Appendix H

Geotechnical Exploration Report

GEOTECHNICAL EXPLORATION
PROPOSED GATEWAY AVIATION CENTER-
MERIDIAN PARK D-1
SW OF HEACOCK STREET AND IRIS AVENUE
MARCH AIR RESERVE BASE, MORENO VALLEY
CALIFORNIA

Prepared for

MERIDIAN PARK LLC
1156 North Mountain Avenue
Upland, California 91786

Project No. 12762.002

October 19, 2020

Updated May 3, 2021

Leighton Consulting, Inc.
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Meridian Park LLC
1156 North Mountain Avenue
Upland, California 91786

Attention: Mr. Timothy Reeves

Subject: Geotechnical Exploration
Proposed Gateway Aviation Center- Meridian Park D-1
SW of Heacock Street and Iris Avenue
March Air Reserve Base, Moreno Valley, California

In accordance with your request, we are pleased to provide this geotechnical exploration report for the subject project summarizing our findings, conclusions and providing recommendations regarding the design and construction of the proposed development. Based on the results of our findings and conclusions, it is our opinion that the site is generally suitable for the intended use provided the recommendations included in herein are implemented during design and construction phases of development. However, it should be noted that additional geotechnical evaluations and/or reviews might be required based on final site development/grading plans and corrective actions recommended herein. *Please note that this update report is prepared to include the additional PCC pavement associated with the offsite taxiway as shown on Figure 2b.*

If you have any questions regarding this report, please do not hesitate to contact the undersigned. We appreciate this opportunity to be of service on this project.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

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1.0 INTRODUCTION

1.1 Purpose and Scope

This geotechnical exploration is for the proposed commercial development referred to as Gateway Aviation Center/Meridian Park D-1, located generally southwest of the intersection of Heacock Street and Iris Avenue, within March Air Reserve Base, California (see Figure 1). Our scope of services for this exploration included the following:

- Review of available site-specific geologic information and Preliminary Site Plan by RGA.
- Coordination of our site access and exploration with representatives of March Air Force Base.
- A site reconnaissance and excavation of twenty-three (23) exploratory borings. Approximate locations of these geotechnical borings are depicted on the *Boring Location Map (Figure 2)*. The logs of exploratory borings are presented in Appendix A.
- Geotechnical laboratory testing of selected soil samples collected during this exploration. Test results are presented in Appendix B.
- Geotechnical engineering analyses performed or as directed by a California registered Geotechnical Engineer (GE) and reviewed by a California Certified Engineering Geologist (CEG).
- Preparation of this report which presents our geotechnical conclusions and recommendations regarding the proposed structures.

This report is not intended to be used as an environmental assessment (Phase I or other), or grading/foundation plan review.

1.2 Site and Project Description

The site is located in southern Moreno Valley area, generally southwest of the intersection of Heacock Street and Iris Avenue within the southern portion of March Air Reserve Base, California (see Figure 1, Site Location Map). Topographically, the site is relatively flat with two small drainages draining gently in a southeastern direction. The site, as depicted on Figure 2a, is currently undeveloped and vacant land covered with small vegetative growth and seasonal weeds. The overall site/County Assessor Parcel Number (APN) 294-170-010 is surrounded to the West and north by March Air Reserve Base, to the east and south by industrial warehouses and vacant parcels. An area known as “Site 7” is located in the eastern portion of the site in which past firefighting training exercises were conducted. The easterly portion of Site 7 that includes “fire pits”/Areas 1, 2, and 5 are currently considered “Not-A-Part” of this exploration work (See Figure 2a and 2b for site delineation).

As per the site development plan (see Figure 2a), the project will include a proposed 201,200 square foot (SF) industrial warehouse building and a 70,140 SF maintenance building along with associated improvements such as commercial cargo aircraft parking and taxiway to be designed in accordance with FAA standards. Commercial truck and employee access roadways and parking will also be provided along with other hardscape improvements. *We also understand that the project will also include improvements to Taxiway A to Taxiway C corners to accommodate larger U.S. Air Force aircraft access to the March ARB tarmac and facilities (see Figure 2b)*. Grading plans were not provided as of the date of this report; however, we anticipate cut and fill grading of less than 5 feet to create finish site grades. Structural loads are expected to be less than 150 kips per column load and 10 kips/LF of continuous wall footing. If site development plans significantly differ from those described herein, the report should be subject to further review and evaluation.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration consisted of the excavation of twenty-three (23) hollow stem borings located generally in areas of planned building and hardscape areas to provide basis for earthwork grading, foundation and pavement design. All explorations were conducted in accordance of the requirements of the Technical Memorandum for Waste Management Related to Geotechnical Investigation (Leighton, 2020). Two borings (LB-22 & LB-23) were located within Areas 3 and 4 identified as "burn Pits" by previous studies by CH2M (CH2M, 2017 & 2020). During exploration, relatively undisturbed and disturbed/bulk samples were collected for further laboratory testing and evaluation. Approximate locations of these explorations are depicted on the *Boring Location Map* (see Figure 2a). Sampling was conducted by a staff geologist from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation. LB-8 and LB-16 through LB-23 were backfilled with concrete and bentonite grout to within three feet of the surface and hydrated bentonite chips were used to complete backfill. LB-15 was backfilled to the surface with hydrated bentonite chips. Cuttings from LB-8 and LB-16 through LB-23 were contained in 50-gallon drums and stored on-site. Between each sample the sampler/rings were decontaminated using non phosphate detergent. After completion of each borehole, the augers and drill pipe used were steam cleaned prior to their next use. Decontamination water was collected and stored on-site in 50-gallon drums. A Photo-ionization detector (PID) was used to take metered air readings of the worker's breathing zones. A 4-gas meter was used to take air readings in the completed bore of borings LB-1 and LB-2 for tunnel classification of proposed jack and bore activities. The exploration logs from this exploration are provided in Appendix A.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of earthwork control and foundation design. The laboratory testing program included in-situ density and moisture content, maximum density and moisture content relationship, expansion index, R-value, California Bearing Ratio (CBR), collapse potential, sieve analysis, soluble sulfate content, chloride content and minimum resistivity. The results of our laboratory testing are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent natural geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the proposed site is located within the relatively stable Perris Block.

The Perris Block, approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally mantle crystalline bedrock, consisting of the Val Verde Tonalite (Kvt) and lesser amounts of Cretaceous granitic dikes (Kg).

3.2 Site Specific Geology

3.2.1 Earth Materials

Our field exploration, observations, and review of the pertinent literature indicate that the site include is underlain by localized younger alluvial materials, older alluvium and granitic bedrock at depth. A more detailed description of each unit is provided on the logs of borings in Appendix A.

- **Undocumented Fill:** Undocumented fill materials are the result of previous test pit and trench excavations by others (CH2M) and “burn pit” backfill. Two reported “burn pits” (Area 3 & Area 4, see Figure 2a) were evaluated during this study and found to contain loose silty sand to silty sand with gravel to depths up to 7.5 feet below ground surface (BGS). Previous trench excavations were report up to 7 feet deep and contained metal debris and small amount of concrete rubble (CH2M, Nov. 2017).
- **Quaternary Alluvium:** Younger alluvial materials were encountered throughout the site from the surface to depths ranging from approximately 2.5 to 10-feet below the existing grade. The younger alluvial materials generally consist of silty sand (SM) and lessor amounts of clayey sands (SC-SM) to well-graded sands (SW-SM). The younger alluvium is expected to generally possess a low expansion potential (EI<51).
- **Older Alluvium:** Older alluvial soils were encountered in all borings. As encountered, these soils generally consist of medium dense to very dense silty to clayey sand (SM/SC) and localized layers of sandy silt to sandy clay

(ML/CL). This older alluvium is expected to generally possess a low expansion potential (EI<51) and collapse potential up to 3.4%.

- **Granitic Bedrock:** Bedrock was encountered at a depth of 40-feet below the existing ground surface in LB-8. As encountered, the bedrock was moderately weathered and was recovered as well-graded sand with silt and varying amounts of gravel (SW-SM).

3.3 Groundwater and Surface Water

Groundwater was encountered during this exploration at a depth of approximately 20 feet (LB-8) below existing ground surface (bgs) and 14.5 feet bgs (LB-15). Historic groundwater data, as reported by Department of Water Resource (DWR) data for Well 338731N1172168W001 located approximately 1.5 miles east of the subject site, reflect a groundwater elevation of 1,476 feet (about 19 feet below site elevation) in March 2020. According to West San Jacinto Groundwater Management Plan, 2016 Annual Report, the groundwater elevation in the subject site vicinity are at the range of 1,520 feet msl (about 32 feet below site elevation). Surface water was not observed onsite during our exploration.

3.4 Regional Faulting and Fault Activity

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional fault systems such as the San Andreas, San Jacinto, and Elsinore Fault Zones. Based on published geologic hazard maps, this site is not located within a currently designated Alquist-Priolo (AP) Earthquake Fault Zone; nor is located within a County Fault Zone.

3.5 Seismicity

As is common for virtually all of Southern California, strong ground shaking can be expected at the site during moderate to severe earthquakes in this general region. Intensity of ground shaking at a given location depends primarily upon earthquake magnitude, site distance from the source, and site response (soil type) characteristics. The seismic coefficients were calculated utilizing an interactive program on current United States Geological Survey (USGS) website using ASCE 7-16 procedures, as well as USGS Unified Hazard Maps. Based on our explorations and review, the site will be underlain by alluvial materials and granitic bedrock materials at depth. As such, the site is classified as a Class D site, and the site-specific seismic coefficients following this USGS general procedure are as listed in the following table:

Table 1. 2019 CBC Seismic Coefficients per USGS General Procedure

	Site Seismic Coefficients / Coordinates	Value
	Latitude	**33.8763**
	Longitude	**-117.2488**
Mapped Spectra (OSHPD)	Spectral Response – Class D (short), S_S	1.50
	Spectral Response – Class D (1 sec), S_1	0.60
	Site Modified Peak Ground Acceleration, PGA_M	0.59
	Max. Considered Earthquake Spectral Response Acceleration (short), S_{MS}	1.50
	Max. Considered Earthquake Spectral Response Acceleration – (1 sec), S_{M1}	1.02
	5% Damped Design Spectral Response Acceleration (short), SDS	1.00
	5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.68
	Peak Ground Acceleration, PGA	0.53

g = Gravity acceleration

3.6 Tunnel Classification

A potential bore-and-Jack tunnel excavation may be performed in the vicinity of boring LB-1 and LB-2 (See Figure 2a). Tunnel Classification was performed in general accordance with California Department of Industrial Relations, Division of Industrial Safety (Cal/OSHA), Code of Regulations (CCR), Title 8, Chapter 4, Subchapter 20, Article 8, Section 8422. The borehole at the proposed jack-and-bore locations were “sniffed” with a standard 4-gas meter device to detect hazardous gasses that may emanate from the boreholes or samples. Based on the results of this testing, we did not detect flammable gas or petroleum vapors (i.e. concentration >5 percent of the lower explosive limit, LEL) in our borings during drilling. In addition, we are unaware of any oil and/or natural gas production in the immediate vicinity of these pits/shafts. In accordance with Cal/OSHA requirements, this proposed trenchless portion of the alignment may be classified as non-gassy. However, natural gas concentrations should be carefully monitored within excavated pits and bored tunnel during pipeline construction.

3.7 Secondary Seismic Hazards

Ground shaking can induce “secondary” seismic hazards such as liquefaction, dynamic densification, lateral spreading, flooding, seiche/tsunami, and ground rupture, as discussed in the following subsections:

3.7.1 Dynamic Settlement (Liquefaction and/or Dry Settlement)

Riverside County Geologic Hazards maps indicate that the site is located in a zone of high liquefaction potential (see Figure 4). However, liquefaction-induced or dynamic dry settlement is not expected to be a significant hazard at this site due to the absence of near surface saturated sand layers and underlying dense older alluvium and granitic bedrock. Our analysis of dynamic settlement due to ground shaking based on PGA of 0.53g with a moment magnitude of 7.0 Mw is estimated to be less than 1 inch. This settlement is expected to be generally global and over a large area. As such, the seismic differential settlement is not expected to exceed 0.5-inch in a 40-foot horizontal distance for the proposed buildings.

