	0.1	0.4333125	0.7634532	0.245935	0.107564	0.435046	0.7665071	0.246919	0.107994
	0.15	0.5323882	0.9228115	0.307145	0.297356	0.533985	0.9255799	0.308067	0.298248
	0.2	0.6011626	1.0358976	0.348873	0.596923	0.602966	1.0390053	0.349919	0.598714
	0.25	0.6426751	1.1138511	0.370814	0.997098	0.64396	1.1160788	0.371555	0.999092
	0.3	0.6615684	1.1663009	0.375266	1.478031	0.662892	1.1686335	0.376016	1.480987
	0.4	0.6499024	1.1761892	0.359103	2.581276	0.651202	1.1785416	0.359821	2.586439
	0.5	0.6163346	1.1405614	0.333054	3.824925	0.616951	1.141702	0.333387	3.82875
	0.75	0.4849809	0.9338658	0.251863	6.771946	0.484981	0.9338658	0.251863	6.771946
	1	0.3953885	0.7764017	0.201355	9.815002	0.395389	0.7764017	0.201355	9.815002
	1.5	0.2908823	0.5792255	0.146079	16.24674	0.291173	0.5798047	0.146225	16.26298
	2	0.2260518	0.4527272	0.11287	22.44576	0.225826	0.4522745	0.112757	22.42331
	3	0.1592467	0.3196624	0.079332	35.57783	0.159247	0.3196624	0.079332	35.57783
	4	0.1211809	0.2408684	0.060966	48.1305	0.12106	0.2406275	0.060905	48.08237
	5	0.0933096	0.1858565	0.046846	57.90724	0.093123	0.1854848	0.046753	57.79143
	7.5	0.0526709	0.1046259	0.026516	73.54607	0.052408	0.1041028	0.026383	73.17834
	10	0.0313259	0.0616432	0.015919	77.76235	0.031169	0.061335	0.01584	77.37354
PGA (g)	0	0.2819284	0.4823391	0.164788	0.0007	0.283328	0.4851066	0.165479	0.000703
PGV (cm/s)	-1	43.750617	78.583093	24.35787	0.108605	NA	NA	NA	NA

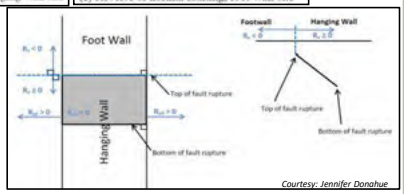
PSa (g), S_d (cm)











Courtesy: Jennifer Donahue

Definition of Parameters

Damping ratio = Viscous damping ratio (%) See Sanaz et al. (2012) PEER Report
PSA = Pseudo-absolute acceleration response spectrum (g)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
S_d = Relative displacement response spectrum (cm)
M_w = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in ASK13, CB13 and CY13. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km). See Figures a, b and c for illustation
R_{y0} = The horizontal distance off the end of the rupture measured parallel to strike (km)
V_{S30} = The average shear-wave velocity (m/s) over a subsurface depth of 30 m
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise
Dip = Average dip of rupture plane (degrees)
Z_{TOR} = Depth to top of coseismic rupture (km)
Z_{HYP} = Hypocentral depth from the earthquake
$Z_{1.0}$ = Depth to Vs=1 km/sec
$Z_{2.5}$ = Depth to Vs=2.5 km/sec
W = Fault rupture width (km)
$V_{s30flag}$ = 1 for measured, 0 for inferred Vs30
F_{AS} = 0 for mainshock; 1 for aftershock
Region = Specific regions considered in the models, Click on Region to see codes
ΔDPP = Directivity term, direct point parameter; uses 0 for median predictions
PGA_r (g) = Peak ground acceleration on rock (g), this specific cell is updated in the cell for BSSA14 and CB14, for others it is taken account for in the macros
Z_{BOT} (km) = The depth to the bottom of the seismogenic crust
Z_{BOR} (km) = The depth to the bottom of the rupture plane
SS = 1 for strike slip, automatically updated in the cell

Input variables with defaults (If entered 999 as input):