3.7.2 Collapsible Soils

Laboratory testing indicates that the onsite soils/alluvium in the eastern portion of the site (east of LB-13/LB-19) are expected to possess a moderate collapse potential (generally up to 3.4 percent). This collapse potential can be as high as 6 percent as found in burn pit of Area 4 (LB-23 at 7.5 feet BGS). Based on our laboratory test results the collapse settlement is estimated to be as follows:

- Former Burn Pits (Areas 3 and 4)- up to 8 inches of alluvium/fill settlement.
- Elsewhere/east of LB-13/LB-19: up to 4 inches of settlement.

3.7.3 Expansive Soils

Limited laboratory testing indicated that onsite soils generally possess a very low expansion potential (EI<21). However, due to the silty to clayey sand, low expansive potential (EI <51) soils may be encountered. The mitigation for this geologic hazard is presented in Section 4 of this report.

3.7.4 Ground Rupture

Since this site is not located within a mapped Fault Zone, the possibility of ground surface-fault-rupture is very low at this site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based on the results of this exploration, it is our opinion that the site is generally suitable for the proposed development from a geotechnical viewpoint. The major geotechnical concerns associated with site development/grading is the presence of potentially contaminated soils within Area 7 potion of the site (especially former burn pits delineated as Areas 3 and 4). In addition, the upper 10 to 15 feet of site soils (fill and alluvium) in the eastern portion of the site (specifically burn pits areas and Maintenance Building) are relatively loose and possess slight to moderate collapse potential (up to 6 percent). As such, specific remedial grading and/or ground improvement measure will be required to reduce the potential for detrimental post construction settlement.

4.2 Earthwork

Earthwork should be performed in accordance with the General Earthwork and Grading Specifications in Appendix D as well as the following recommendations. The recommendations contained in Appendix D, are general grading specifications provided for typical grading projects and some of the recommendations may not be strictly applicable to this project. The specific recommendations contained in the text of this report supersede the general recommendations in Appendix D.

The contract between the developer and earthwork contractor should be worded such that it is the responsibility of the contractor to place fill properly in accordance with the recommendations of this report, the specifications in Appendix D, applicable County Grading Ordinances, notwithstanding the testing and observation of the geotechnical consultant during construction.

4.2.1 Site Preparation and Remedial Grading

Prior to grading, the proposed structural improvement areas (i.e. all-structural fill areas, pavement areas, buildings, etc.) should be cleared of surface and subsurface pipelines and obstructions. Heavy vegetation, roots and debris should be disposed of offsite. Any onsite wells or septic waste system should be removed or abandoned in accordance with the Riverside Country Department of Environmental Health. Voids created by removal of buried/unsuitable materials should be backfilled with properly compacted soil in general accordance with the recommendations of this report. To reduce the potential for excessive differential settlement, we recommend that the

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existing soils be removed and re-compacted (R&R) / over-excavated (OX) as described below

D-1 Building: The depth of R&R should extend a minimum of 5 feet BGS or 3 feet below bottom of footings, whichever is deeper. Post construction settlement is expected to be 1-inch total and 0.5-inch differential in 40 feet.

Maintenance Building: The depth of R&R should extend a minimum of 7.5 feet BGS or 5 feet below bottom of footings, whichever is deeper. Post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet.

AC/PCC Pavement West of LB-13/LB-19: The depth of R&R should extend a minimum of 2 feet BGS or design soil subgrade elevation, whichever is deeper. Post construction settlement is expected to be 1-inch total and 0.5-inch differential in 40 feet. These same recommendations also apply to the reconstruction and widening of the Taxiway A to Taxiway C corners, known as Work Area 1 addition (see Figure 2b).

AC/PCC Pavement East of LB-13/LB-19: The depth of R&R should extend a minimum of 3 feet BGS or design soil subgrade, whichever is deeper. Post construction settlement is expected to be 4-inch total and 2-inch differential in 40 feet. Alternatively, if the depth of R&R extends to a minimum of 7 feet BGS or 5 below finish subgrade, whichever is deeper, then post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet.

Burn Pit Areas 3 & 4: The depth of R&R should extend a minimum of 10 feet BGS or finish subgrade, whichever is deeper. Post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet. Soils removed from within the burn pit areas may need to be disposed of as recommended in the environmental site assessment/soil management plan documents and replace with clean suitable backfill soils. Alternatively, other ground improvement methods such as compaction grouting and dynamic deep compaction may need to be considered if these potentially contaminated soils are to remain in place.

The removal limit should be established by a 1:1 (horizontal:vertical) projected down and away from the edge of fill soils or footings supporting structural fill or settlement-sensitive structures to a competent material identified by the geotechnical consultant. This may require remedial grading that extends beyond the limits of design grading. Removal will also include benching into competent material as the fills rise. Areas adjacent to existing property limits or protected habitat areas may require special considerations and monitoring. Steeper temporary slopes in these areas may be considered.

After completion of the recommended removal of unsuitable soils and prior to fill placement, the exposed surface should be scarified to a minimum depth of 8-inches, moisture conditioned as necessary to optimum moisture content and compacted using heavy compaction equipment to an unyielding condition. All structural fill should be compacted throughout to 90 percent of the ASTM D 1557 laboratory maximum density, at or slightly above optimum moisture.

4.2.2 Structural Fills

From a geotechnical perspective, the onsite soils are generally suitable for re-use as compacted fill, provided they are free of debris and organic matter. The site environmental assessment reports provide further guidance on handling/moving site soils.

Fills placed within 10 feet of finish pad grades or slope faces should contain no rocks over 12 inches in maximum dimension. In addition, encountered expansive clayey soils layers (EI>21), if any, should be placed at a depth greater than 3 feet below finished grades.

Areas to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 8 inches, conditioned to at least optimum moisture content, and recompacted. Fill soils should be placed at a minimum of 90 percent relative compaction (based on ASTM D1557) at or above optimum moisture content. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in thickness.

Fills placed on slopes steeper than 5:1 (horizontal:vertical) should be benched into dense soils (see Appendix D for benching detail). Benching should be of sufficient depth to remove all loose material. A minimum bench height of 2 feet into approved material should be maintained at all times.

4.2.3 Import Soils

Import soils and/or borrow sites, if needed, should be evaluated by us prior to import. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less-than 2 percent), have very low expansion potential (E<21) and have a low corrosion impact to the proposed improvements.

4.2.4 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2018 Edition. Fill material above the pipe zone should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted to at least 90 percent relative compaction (ASTM D 1557) by mechanical means only. Site soils may generally be suitable as trench backfill provided these soils are screened of rocks over 1½ inches in diameter and organic matter. If imported sand is used as backfill, the upper 3 feet in building and pavement areas should be compacted to 95 percent. The upper 6 inches of backfill in all pavement areas should be compacted to at least 95 percent relative compaction.

Where granular backfill is used in utility trenches adjacent to moisture sensitive subgrades and foundation soils, we recommend that a cut-off "plug" of impermeable material be placed in these trenches at the perimeter of buildings, and at pavement edges adjacent to irrigated landscaped areas. A "plug" can consist of a 5-foot long section of clayey soils with more than 35-percent passing the No. 200 sieve, or a Controlled Low Strength Material (CLSM) consisting of one sack of Portland-cement plus one sack of bentonite per cubic-yard of sand. CLSM should generally conform to requirements of the "Greenbook". This is intended to reduce the likelihood of water permeating trenches from landscaped areas, then seeping along permeable trench backfill into the building and pavement subgrades, resulting in wetting of moisture sensitive subgrade earth materials under buildings and pavements.

Excavation of utility trenches should be performed in accordance with the project plans, specifications and the *California Construction Safety Orders* (latest Edition). The contractor should be responsible for providing a "competent person" as defined in Article 6 of the *California Construction Safety Orders*. Contractors should be advised that sandy soils (such as fills generated from the onsite alluvium) could make excavations particularly unsafe if all safety precautions are not properly implemented. In addition, excavations at or near the toe of slopes and/or parallel to slopes may be highly unstable due to the increased driving force and load on the trench wall. Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Leighton Consulting, Inc. does not consult in the area of safety engineering.

4.2.5 Shrinkage

The volume change of excavated onsite soils upon recompaction is expected to vary with materials, density, insitu moisture content, and location and compaction effort. The in-place and compacted densities of soil materials vary and accurate overall determination of shrinkage and bulking cannot be made. Therefore, we recommend site grading include, if possible, a balance area or ability to adjust grades slightly to accommodate some variation. Based on our geotechnical laboratory results, we expect recompaction shrinkage (when recompacted to an average 92 percent of ASTM D1557) and estimate the following earth volume changes will occur during grading, and for the alluvium, the shrinkage is expected to be in the 10 to 15% range.

4.2.6 Drainage

All drainage should be directed away from structures and pavements by means of approved permanent/temporary drainage devices. Adequate storm drainage of any proposed pad should be provided to avoid wetting of foundation soils. Irrigation adjacent to buildings should be avoided when possible. As an option, sealed-bottom planter boxes and/or drought resistant vegetation should be used within 5-feet of buildings.

4.3 Foundation Design

4.3.1 Design Parameters – Spread/Continuous Shallow Footings

Footings should be embedded at least 12-inches below lowest adjacent grade for the proposed structure. Footing embedment should be measured from lowest adjacent finished grade, considered as the top of interior slabs-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower. Footings located adjacent to utility trenches or vaults should be embedded below an imaginary 1:1 (horizontal:vertical) plane projected upward and outward from the bottom edge of the trench or vault, up towards the footing.

- **Bearing Capacity**: For footings on newly placed, properly compacted fill soil, an allowable vertical bearing capacity of 2,000 pounds-per-square-foot (psf) should be used. These footings should have a minimum base width of 18 inches for continuous wall footings and a minimum bearing area of 3 square feet (1.75-ft by 1.75-ft) for pad foundations. The bearing pressure value may be increased by 250 psf for each additional foot of embedment or each additional foot of width to a maximum vertical bearing value of 3,500 psf. Additionally, these bearing values may be increased by one-third when considering short-term seismic or wind loads. A modulus of subgrade reaction, K of 200 PCI may be used to relative dense bedrock or onsite soil compacted to minimum 90% relative compaction.
- **Lateral loads**: Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.35 may be used for design. In addition, lateral resistance may be provided by passive pressures acting against foundations poured neat against properly compacted granular fill. We recommend that an

allowable passive pressure based on an equivalent fluid pressure of 350 pounds-per-cubic-foot (pcf) be used in design. These friction and passive values have already been reduced by a factor-of-safety of 1.5.

4.3.2 Settlement Estimates

For settlement estimates, we assumed that column loads will be no larger than 150 kips, with bearing wall loads not exceeding 10 kips per foot of wall. If greater column or wall loads are required, we should re-evaluate our foundation recommendation, and re-calculate settlement estimates.

Building D-1 founded on compacted fill soils as required per Section 4.2.1 above should be designed in anticipation of 1 inch of total settlement and 0.5-inch of differential settlement within a 40-foot horizontal run. Maintenance Building should be designed in anticipation of 2 inches of total settlement and 1-inch of differential settlement within a 40-foot horizontal run.

4.4 Vapor Retarder

It has been a standard of care to install a moisture-vapor retarder underneath all slabs where moisture condensation is undesirable. Moisture vapor retarders may retard but not totally eliminate moisture vapor movement from the underlying soils up through the slabs. Moisture vapor transmission may be additionally reduced by use of concrete additives. Leighton Consulting, Inc. does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

However, based on our experience, the standard of practice in Southern California has evolved over the last 15 to 20 years into a construction of a vapor retarder system that generally consisted of a membrane (such as 15-mil thick), underlain by a capillary break consisting of 4 inches of clean ½-inch-minimum gravel or 2-inch sand layer (SE>30). The structural engineer/architect or concrete contractor often require a sand layer be placed over the membrane (typically 2-inch thick layer) to help in curing and reduction of curling of concrete. If such sand layer is placed on top of the membrane, the contractor should not allow the sand to become wet prior to concrete placement (e.g., sand should not be placed if rain is expected).