Red colored value: The value is used in the code when input is unknown

DEFAULTs	USER defined	ASK14	BSSA14	CB14	CY14	I14
W (km)	999.00			15.000		
$Z_{1.0}$ (km)	999.000	0.457			0.464	
$\delta Z_{1.0}$ (km)	0.000		0.000			
$Z_{2.5}$ (V_{S30}=1100)(km)	999.000			0.398		
$Z_{2.5}$ (V_{S30})(km)	999.000			1.802		
Z_{TOR} (km)	999.00			10.227		
Z_{HYP} (km)	999.00			0.000	0.000	
Z_{BOR} (km)	-			15.000		

ACKNOWLEDGEMENTS

Nick Gregor, Bechtel
Silvia Mazzoni, Consultant

All NGA West-2 participants are acknowledged for their constructive comments and feedback.

PACIFIC EARTHQUAKE ENGINEERING RESEARCH CENTER

WEIGHTED AVERAGE of 2014 NGA WEST-2 GMPEs

Last updated: 04 14 15

by Emel Seyhan, PhD, PEER & UCLA -- email: emel.seyhan@gmail.com, peer_center@berkeley.edu

This excel file will be updated as necessary on the PEER website to fix any typos or other errors. Please check the website frequently for new versions at: http://peer.berkeley.edu/ngawest2/databases/

Legend	Pre-defined option	Main input variable	Calculated variable	Input var. flag	Internal variable

GMPE averaging	Geometric

Weighted average of the natural logarithm of the spectral values

GMPEs	ASK14	BSSA14	CB14	CY14	I14
Weight	0.25	0.25	0.25	0.25	0

# of std. dev.	1
Damping ratio (%)	5

Modification factors are calculated in Sheet DSF

ASK14 Abrahamson & Silva & Kamai 2014 NGA West-2 Model
BSSA14 Boore & Stewart & Seyhan & Atkinson 2014 NGA West-2 Model
CB14 Campbell & Bozorgnia 2014 NGA West-2 Model
CY14 Chiou & Youngs 2014 NGA West-2 Model
I14 Idriss 2014 NGA West-2 Model

RotD50 Horizontal Component of PGA, PGV and *IMs*

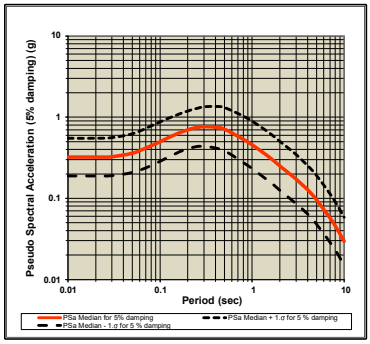
Input variables | **Errors and warnings**

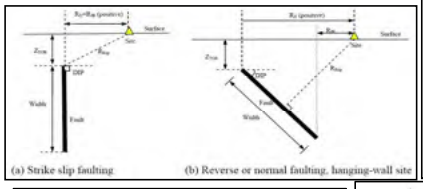
M_w	7.75
R_{RUP} (km)	13.48
R_{JB} (km)	13.48
R_X (km)	13.48
Ry0 (km)	999 *If unknown use 999*
V_{S30} (m/sec)	293.5
U (BSSA13)	0 *1: Unspecified fault mech.*
F_{RV}	0 *1: reverse fault*
F_{NM}	0 *1: normal fault*
F_{HW}	0 *1: hanging wall side*
Dip (deg)	90
Z_{TOR} (km)	999 *If unknown use 999*
Z_{HYP} (km)	999 *If unknown use 999*
$Z_{1.0}$ (km)	999 *If unknown use 999*
$Z_{2.5}$ (km)	999 *If unknown use 999*
W (km)	999 *If unknown use 999*
Vs30Flag	measured *Choose options for V_{s30} from the list*
F_{AS}	no *Aftershock effect is not applicable.*
Region	California *Choose region from the list*

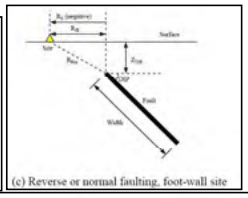
Calculated Variables/Flags

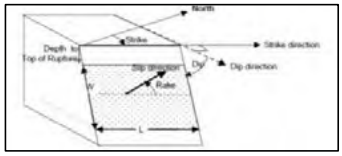
ΔDPP	0 *Always 0 for median calcs.*
PGA_r (g)	0.259
Z_{BOT} (km) (CB14)	15 *Enter for default W calcs*
SS	1 *auto calculated*
$V_{s30Flag}$	1 *measured*
F_{AS}	0 *Aftershock effect is not applicable.*
Region	0 *California*
Option for Sa value	1 *Weighted average of the natural logarithm of the spectral values*

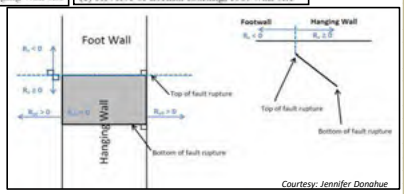
GMP	T (s)	Baseline: 5% Damping PSa Median for 5% damping	PSa Median + 1.σ for 5% damping	PSa Median - 1.σ for 5% damping	S_d Median for 5% damping	User defined: 5% Damping PSa Median for 5% damping	PSa Median + 1.σ for 5 % damping	PSa Median - 1.σ for 5 % damping	Sd Median for 5 % damping
PSa (g), S_d (cm)	0.01	0.3236477	0.551198	0.190037	0.000803	0.323648	0.551198	0.190037	0.000803
	0.02	0.3230239	0.5508955	0.189409	0.003207	0.323024	0.5508955	0.189409	0.003207
	0.03	0.3282293	0.5624769	0.191536	0.007333	0.327901	0.5619145	0.191344	0.007326
	0.05	0.361657	0.6270746	0.208581	0.022444	0.361657	0.6270746	0.208581	0.022444
	0.075	0.4307644	0.7548069	0.245835	0.060149	0.432057	0.7570714	0.246573	0.060329
	0.1	0.5001884	0.8750856	0.285902	0.124165	0.501689	0.8777108	0.286759	0.124538
	0.15	0.6193404	1.0653653	0.360048	0.345922	0.620579	1.067496	0.360768	0.346614
	0.2	0.699931	1.1970877	0.409246	0.694995	0.701331	1.1994819	0.410065	0.696385
	0.25	0.7466071	1.285178	0.433731	1.158346	0.7481	1.2877483	0.434599	1.160663
	0.3	0.7665928	1.3433792	0.437453	1.71267	0.768126	1.3460659	0.438327	1.716095
	0.4	0.7536151	1.3580922	0.418186	2.993201	0.755122	1.3608084	0.419023	2.999188
	0.5	0.7127063	1.3145644	0.386402	4.423	0.713419	1.3158789	0.386788	4.427423
	0.75	0.5589094	1.0740727	0.290837	7.804234	0.558909	1.0740727	0.290837	7.804234
	1	0.4569073	0.8960151	0.232992	11.34213	0.456907	0.8960151	0.232992	11.34213
	1.5	0.3286153	0.6539489	0.165132	18.35425	0.328944	0.6546029	0.165297	18.37261
	2	0.2520339	0.5046424	0.125873	25.02564	0.25153	0.5036332	0.125622	24.97559
	3	0.1726799	0.346616	0.086027	38.57898	0.17268	0.346616	0.086027	38.57898
	4	0.1277801	0.2539849	0.064286	50.7516	0.127652	0.2537309	0.064222	50.70084
	5	0.0962813	0.1917755	0.048338	59.75141	0.095992	0.1912002	0.048193	59.57216
	7.5	0.0511949	0.1016939	0.025773	71.48507	0.05099	0.1012872	0.025669	71.19913
	10	0.0298694	0.058777	0.015179	74.14675	0.02975	0.0585419	0.015118	73.85016
PGA (g)	0	0.3219997	0.5479736	0.189213	0.000799	0.323648	0.551198	0.190037	0.000803
PGV (cm/s)	-1	49.076686	88.039527	27.35727	0.121826	NA	NA	NA	NA