In conclusion, the construction of the vapor barrier/retarder system is dependent on several variables which cannot be all geotechnically evaluated and/or tested. As such, the design of this system should be a design team/owner decision taking into consideration finish flooring materials and manufacture's installation requirements of proposed membrane. Moreover, we recommend that the design team also follow ACI Committee 302 publication for "Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials" (ACI 302.2R-06) which includes a flow chart that assists in determining if a vapor barrier/retarder is required and where it is to be placed.

4.5 Retaining Walls

Retaining wall earth pressures are a function of the amount of wall yielding horizontally under load. If the wall can yield enough to mobilize full shear strength of backfill soils, then the wall can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. Retaining walls backfilled with non-expansive soils can be designed using the following equivalent fluid pressures:

Table 2. Retaining Wall Design Earth Pressures (Static, Drained)

Loading Conditions	Equivalent Fluid Density (pcf)	
	Level Backfill	2:1 Backfill
Active	36	55
At-Rest	55	85
Passive*	350	150 (2:1, sloping down)

* This assumes level condition in front of the wall will remain for the duration of the project, not to exceed 3,500 psf at depth.

Unrestrained (yielding) cantilever walls should be designed for the active equivalent-fluid weight value provided above for very low to low expansive soils that are free draining. In the design of walls restrained from movement at the top (non-yielding) such as basement or elevator pit/utility vaults, the at-rest equivalent fluid weight value should be used. Total depth of retained earth for design of cantilever walls should be measured as the vertical distance below the ground surface measured at the wall face for stem design, or measured at the heel of the footing for overturning and sliding calculations. Should a sloping backfill other than a 2:1 (horizontal:vertical) be constructed above the wall (or a backfill is loaded by an adjacent surcharge load), the equivalent fluid weight values provided above should be re-evaluated on an individual case basis by us. Non-standard wall designs should also be reviewed by us prior to construction to check that the proper soil parameters have been incorporated into the wall design.

All retaining walls should be provided with appropriate drainage. The outlet pipe should be sloped to drain to a suitable outlet. Wall backfill should be non-expansive (EI $\leq$ 21) sands compacted by mechanical methods to a minimum of 90 percent relative compaction (ASTM D 1557). Clayey site soils should not be used as wall backfill. Walls should not be backfilled until wall concrete attains the 28-day compressive strength and/or as determined by the Structural Engineer that the wall is structurally capable of supporting backfill. Lightweight compaction equipment should be used, unless otherwise approved by the Structural Engineer.

4.6 Corrosivity Evaluation

Sulfate ions in the soil can lower soil resistivity and can be highly aggressive to Portland cement concrete by combining chemically with certain constituents of the concrete, principally tricalcium aluminate. This reaction is accompanied by expansion and eventual disruption of the concrete matrix. Potentially high sulfate content could also cause corrosion of the reinforcing steel in concrete. Table 3 below summarizes current standards for concrete exposed to sulfate-containing solutions.

Table 3. Sulfate Concentration and Sulfate Exposure

Sulfate In Water (parts-per-million)	Water-Soluble Sulfate (SO_4) in soil (percentage by weight)	Sulfate Exposure
0-150	0.00 - 0.10	Negligible
150-1,500	0.10 - 0.20	Moderate (Seawater)
1,500-10,000	0.20 - 2.00	Severe
>10,000	Over 2.00	Very Severe

The sulfate content was determined in the laboratory for representative onsite soil sample. The results indicate that the water soluble sulfate range is less than 0.2 percent by weight, which is considered moderate per Table 5 above. Based upon the test results, Type II cement or an equivalent may be used.

Many factors can affect corrosion potential of soil including soil moisture content, resistivity, permeability and pH, as well as chloride and sulfate concentration. In general, soil resistivity, which is a measure of how easily electrical current flows through soils, is the most influential factor. Based on the findings of studies presented in ASTM STP 1013 titled “Effects of Soil Characteristics on Corrosion” (February, 1989), the approximate relationship between soil resistivity and soil corrosiveness was developed as shown in Table 4 below.

Table 4. Relationship between Soil Resistivity and Soil Corrosivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
0 to 900	Very Severely Corrosive
900 to 2,300	Severely Corrosive
2,300 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
10,000 to >100,000	Very Mildly Corrosive

Acidity is an important factor of soil corrosivity. The lower the pH (the more acidic the environment), the higher the soil corrosivity will be with respect to buried metallic structures and utilities. As soil pH increases above 7 (the neutral value), the soil is increasingly more alkaline and less corrosive to buried steel structures, due to protective surface films, which form on steel in high pH environments. The pH of site soils on representative samples vary from 7.7 to 7.9 which is generally considered less active from a corrosion standpoint. Chloride and sulfate ion concentrations, and pH appear to play secondary roles in affecting corrosion potential. High chloride levels tend to reduce soil resistivity and break down otherwise protective surface deposits, which can result in corrosion of buried steel or reinforced concrete structures.

Based on minimum resistivity laboratory test results (see Table 5 below), the onsite soil is considered moderately corrosive. Ferrous pipe can be protected by polyethylene bags, tape or coatings, di-electric fittings, concrete encasement or other means to separate the pipe from wet onsite soils. We understand that further testing and/or soil corrosivity evaluation is being performed by others and specific recommendations for corrosion protection is provided by the corrosion engineer.

Table 5. Corrosion Sample Results

Boring #	Sample Depth (ft)	Sulfate Content (ppm)	Chloride Content (ppm)	pH	Minimum Resistivity (ohm-cm)
LB-7	5.0-10.0	193	80	7.90	3,090
LB-15	0.0-5.0	148	60	7.70	2,810

4.7 Preliminary Pavement Design / Vehicular Parking Driveways

Our preliminary vehicle pavement design is based on an R-value of 10 and the Caltrans Highway Design Manual. For planning and estimating purposes, the vehicle pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 6. Asphalt Pavement Sections

General Traffic Condition	Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	7.5
	5.0	3.0	9.0
Truck Access & Driveways	6.0	4.0	10.5
	6.5	4.0	12.5

Appropriate Traffic Index (TI) should be selected or verified by the project civil engineer and actual R-value of the subgrade soils will need to be verified after completion of site grading to finalize the pavement design. Pavement design and construction should also conform to applicable local, county and industry standards. The Caltrans pavement section design calculations were based on a pavement life of approximately 20 years with periodic flexible pavement maintenance.

Where applicable, we recommend that a minimum of 7 inches of PCC pavement be used in high impact load areas or if to be subjected to truck traffic. The PCC pavement should be placed on a minimum 6-inch aggregate base. The PCC pavement may be placed directly on a compacted subgrade with an R-Value of 40 or higher. The PCC pavement should have a minimum of 28-day compressive strength of 3250 psi. Other requirements of Caltrans Standard Specifications regarding mixing and placing of concrete should be followed.

The upper 6 inches of the subgrade soils should be moisture-conditioned to near optimum moisture content, compacted to at least 95 percent relative compaction (ASTM D1557) and kept in this condition until the pavement section is constructed. Minimum relative compaction requirements for aggregate base should be 95 percent of the maximum laboratory density as determined by ASTM D1557. If applicable, aggregate base should conform to the “Standard Specifications for Public Works Construction” (green book) current edition or Caltrans Class 2 aggregate base.

If pavement areas are adjacent to heavily watered landscape areas, some deterioration of the subgrade load bearing capacity and pavement failure may result. Moisture control measures such as deepened curbs or other moisture barrier materials may be used to prevent the subgrade soils from becoming saturated. The use of concrete cutoff or edge barriers should be considered when pavement is planned adjacent to either open (unfinished) or irrigated landscaped areas.

4.8 Preliminary Pavement Design / Air Traffic - Taxiways

Our preliminary concrete (PCC) pavement section for air traffic aprons/taxiways has been developed using FAARFIELD computer program and based on the FAA Airport Advisory Circular (AC) No. 150/5320-6F (2016) and Errata Sheet dated September 20, 2017. Aprons' traffic information was not provided to us; therefore, the design assumes a maximum aircraft weight of 836,000 pounds (Boeing 747-300), and an equivalent annual departure rate of 2,750 total departures per year. The design was also based on a sub-grade CBR value of 10, and minimum subgrade modulus of 20 psi. Given the maximum aircraft weights indicated above, stabilized base and subbase are required. Initial pavement design section is presented below.

Table 7. Flexible Pavement Cross Section

Initial Flexible Pavement Cross Section	
17.5"	PCC Surface
5"	Pavement Stabilizing Layer (P-401)
6"	Base Layer (P-209)
28.5"	**Total Thickness Required** (inches)

Per FAA requirements, the subgrade soils should be compacted in accordance with the criteria in table below.

Table 8. FAA Subgrade Compaction

Subgrade Compaction Requirements for Design Aircraft Per FAA	
Relative Compaction (ASTM D1557)	**Depth Required (inches)**
95	0 - 6.2
90	6.2 - 12.4
85	12.4 - 19.4
80	19.4 - 25.6

5.0 GEOTECHNICAL CONSTRUCTION SERVICES

Geotechnical review is of paramount importance in engineering practice. Poor performances of many foundation and earthwork projects have been attributed to inadequate construction review. We recommend that Leighton Consulting, Inc. be provided the opportunity to review the grading plan and foundation plan(s) prior to bid.

Reasonably-continuous construction observation and review during site grading and foundation installation allows for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction. Geotechnical conclusions and preliminary recommendations should be reviewed and verified by Leighton Consulting, Inc. during construction, and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site demolition and clearing,
- During over-excavation of compressible soil,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction, and
- When any unusual conditions are encountered.

Additional geotechnical exploration and analysis may be required based on final development plans, for reasons such as significant changes in proposed structure locations/footprints. We should review grading (civil) and foundation (structural) plans, and comment further on geotechnical aspects of this project.

6.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions and recommendations presented in this report are based on the assumption that we (Leighton Consulting, Inc.) will provide geotechnical observation and testing during construction as the Geotechnical Engineer of Record for this project. Please refer to Appendix E, GBA's *Important Information About This Geotechnical-Engineering Report*, prepared by the Geoprofessional Business Association (GBA) presenting additional information and limitations regarding geotechnical engineering studies and reports.

This report was prepared for the sole use of Client and their design team, for application to design of the proposed maintenance building, in accordance with generally accepted geotechnical engineering practices at this time in California. Any unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Leighton Consulting, Inc.

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Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 4,000 '	Date: April 2021

Base Map: Bing Maps 2021
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

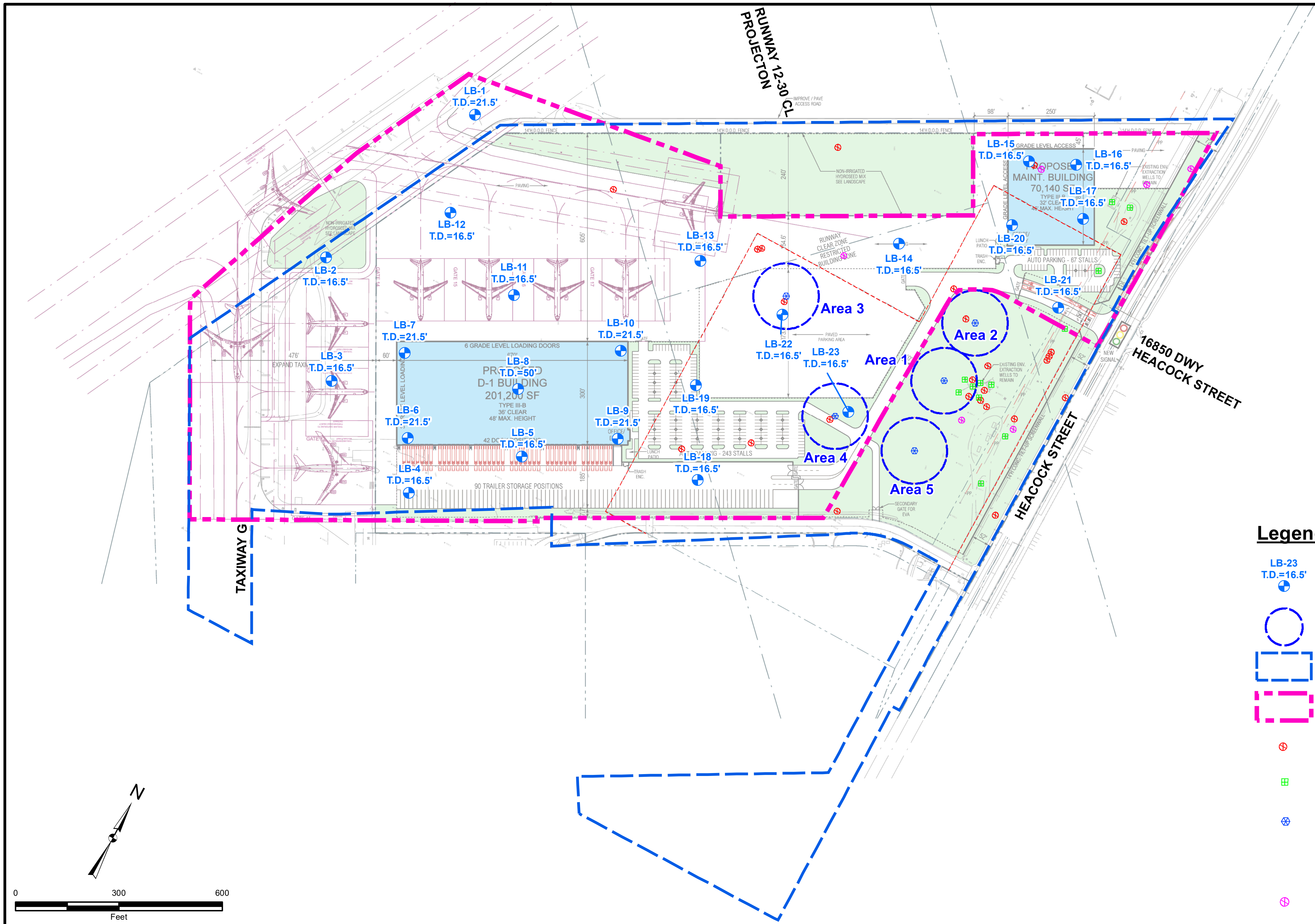
SITE LOCATION MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 1

Leighton

Map Saved as P:\Drafting\12762\002\Maps\12762-002_F01_SLM_2021-04-28.mxd on 4/29/2021 8:50:28 AM



Legend

- LB-23 T.D.=16.5' — Approximate Location of Geotechnical Boring Showing Total Depth
- 95' Radius Offset of Burn Pit Location
- Approximate APN 294-170-010 Limits
- Approximate Site Limits
- Existing Monitoring Well
- Existing Extraction Well
- Burn Pit Locations shown hereon based on Appendix D Information of Final Site 007 Focused Investigation Report 2017-2019 Dated March 4, 2020, CH2M
- Unknown

Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 300 '	Date: April 2021

Base Map: Sheet A1-1P, D-1 Site by RGA.

Author: Leighton Geomatics (mmurphy)

BORING LOCATON MAP

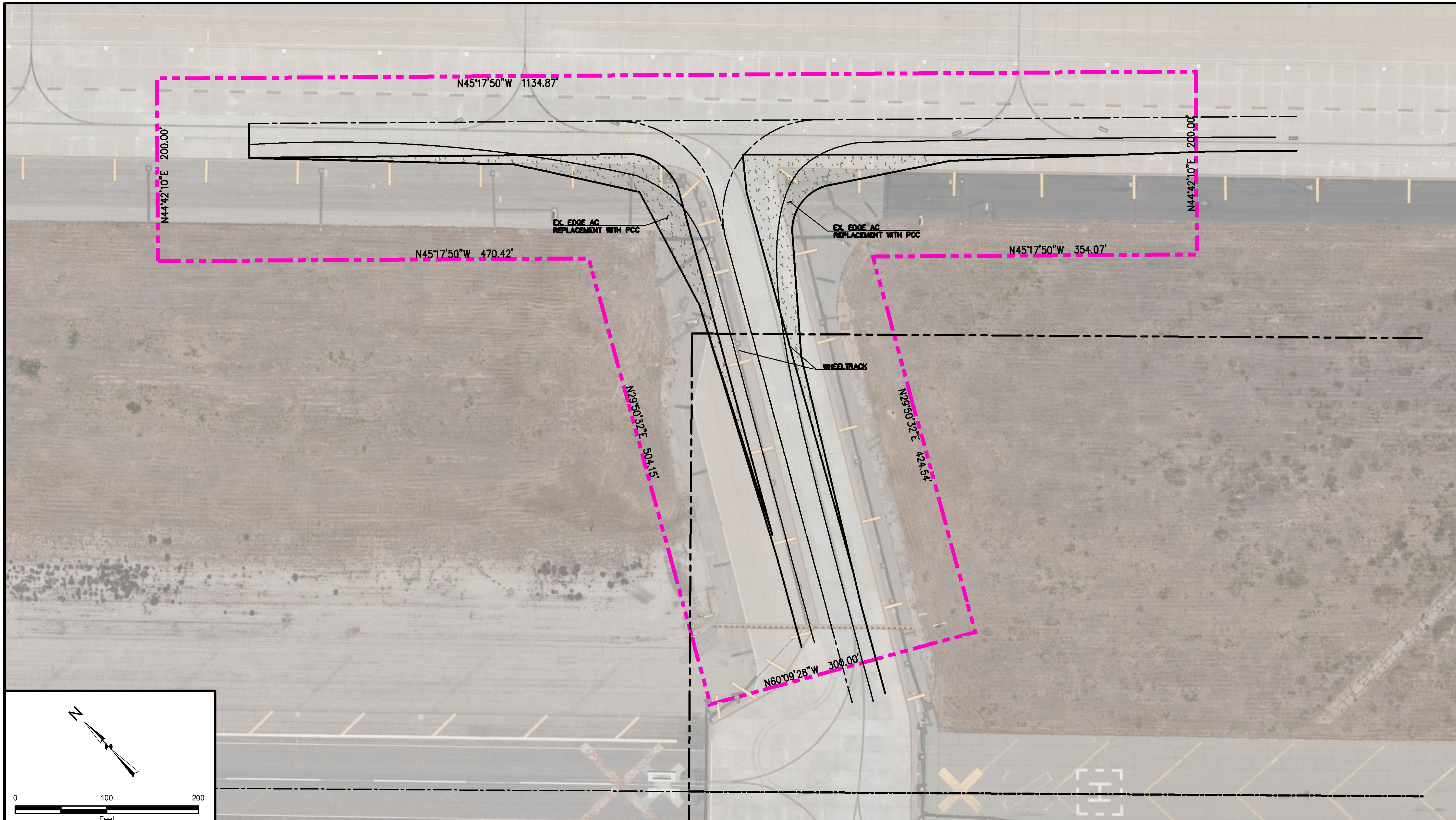
Meridian D-1, LLC/Gateway Aviation Center

Moreno Valley, California

Figure 2a

Leighton

Map Saved as V:\Drafting\12762\002\Maps\12762-002_F02a_BLP_2021-04-27a.mxd on 4/28/2021 7:27:12 AM



Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 100 '	Date: April 2021

Reference: Bing Maps, 2016 2021

Author: Leighton Geomatics (mmurphy)

WORK AREA 1 MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 2b

Leighton

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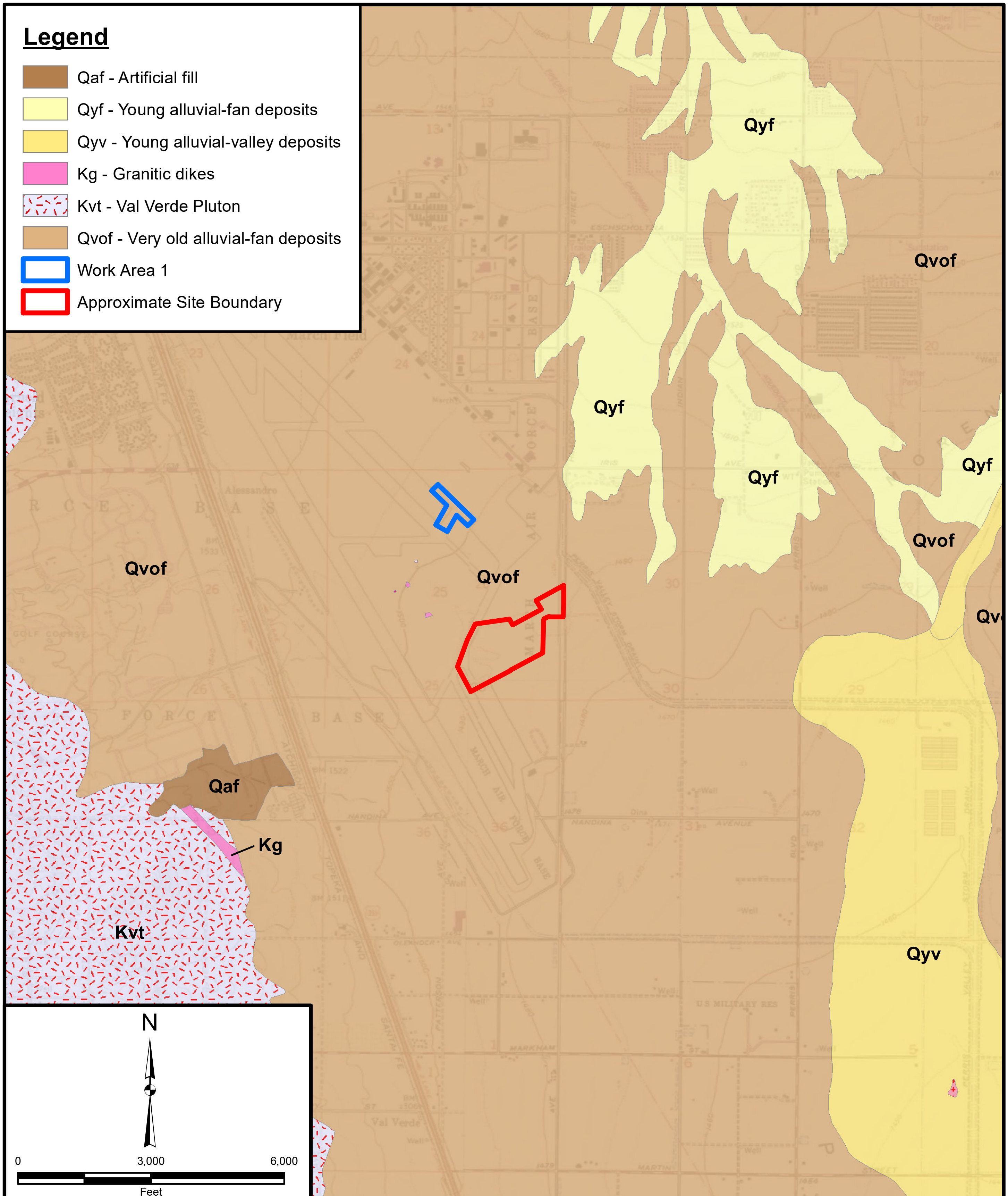


Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 3,000 '	Date: April 2021

Reference: USGS, 2006 Geologic map of the San Bermardino and Santa Ana 30'x60 quadrangle, California Version 1,0 Open File Report 2006-1217.