Courtesy: Jennifer Donahue

Definition of Parameters

Damping ratio = Viscous damping ratio (%) See Sanaz et al. (2012) PEER Report
PSA = Pseudo-absolute acceleration response spectrum (g)
PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
S_d = Relative displacement response spectrum (cm)
M_w = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in ASK13, CB13 and CY13. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km). See Figures a, b and c for illustation
R_{y0} = The horizontal distance off the end of the rupture measured parallel to strike (km)
V_{S30} = The average shear-wave velocity (m/s) over a subsurface depth of 30 m
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise
Dip = Average dip of rupture plane (degrees)
Z_{TOR} = Depth to top of coseismic rupture (km)
Z_{HYP} = Hypocentral depth from the earthquake
$Z_{1.0}$ = Depth to Vs=1 km/sec
$Z_{2.5}$ = Depth to Vs=2.5 km/sec
W = Fault rupture width (km)
$V_{s30flag}$ = 1 for measured, 0 for inferred Vs30
F_{AS} = 0 for mainshock; 1 for aftershock
Region = Specific regions considered in the models, Click on Region to see codes
ΔDPP = Directivity term, direct point parameter; uses 0 for median predictions
PGA_r (g) = Peak ground acceleration on rock (g), this specific cell is updated in the cell for BSSA14 and CB14, for others it is taken account for in the macros
Z_{BOT} (km) = The depth to the bottom of the seismogenic crust
Z_{BOR} (km) = The depth to the bottom of the rupture plane
SS = 1 for strike slip, automatically updated in the cell

Input variables with defaults (If entered 999 as input):

Red colored value: The value is used in the code when input is unknown

DEFAULTs	USER defined	ASK14	BSSA14	CB14	CY14	I14
W (km)	999.00			15.000		
$Z_{1.0}$ (km)	999.000	0.457			0.464	
$\delta Z_{1.0}$ (km)	0.000		0.000			
$Z_{2.5}$ (V_{S30}=1100)(km)	999.000			0.398		
$Z_{2.5}$ (V_{S30})(km)	999.000			1.802		
Z_{TOR} (km)	999.00			10.227		
Z_{HYP} (km)	999.00			0.000	0.000	
Z_{BOR} (km)	-			15.000		

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PACIFIC EARTHQUAKE ENGINEERING RESEARCH CENTER

WEIGHTED AVERAGE of 2014 NGA WEST-2 GMPEs

Last updated: 04 14 15

by Emel Seyhan, PhD, PEER & UCLA -- email: emel.seyhan@gmail.com, peer_center@berkeley.edu

This excel file will be updated as necessary on the PEER website to fix any typos or other errors. Please check the website frequently for new versions at: http://peer.berkeley.edu/ngawest2/databases/

Legend	Pre-defined option	Main input variable	Calculated variable	Input var. flag	Internal variable

GMPE averaging	Geometric	*Weighted average of the natural logarithm of the spectral values*

GMPEs	ASK14	BSSA14	CB14	CY14	I14
Weight	0.25	0.25	0.25	0.25	0

# of std. dev.	1	
Damping ratio (%)	5	*Modification factors are calculated in Sheet DSF*

ASK14 Abrahamson & Silva & Kamai 2014 NGA West-2 Model
BSSA14 Boore & Stewart & Seyhan & Atkinson 2014 NGA West-2 Model
CB14 Campbell & Bozorgnia 2014 NGA West-2 Model
CY14 Chiou & Youngs 2014 NGA West-2 Model
I14 Idriss 2014 NGA West-2 Model

Input variables | **Errors and warnings**

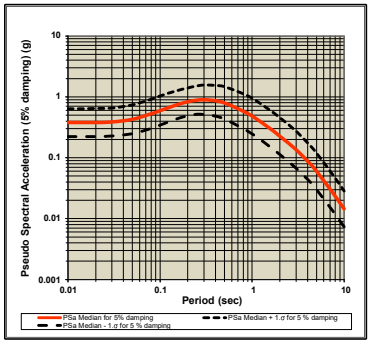
M_w	6.75
R_{RUP} (km)	6.14
R_{JB} (km)	6.14
R_X (km)	6.14
Ry0 (km)	999 *If unknown use 999*
V_{S30} (m/sec)	293.5
U (BSSA13)	0 *1: Unspecified fault mech.*
F_{RV}	0 *1: reverse fault*
F_{NM}	0 *1: normal fault*
F_{HW}	0 *1: hanging wall side*
Dip (deg)	90
Z_{TOR} (km)	999 *If unknown use 999*
Z_{HYP} (km)	999 *If unknown use 999*
$Z_{1.0}$ (km)	999 *If unknown use 999*
$Z_{2.5}$ (km)	999 *If unknown use 999*
W (km)	999 *If unknown use 999*
Vs30flag	measured *Choose options for V_{s30} from the list*
F_{AS}	no *Aftershock effect is not applicable.*
Region	California *Choose region from the list*