Author: Leighton Geomatics (mmurphy)

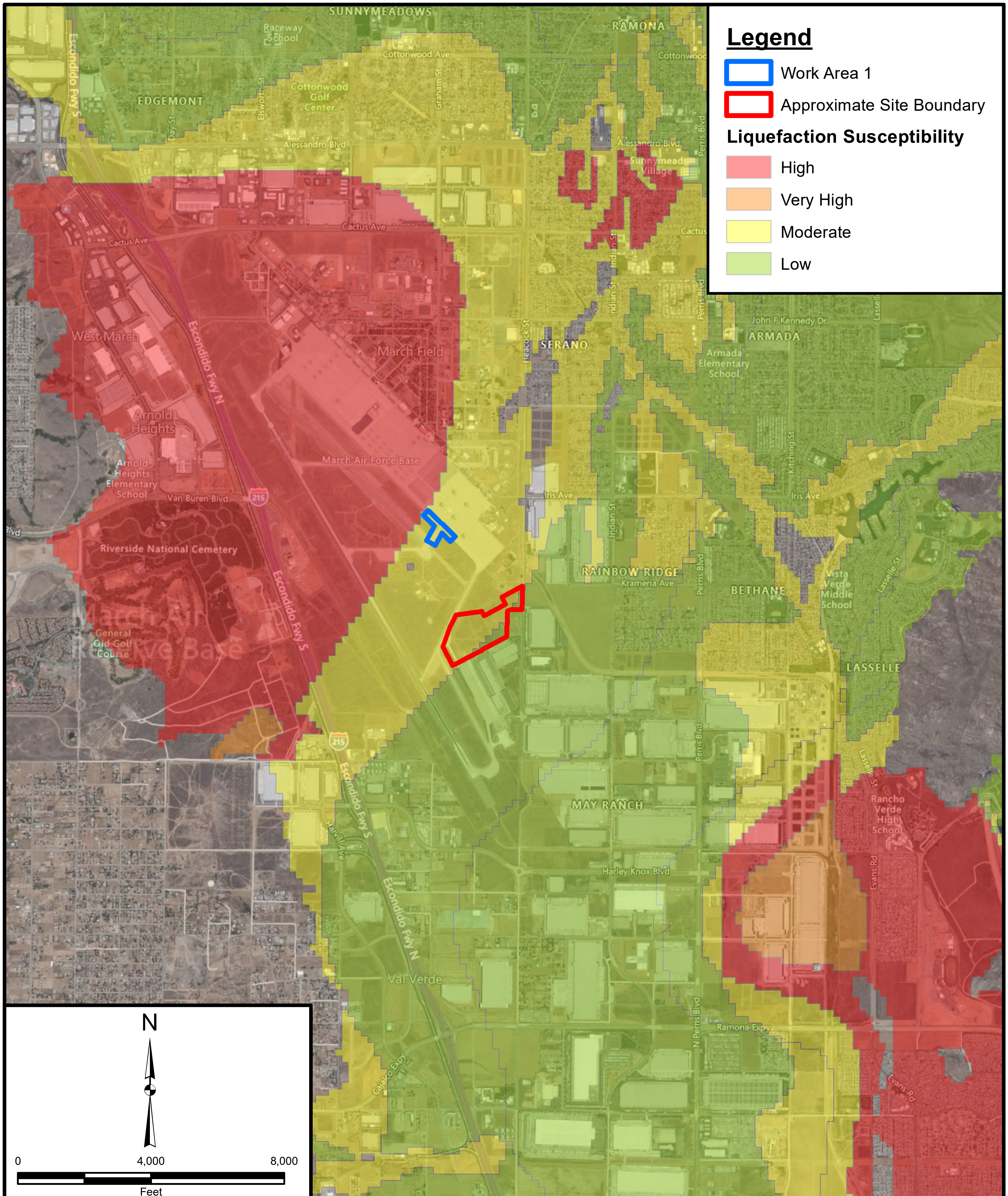
REGIONAL GEOLOGY MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 3

Leighton

Map Saved as P:\Drafting\12762\002\Maps\12762-002_F03_RGM_2021-04-29.mxd on 4/29/2021 8:54:25 AM



Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 4,000 '	Date: April 2021

Base Map: Bing Maps 2021
Reference: CGS
Author: Leighton Geomatics (mmurphy)

LIQUEFACTION MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 4

Leighton

Map Saved as P:\Drafting\12762\002\Maps\12762-002_F04_LM_2021-04-29.mxd on 4/29/2021 8:58:47 AM

APPENDIX A

LOGS OF GEOTECHNICAL FIELD EXPLORATIONS

Encountered earth materials were logged and sampled in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). Representative soil samples were transported to our in-house Temecula laboratory for geotechnical testing. After logging and sampling, our borings were backfilled with spoils generated during drilling.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on these logs. Subsurface conditions at other locations may differ from conditions occurring at these logged locations. Passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on these logs represent an approximate boundary between sampling intervals and soil types; and transitions may be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1490'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0		B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to medium grained sand, RV = 22 MD = 131.6 @ 6.8%	RV, SA, MD, CBR
			R-1	7 13 14	116	3		SILTY SAND, medium dense, brown, slightly moist, fine to coarse grained sand	
	5		R-2	11 11 17	111	3	SW-SM	Well-graded SAND with SILT, medium dense, brown, slightly moist, fine to coarse grained sand	
	10		R-3	13 18 30	119	13	SM	**Older Alluvium (Qalo)**; SILTY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	15		R-4	7 13 23	119	13	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	20		R-5	18 40 50			CL	SANDY Lean CLAY, hard, dark gray, moist, very fine to fine grained sand	
								Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings, CO = 0.0ppm, %LEL = 0%, H2S = 0.0ppm, O2 = 20.9%	
	25								
	30								

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 %FINES PASSING
- AL ATTERBERG LIMITS
- CBR CALIFORNIA BEARING RATION
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-2

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
	5			R-1 B-1	17 31 50/5"	126	10	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
				R-2	8 12 19	116	12		SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, very fine to fine grained sand, CO = -0.54%	CO
	10			R-3	8 12 19	115	14		SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, very fine to fine grained sand	
	15			R-4	8 39 46			SC	CLAYEY SAND, dense, dark yellowish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings, CO = 0.0ppm, %LEL = 0%, H2S = 0.0ppm, O2 = 20.9%	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-3

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1493'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	11 17 24	124	9	SC	CLAYEY SAND, medium dense, dark brown, moist, very fine to fine grained sand	
	5			R-2	13 35 50/5"			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
	10			R-3	11 14 28	116	10	ML	SILT with SAND, stiff, dark grayish brown, moist, very fine to fine grained sand	
	15			R-4	14 21 32			SM	SILTY SAND, dense, dark yellowish brown, moist, very fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-4

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1493'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SM	**<u>Quaternary Alluvium (Qal)</u>**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	10 22 36	129	3	SM	**<u>Older Alluvium (Qalo)</u>**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	19 13 21				SILTY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	10			R-3	39 50/6"				SILTY SAND, dense, dark reddish brown, moist, fine to medium grained sand	
	15			R-4	5 17 20	122	10		SILTY SAND, medium dense, dark brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-5

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, slightly moist, fine to coarse grained sand, MD = 135.0 @ 7.2%	MD
				R-1	12 10 11	111	3		SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	9 10 15	111	4		SILTY SAND, medium dense, light brown, moist, fine to medium grained sand	
	10			R-3	15 27 40	122	12	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	15			R-4	16 21 35				SILTY, CLAYEY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-6

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1497'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			R-1	15 17 17	117	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, grayish brown, slightly moist, fine to medium grained sand	
	5			R-2	17 18 21	120	3		SILTY SAND, medium dense, brown, moist, fine to coarse grained sand	
	10			R-3	12 24 35	122	12	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand, CO = -0.47%	CO
	15			R-4	9 17 27			SC-SM	SILTY, CLAYEY SAND, medium dense, gray to dark yellowish brown, moist, fine to coarse grained sand	
	20			R-5	11 15 15	120	13	SM	SILTY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-7

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			R-1	3 10 10	110	2	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, light brown, slightly moist, fine to coarse grained sand	
	5			R-2 B-1	27 30 50/5"	121	3	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark reddish brown, moist, fine to coarse grained sand, EI = 1 MD = 130.4 @ 8.5%	CR, EI, SA, MD, CBR
	10			R-3	18 32 43			SM	SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	15			R-4	17 35 39	126	10		SILTY SAND, dense, dark reddish brown, moist, fine to coarse grained sand	
	20			R-5	13 18 22	114	15	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CBR CALIFORNIA BEARING RATION
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-8

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
	5			R-1	5 6 7	109	2		SILTY SAND, loose, grayish brown, slightly moist, fine to medium grained sand	
	10			R-2	23 30 45			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	15			R-3	10 20 32			SC	CLAYEY SAND, dense, dark reddish brown, moist, fine to medium grained sand	
	20			R-4	10 11 18	114	15		CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, MnO2 staining	
	25			R-5	5 24 38				CLAYEY SAND, dense, dark reddish brown to dark grayish brown, moist, fine to medium grained sand	
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-8

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			R-6	50/3"			SW-SC	Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL), dense, dark gray, wet, fine to coarse grained sand with fine gravel	
	35			R-7	50/2"			SW	Well-graded SAND with GRAVEL, dense, dark grayish brown, wet, fine to coarse grained sand with fine gravel	
	40			R-8	50/3"				**Granitic Bedrock (Kgr)**: Moderately weathered, recovered as: Well-graded SAND with SILT , dense, dark grayish brown, wet, fine to coarse grained sand	
	45									
	50			R-9	50/5"				Well-graded SAND with SILT and GRAVEL, dense, gray, moist to wet, fine to coarse grained sand with fine gravel	
									Drilled to 50.42' Sampled to 50.42' Groundwater at 20.16' Backfilled with cement and bentonite grout to 3' bgs, hydrated bentonite chips from 3' to surface	
	55									
	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-9

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1490'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			R-1	10 12 9	106	3	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, light brown, slightly moist, fine to coarse grained sand, roots, trace pinhole voids	
	5			R-2	32 38 43			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, brown, moist, fine to coarse grained sand	
	10			R-3	16 18 33	114	15		SILTY SAND, dense, olive brown, moist, fine to medium grained sand, CO = -0.46%	CO
	15			R-4	13 18 26			SM-ML	SILTY SAND to SANDY SILT, medium dense, olive brown, moist, very fine to fine grained sand	
	20			R-5	8 17 19	118	15	SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown and dark yellowish brown, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-10

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1489.5'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brown, slightly moist, fine to coarse grained sand	
				R-1	13 30 45	122	8	SM	**Older Alluvim (Qalo)**; SILTY SAND, dense, dark grayish brown and dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	13 30 43	118	8		SILTY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	10			R-3	12 21 29	116	15		SILTY SAND, dense, dark grayish brown, moist, fine grained sand, CO = -0.32%	CO
	15			R-4	8 14 35				SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
	20			R-5	3 12 22	121	12	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-11

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, slightly moist, fine to coarse grained sand	
				R-1	27 21 29	116	10	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to medium grained sand	
	5			R-2	25 25 48	122	4	SC-SM	SILTY, CLAYEY SAND, dense, dark brown, moist, fine to coarse grained sand	
	10			R-3	17 21 29	121	10	SM	SILTY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	15			R-4	15 18 27			SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown, moist, very fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-12

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to medium grained sand	
				R-1	23 50/4"	120	5	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
	5			R-2	31 31 31	119	3	SC-SM	SILTY, CLAYEY SAND, dense, brown, slightly moist, fine to coarse grained sand	
	10			R-3	13 24 27			SM	SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
	15			R-4	20 31 30			SW	Well-graded SAND, dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-13

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			R-1 B-1	8 9 7	109	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, loose, light brownish gray, slightly moist, fine to medium grained sand, roots	
	5			R-2	36 36 33	116	8	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, moist, fine grained sand	
	10			R-3	11 18 30	122	7		SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, very fine to medium grained sand	
	15			R-4	11 17 18			SW-SM	Well-graded SAND with SILT, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-14

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, moist, fine to medium grained sand	
				R-1	10 9 8	115	2		SILTY SAND, medium dense, dark reddish brown, moist, fine to coarse grained sand	
	5			R-2	7 9 18			SW-SM	**Older Alluvium (Qalo)**; Well-graded SAND with SILT, medium dense, reddish brown, moist, medium to coarse grained sand	
	10			R-3	10 17 19	119	12	SM	SILTY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	15			R-4	17 30 39				SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-15

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0			R-1 B-1	17 25 21	125	4	SM/ML	**Quaternary Alluvium (Qal)**; SILTY SAND to SANDY SILT, medium dense, yellowish brown, slightly moist, fine grained sand	CR, SA
				R-2	20 23 16	124	5		SILTY SAND to SANDY SILT, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-3	20 31 50/5"			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand	
				R-4	20 38 40				SILTY SAND, dense, dark brown, moist, fine to medium grained sand	
	10			R-5	12 20 20	118	10		SILTY SAND, dense, dark yellowish brown, moist, very fine to medium grained sand, CO = -3.40%	CO
	15			R-6	10 16 18	110	10	SC	CLAYEY SAND, medium dense, dark grayish brown, moist to wet, fine to coarse grained sand, approximately 5" layer of SW sand in top 6 rings	
	20								Drilled to 16.5' Sampled to 16.5' Groundwater at 14.58' Backfilled with hydrated bentonite chips to surface, cuttings drummed	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-16

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	13 25 38	115	8	SM-ML	**Older Alluvium (Qalo)**; SILTY SAND to SANDY SILT, dense to hard, light brownish gray, slightly moist, very fine to medium grained sand	
	5			R-2	16 22 30	112	6	SM	SILTY SAND, dense, brown, slightly moist, very fine to medium grained sand, few pinhole voids, CO = 2.93%	CO
				R-3	6 12 13	114	11	ML	SANDY SILT, stiff, dark yellowish brown, moist, very fine to medium grained sand	
	10			R-4	7 13 16	111	6	SC-SM	SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, (CO = 2.84%)	CO
	15			R-5	13 20 21	123	10	SC	CLAYEY SAND, medium dense, brown, moist to wet, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-17

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1496'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			R-1 B-1	7 12 18	107	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, medium dense, slightly moist, very fine to medium grained sand, EI = 14 MD = 130.7 @ 9%	MD, CR, EI
				R-2	12 20 32	108	10	SC	**Older Alluvium (Qalo)**; CLAYEY SAND, dense, dark brown, moist, fine to medium grained sand	
	5			R-3	19 23 27	108	6	SM	SILTY SAND, dense, yellowish brown, moist, very fine to medium grained sand	
	10			R-4	14 21 27	110	7		SILTY SAND, medium dense, yellowish brown to dark reddish brown, moist, fine to coarse grained sand	
	15			R-5	7 15 24			SC	CLAYEY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-18

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	10 21 34	111	3	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, brown, slightly moist, fine to coarse grained sand	
	5			R-2	17 30 31	119	8	SC	CLAYEY SAND, dense, dark gray, moist, fine to medium grained sand	
				R-3	9 21 33			SM	SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand, few pinhole voids	
	10			R-4	18 24 33			SC-SM	SILTY, CLAYEY SAND, dense, dark yellowish brown, moist, fine to coarse grained sand	
	15			R-5	15 16 19			SM	SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-19

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			R1 B-1	7 12 20	105	4	ML	**Quaternary Alluvium (Qal)**; SANDY SILT, medium dense, dark yellowish brown and yellowish brown, slightly moist, fine to coarse grained sand, MD = 127.3 @ 9.8%, RV = 9	MD, RV, SA
				R-2	18 38 43	116	6	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand, few caliche	
	5			R-3	17 30 46	118	4		SILTY SAND, dense, yellowish brown, moist, fine to medium grained sand, few caliche, CO = 1.97%	CO
	10			R-4	7 11 17	110	4		SILTY SAND, medium dense, yellowish brown, moist, fine to medium grained sand	
	15			R-5	14 21 26				SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-20

Project No. 12762.002
Project Meridian D-1 Aviation
Drilling Co. Martini Drilling Corp
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Boring Location Map

Date Drilled 9-15-20
Logged By JTD
Hole Diameter 8"
Ground Elevation ~1495'
Sampled By JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	10 20 40	118	5	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, slightly moist, fine to medium grained sand	
	5			R-2	23 30 37	118	6		SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand	
				R-3	11 20 28				SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	10			R-4	16 24 30	122	7	SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to coarse grained sand	
	15			R-5	13 23 50				SILTY, CLAYEY SAND, dense, dark grayish brown to dark yellowish brown, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
B BULK SAMPLE
C CORE SAMPLE
G GRAB SAMPLE
R RING SAMPLE
S SPLIT SPOON SAMPLE
T TUBE SAMPLE

TYPE OF TESTS:
-200 % FINES PASSING
AL ATTERBERG LIMITS
CN CONSOLIDATION
CO COLLAPSE
CR CORROSION
CU UNDRAINED TRIAXIAL
DS DIRECT SHEAR
EI EXPANSION INDEX
H HYDROMETER
MD MAXIMUM DENSITY
PP POCKET PENETROMETER
RV R VALUE
SA SIEVE ANALYSIS
SE SAND EQUIVALENT
SG SPECIFIC GRAVITY
UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG LB-21

Project No.	12762.002	**Date Drilled**	9-16-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand, EI = 7, RV = 11	EI, RV
				R-1	12 24 32	121	5	SC	**Older Alluvium (Qalo)**; CLAYEY SAND, dense, dark yellowish brown, slightly moist, fine to coarse grained sand	
	5			R-2	19 27 50/2"	119	4		CLAYEY SAND, dense, brown, slightly moist, fine to coarse grained sand	
				R-3	15 50				CLAYEY SAND, dense, grayish brown, moist, fine to medium grained sand	
	10			R-4	19 28 30			SM	SILTY SAND, dense, yellowish brown, moist, fine grained sand, caliche nodules	
	15			R-5	16 20 24			SW-SM	Well-graded SAND with SILT, medium dense, yellowish brown, moist, fine to coarse grained sand	
								CL	SANDY Lean CLAY, stiff, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-22

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1494'
Location	See Boring Location Map	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Artificial Fill Undocumented (Afu)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	3 5 4	108	3		SILTY SAND, loose, brown, slightly moist, fine to coarse grained sand, abundant pinhole voids	
	5			R-2	4 9 18	108	2		SILTY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, roots	
				R-3	20 35 32			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	10			R-4	11 12 16	103	9		SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand, C0 = 1.9%	CO
	15			R-5	7 10 17			CL	SANDY Lean CLAY, stiff, dark yellowish brown, moist, very fine to fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-23

Project No.	12762.002	**Date Drilled**	9-16-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SM	**Artificial Fill Undocumented (Afu)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	5 10 20	106	8		SILTY SAND, medium dense, brown, slightly moist, fine to coarse grained sand, few pinhole voids	
	5			R-2	13 16 25	110	6	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, few pinhole voids	
				R-3	9 14 18	107	7	SC	CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, C0 = 5.94%	CO
	10			R-4	11 16 21	111	10	SC-SM	SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, trace pinhole voids	
	15			R-5	14 19 38			SC	CLAYEY SAND, dense, dark grayish brown to dark yellowish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

APPENDIX B

RESULTS OF GEOTECHNICAL LABORATORY TESTS

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS
ASTM D 6913

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	MRV	Date:	07/30/20
Project No.:	12762.002	Checked By:	MRV	Date:	08/11/20
Boring No.:	LB-1	Depth (feet):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	X	Wt. of Air-Dry Soil + Cont. (g)	822.2
Wt. of Air-Dried Soil + Cont.(g)	822.2	Wt. of Dry Soil + Cont. (g)	808.2
Wt. of Container (g)	276.0	Wt. of Container No.______ (g)	276.0
Dry Wt. of Soil (g)	532.2	Moisture Content (%)	2.6

After Wet Sieve	Container No.	X
	Wt. of Dry Soil + Container (g)	670.8
	Wt. of Container (g)	276.0
	Dry Wt. of Soil Retained on # 200 Sieve (g)	394.8

U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	12.2	97.7
#8	2.360	62.6	88.2
#16	1.180	152.1	71.4
#30	0.600	235.3	55.8
#50	0.300	301.8	43.3
#100	0.150	348.7	34.5
#200	0.075	387.8	27.1
PAN			

GRAVEL: **2 %**

SAND: **71 %**

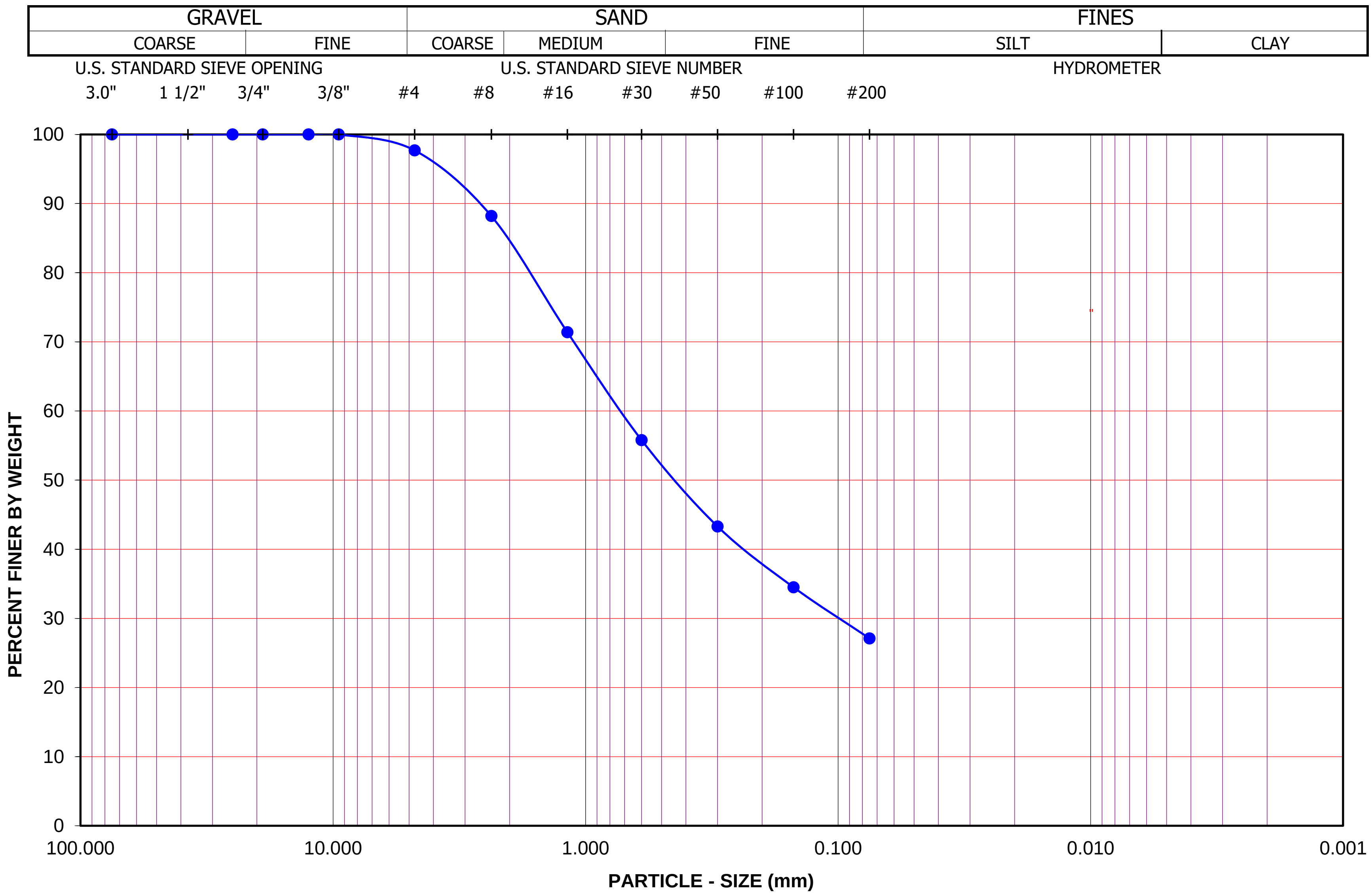
FINES: **27 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = N/A

Cc = (D30)²/(D60*D10) = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

Boring No.: LB-1 | Sample No.: B-1

Depth (feet): 0 - 5.0 | Soil Type : SM

Soil Identification: Silty Sand (SM), Reddish Brown.