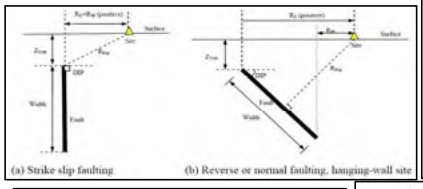
Calculated Variables/Flags

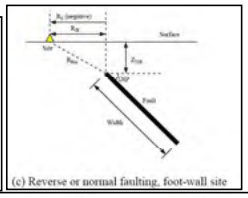
ΔDPP	0 *Always 0 for median calcs.*
PGA_r (g)	0.301
Z_{BOT} (km) (CB14)	15 *Enter for default W calcs*
SS	1 *auto calculated*
$V_{s30flag}$	1 *measured*
F_{AS}	0 *Aftershock effect is not applicable.*
Region	0 *California*
Option for Sa value	1 *Weighted average of the natural logarithm of the spectral values*

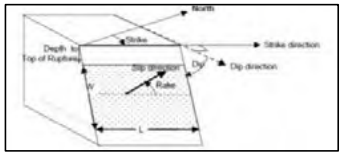
RotD50 Horizontal Component of PGA, PGV and *IMs*

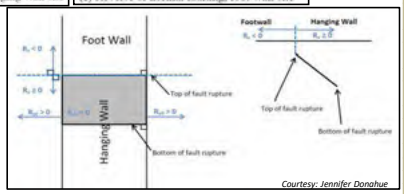
GMP	T (s)	Baseline: 5% Damping: PSa Median for 5% damping	PSa Median + 1.σ for 5% damping	PSa Median - 1.σ for 5% damping	S_a Median for 5% damping	User defined: 5% Damping: PSa Median for 5% damping	PSa Median + 1.σ for 5 % damping	PSa Median - 1.σ for 5 % damping	Sd Median for 5 % damping
PSa (g), S_d (cm)	0.01	0.3800029	0.6431229	0.224533	0.000943	0.380003	0.6431229	0.224533	0.000943
	0.02	0.3811991	0.6458771	0.224985	0.003785	0.381199	0.6458771	0.224985	0.003785
	0.03	0.3884517	0.6609105	0.228313	0.008679	0.388452	0.6609105	0.228313	0.008679
	0.05	0.429942	0.7398428	0.249851	0.026682	0.429942	0.7398428	0.249851	0.026682
	0.075	0.5134583	0.8929952	0.295231	0.071696	0.514485	0.8947812	0.295821	0.071839
	0.1	0.5970556	1.0364186	0.343949	0.148211	0.59825	1.0384914	0.344637	0.148508
	0.15	0.740511	1.2629565	0.434185	0.4136	0.741992	1.2654824	0.435053	0.414427
	0.2	0.83245	1.4119004	0.490809	0.826579	0.833282	1.4133123	0.491299	0.827406
	0.25	0.885218	1.512736	0.518009	1.373399	0.887874	1.5172742	0.519563	1.377519
	0.3	0.901044	1.5697004	0.51722	2.013051	0.901945	1.5712701	0.517737	2.015064
	0.4	0.8663445	1.5562376	0.482287	3.440939	0.867211	1.5577939	0.482769	3.44438
	0.5	0.8010339	1.4748206	0.435073	4.971154	0.801835	1.4762955	0.435509	4.976126
	0.75	0.6111185	1.1744314	0.317997	8.533247	0.611119	1.1744314	0.317997	8.533247
	1	0.4854499	0.952784	0.24734	12.05066	0.484964	0.9518312	0.247093	12.03861
	1.5	0.3173662	0.632522	0.159238	17.72595	0.317684	0.6331545	0.159397	17.74367
	2	0.2269466	0.4552307	0.11314	22.53461	0.226493	0.4543203	0.112914	22.48954
	3	0.1362336	0.2739705	0.067743	30.43638	0.136097	0.2736965	0.067675	30.40594
	4	0.0883614	0.1759633	0.044371	35.0953	0.088273	0.1757874	0.044327	35.0602
	5	0.0602279	0.1201874	0.030181	37.37698	0.059987	0.1197067	0.03006	37.22747
	7.5	0.0265016	0.0527405	0.013317	37.00511	0.026449	0.052635	0.01329	36.9311
	10	0.014618	0.028818	0.007415	36.28731	0.01456	0.0287027	0.007385	36.14216
PGA (g)	0	0.3779404	0.6391511	0.223482	0.000938	0.380003	0.6431229	0.224533	0.000943
PGV (cm/s)	-1	48.512631	86.889368	27.08588	0.120426	NA	NA	NA	NA