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

GR:SA:FI : (%) 2 : 71 : 27

Aug-20

Sieve; LB-1, B-1 (07-27-20)

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	FLM	Date:	08/07/20
Project No.:	12762.002	Checked By:	MRV	Date:	08/11/20
Boring No.:	LB-7	Depth (feet):	5.0 - 10.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	T	Wt. of Air-Dry Soil + Cont. (g)	2386.7
Wt. of Air-Dried Soil + Cont.(g)	2386.7	Wt. of Dry Soil + Cont. (g)	2333.5
Wt. of Container (g)	971.7	Wt. of Container No.______ (g)	971.7
Dry Wt. of Soil (g)	1361.8	Moisture Content (%)	3.9

After Wet Sieve	Container No.	T
	Wt. of Dry Soil + Container (g)	1877.2
	Wt. of Container (g)	971.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	905.5

U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	18.6	98.6
#8	2.360	109.2	92.0
#16	1.180	237.0	82.6
#30	0.600	381.8	72.0
#50	0.300	570.2	58.1
#100	0.150	754.0	44.6
#200	0.075	887.5	34.8
PAN			

GRAVEL: **1 %**

SAND: **64 %**

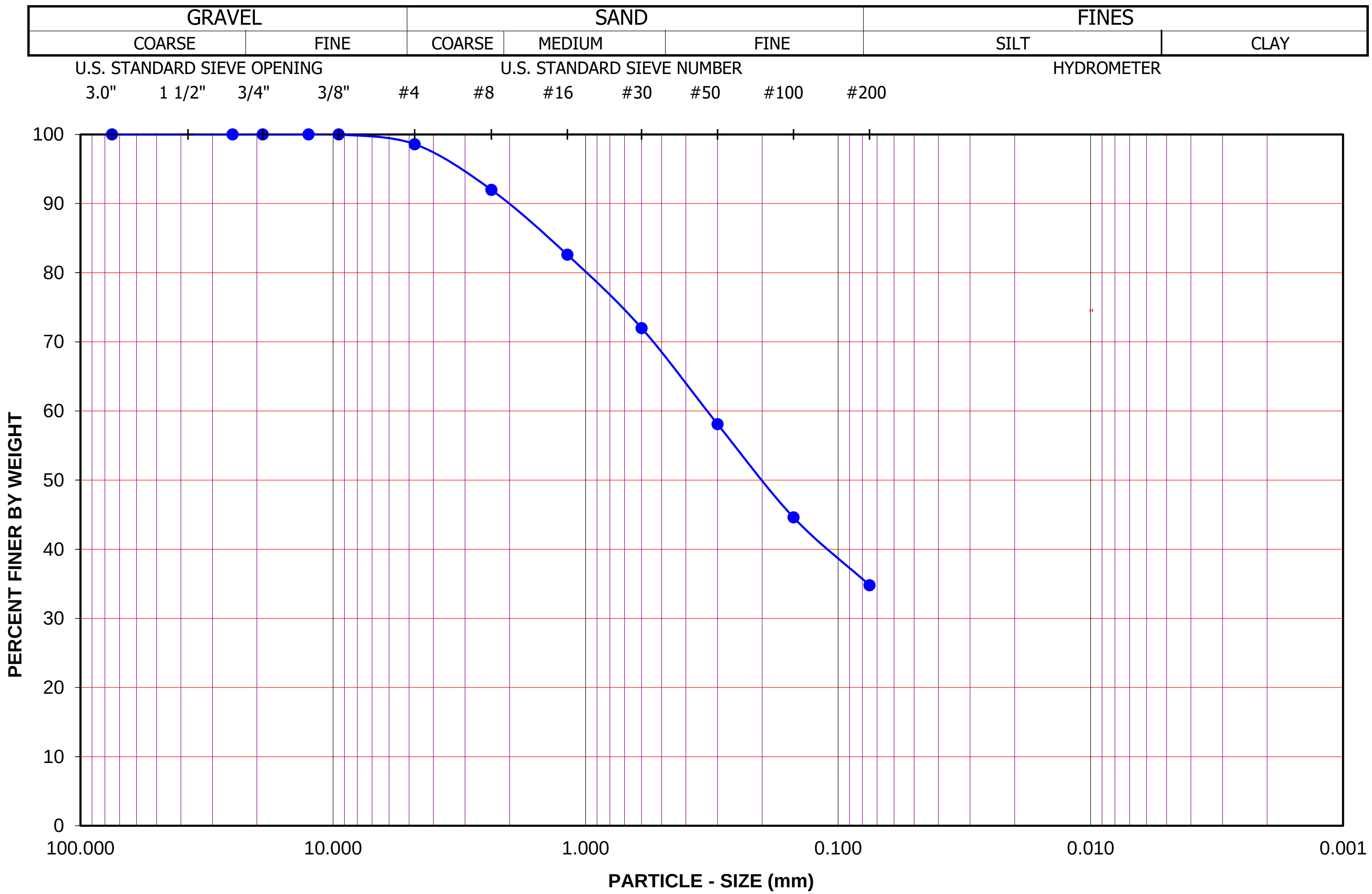
FINES: **35 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = N/A

Cc = (D30)²/(D60*D10) = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

Boring No.: LB-7 Sample No.: B-1

Depth (feet): 5.0 - 10.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Brown.

GR:SA:FI : (%) 1 : 64 : 35

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Aug-20

Sieve; LB-7, B-1 (07-27-20)

Leighton

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	FLM	Date:	08/07/20
Project No.:	12762.002	Checked By:	MRV	Date:	08/11/20
Boring No.:	LB-15	Depth (feet):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	M	Wt. of Air-Dry Soil + Cont. (g)	1028.5
Wt. of Air-Dried Soil + Cont.(g)	1028.5	Wt. of Dry Soil + Cont. (g)	1008.6
Wt. of Container (g)	666.7	Wt. of Container No.______ (g)	666.7
Dry Wt. of Soil (g)	341.9	Moisture Content (%)	5.8

After Wet Sieve	Container No.	M
	Wt. of Dry Soil + Container (g)	840.0
	Wt. of Container (g)	666.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	173.3

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	2.4	99.3
#8	2.360	21.5	93.7
#16	1.180	42.7	87.5
#30	0.600	62.1	81.8
#50	0.300	84.9	75.2
#100	0.150	122.1	64.3
#200	0.075	167.7	51.0
PAN			

GRAVEL: **1 %**

SAND: **48 %**

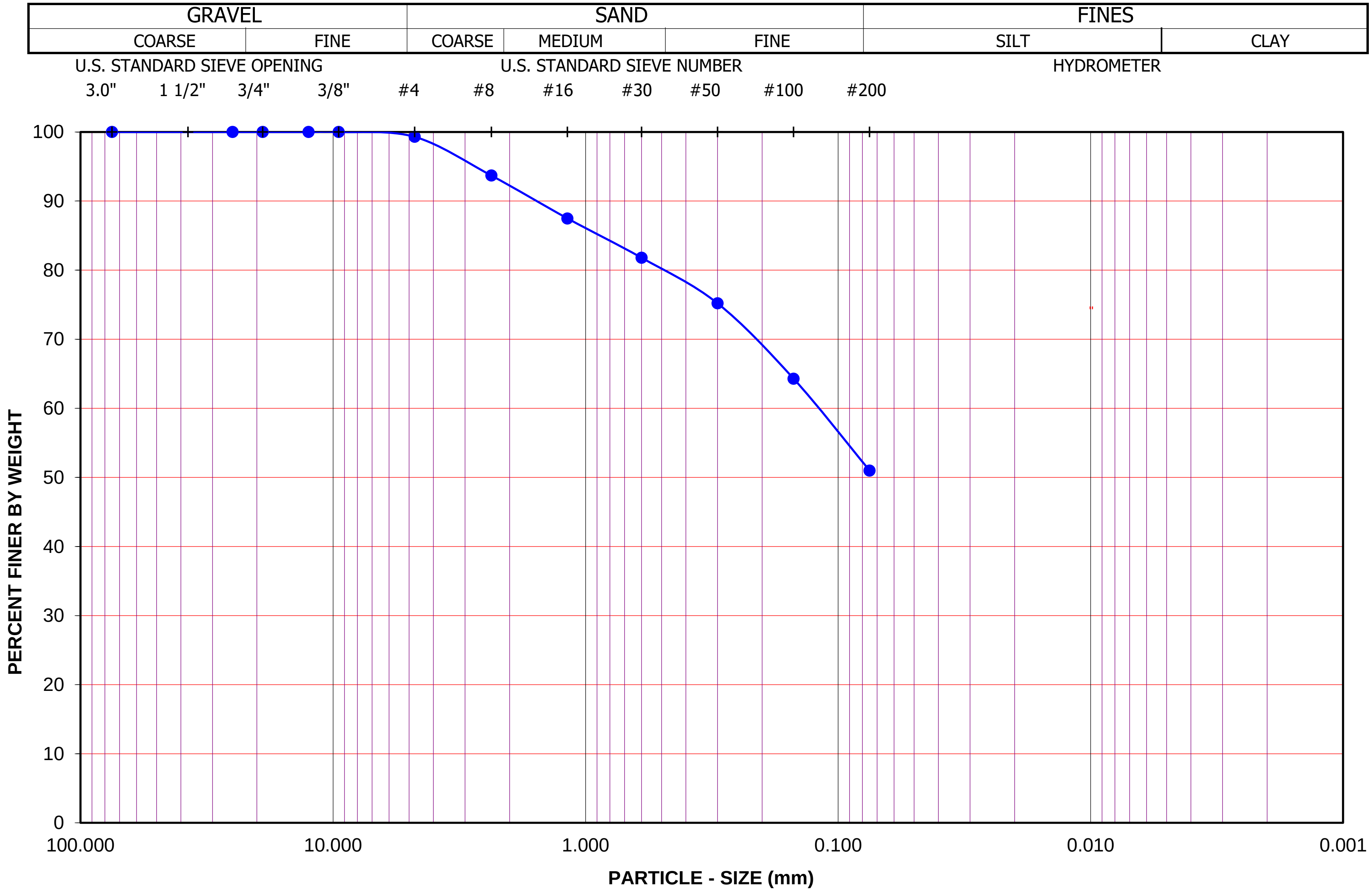
FINES: **51 %**

GROUP SYMBOL: **s(ML)**

Cu = D60/D10 = N/A

Cc = (D30)²/(D60*D10) = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

Boring No.: LB-15 Sample No.: B-1

Depth (feet): 0 - 5.0 Soil Type : s(ML)

Soil Identification: Sandy Silt s(ML), Brown.