Courtesy: Jennifer Donahue

Definition of Parameters

Damping ratio = Viscous damping ratio (%) See Sanaz et al. (2012) PEER Report
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PGA = Peak ground acceleration (g)
PGV = Peak ground velocity (cm/s)
S_d = Relative displacement response spectrum (cm)
M_w = Moment magnitude
R_{RUP} = Closest distance to coseismic rupture (km), used in ASK13, CB13 and CY13. See Figures a, b and c for illustation
R_{JB} = Closest distance to surface projection of coseismic rupture (km). See Figures a, b and c for illustation
R_X = Horizontal distance from top of rupture measured perpendicular to fault strike (km). See Figures a, b and c for illustation
R_{y0} = The horizontal distance off the end of the rupture measured parallel to strike (km)
V_{S30} = The average shear-wave velocity (m/s) over a subsurface depth of 30 m
U = Unspecified-mechanism factor: 1 for unspecified; 0 otherwise
F_{RV} = Reverse-faulting factor: 0 for strike slip, normal, normal-oblique; 1 for reverse, reverse-oblique and thrust
F_{NM} = Normal-faulting factor: 0 for strike slip, reverse, reverse-oblique, thrust and normal-oblique; 1 for normal
F_{HW} = Hanging-wall factor: 1 for site on down-dip side of top of rupture; 0 otherwise
Dip = Average dip of rupture plane (degrees)
Z_{TOR} = Depth to top of coseismic rupture (km)
Z_{HYP} = Hypocentral depth from the earthquake
$Z_{1.0}$ = Depth to Vs=1 km/sec
$Z_{2.5}$ = Depth to Vs=2.5 km/sec
W = Fault rupture width (km)
$V_{s30flag}$ = 1 for measured, 0 for inferred Vs30
F_{AS} = 0 for mainshock; 1 for aftershock
Region = Specific regions considered in the models, Click on Region to see codes
ΔDPP = Directivity term, direct point parameter; uses 0 for median predictions
PGA_r (g) = Peak ground acceleration on rock (g), this specific cell is updated in the cell for BSSA14 and CB14, for others it is taken account for in the macros
Z_{BOT} (km) = The depth to the bottom of the seismogenic crust
Z_{BOR} (km) = The depth to the bottom of the rupture plane
SS = 1 for strike slip, automatically updated in the cell

Input variables with defaults (If entered 999 as input):

Red colored value: The value is used in the code when input is unknown

DEFAULTs	USER defined	ASK14	BSSA14	CB14	CY14	I14
W (km)	999.00			14.576		
$Z_{1.0}$ (km)	999.000	0.457			0.464	
$\delta Z_{1.0}$ (km)	0.000		0.000			
$Z_{2.5}$ (V_{S30}=1100)(km)	999.000			0.398		
$Z_{2.5}$ (V_{S30})(km)	999.000			1.802		
Z_{TOR} (km)	999.00			10.650		
Z_{HYP} (km)	999.00			0.424	0.424	
Z_{BOR} (km)	-			15.000		

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