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

GR:SA:FI : (%) 1 : 48 : 51

Aug-20

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS
ASTM D 6913

Leighton

Project Name:	Meridian D-1 Aviation Geo	Tested By:	MRV	Date:	10/06/20
Project No.:	12762.002	Checked By:	MRV	Date:	10/08/20
Boring No.:	LB-19	Depth (feet):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Dark Yellowish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	BA	Wt. of Air-Dry Soil + Cont. (g)	810.1
Wt. of Air-Dried Soil + Cont.(g)	810.1	Wt. of Dry Soil + Cont. (g)	783.5
Wt. of Container (g)	278.1	Wt. of Container No.______ (g)	278.1
Dry Wt. of Soil (g)	505.4	Moisture Content (%)	5.3

After Wet Sieve	Container No.	BA
	Wt. of Dry Soil + Container (g)	519.1
	Wt. of Container (g)	278.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	241.0

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	11.1	97.8
#16	1.180	35.3	93.0
#30	0.600	68.8	86.4
#50	0.300	107.9	78.7
#100	0.150	158.6	68.6
#200	0.075	228.3	54.8
PAN			

GRAVEL: **0 %**

SAND: **45 %**

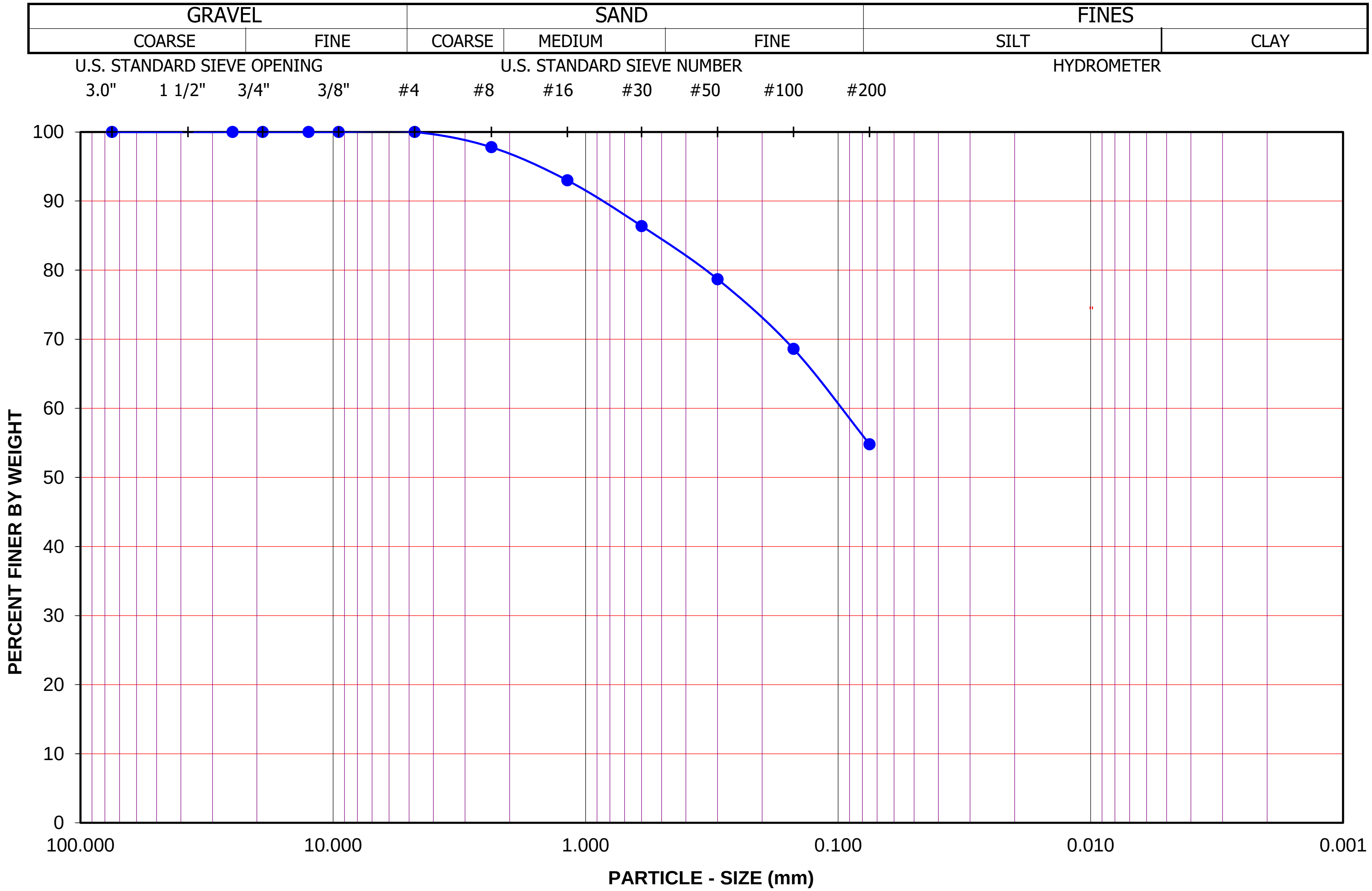
FINES: **55 %**

GROUP SYMBOL: **s(ML)**

Cu = D60/D10 = N/A

Cc = (D30)²/(D60*D10) = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo

Project No.: 12762.002

Boring No.: LB-19

Sample No.: B-1

Depth (feet): 0 - 5.0

Soil Type : s(ML)

Soil Identification: Sandy Silt s(ML), Dark Yellowish Brown.

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

GR:SA:FI : (%) 0 : 45 : 55

Oct-20

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	Meridian D-1 March Aviation	Tested By:	J. Gonzalez	Date:	08/11/20
Project No.:	12762.002	Input By:	A. Santos	Date:	08/12/20
Boring No.:	LB-1	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.07490 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	7130	7479	7520			
Weight of Mold (g)	2734	2734	2734			
Net Weight of Soil (g)	4396	4745	4786			
Wet Weight of Soil + Cont. (g)	714.5	642.5	789.6			
Dry Weight of Soil + Cont. (g)	694.0	609.9	731.9			
Weight of Container (g)	88.2	88.9	77.3			
Moisture Content (%)	3.38	6.26	8.81			
Wet Density (pcf)	129.4	139.7	140.9			
Dry Density (pcf)	125.2	131.4	129.5			

Maximum Dry Density (pcf) 131.6 **Optimum Moisture Content (%)** 6.8

PROCEDURE USED

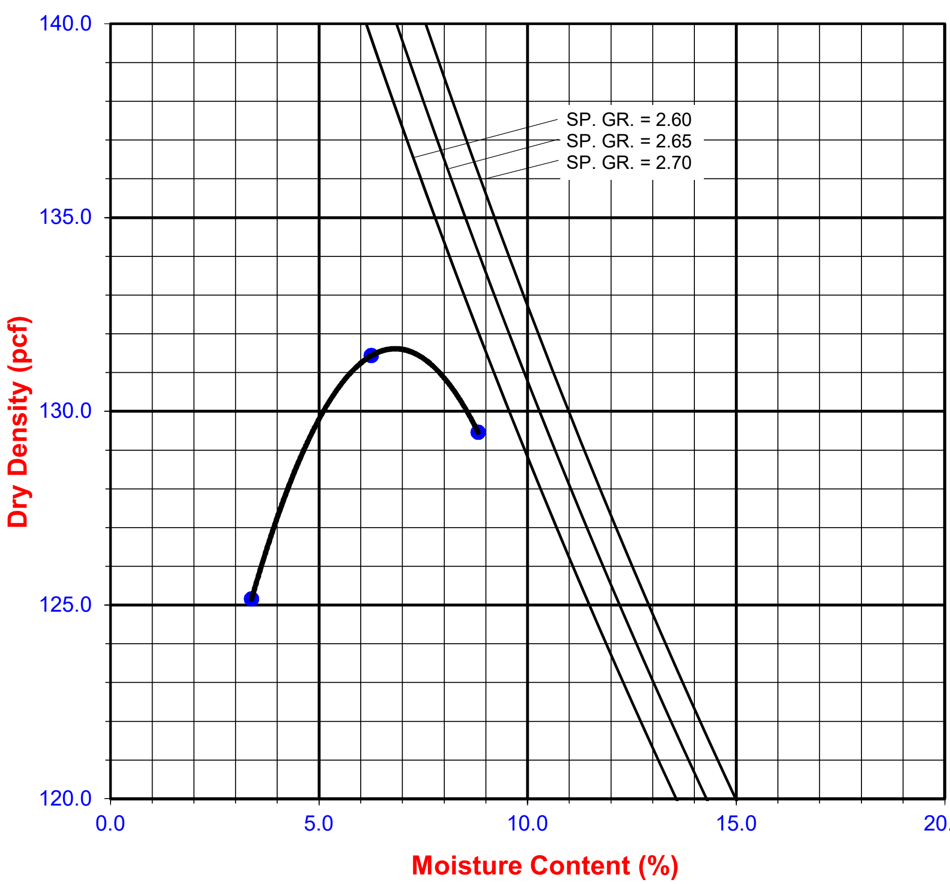
[ ] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[X] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution: 2:71:27
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	M. Vinet	Date:	08/10/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	08/11/20
Boring No.:	LB-5	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

Preparation Method: [X] Moist [ ] Dry | [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 | *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5628	5738	5760	5700		
Weight of Mold (g)	3562	3562	3562	3562		
Net Weight of Soil (g)	2066	2176	2198	2138		
Wet Weight of Soil + Cont. (g)	782.1	883.4	802.0	931.2		
Dry Weight of Soil + Cont. (g)	760.1	846.0	760.9	870.0		
Weight of Container (g)	278.5	281.3	280.6	278.8		
Moisture Content (%)	4.6	6.6	8.6	10.4		
Wet Density (pcf)	136.4	143.6	145.1	141.1		
Dry Density (pcf)	130.4	134.7	133.6	127.9		

Maximum Dry Density (pcf) 135.0 **Optimum Moisture Content (%)** 7.2

PROCEDURE USED

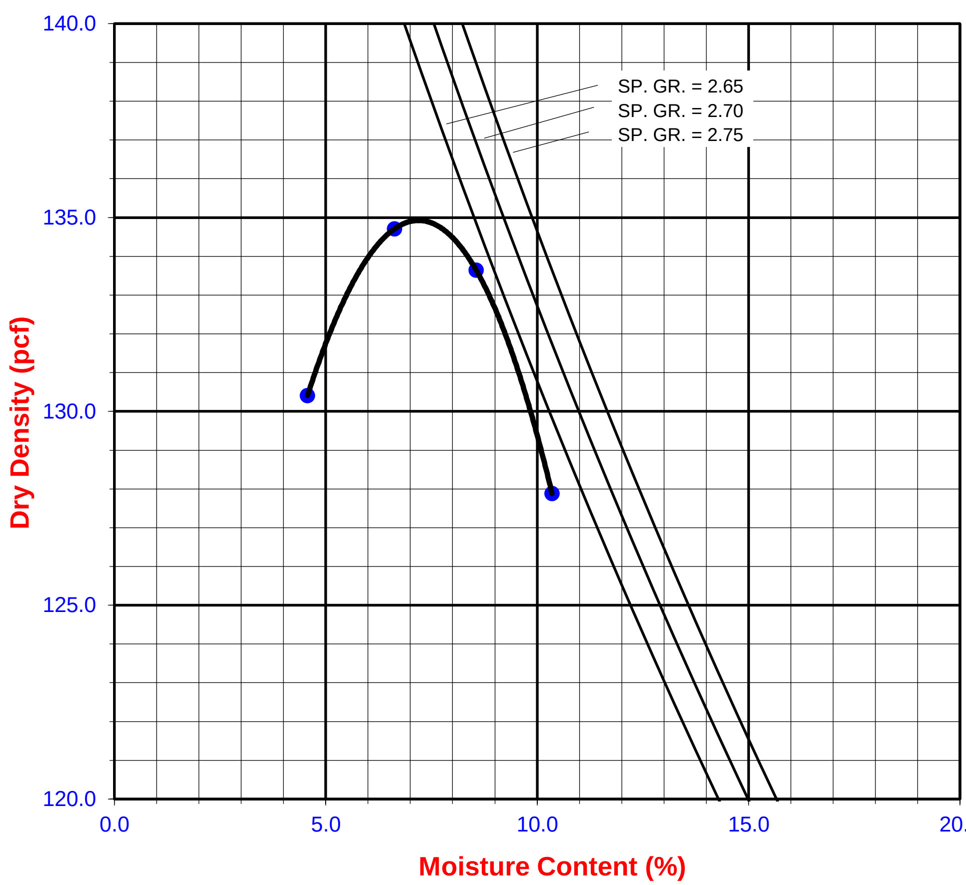
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 March Aviation	Tested By:	J. Gonzalez	Date:	08/11/20
Project No.:	12762.002	Input By:	A. Santos	Date:	08/12/20
Boring No.:	LB-7	Depth (ft.):	5-10		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Brown				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.07490 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	6949	7492	7531			
Weight of Mold (g)	2734	2734	2734			
Net Weight of Soil (g)	4215	4758	4797			
Wet Weight of Soil + Cont. (g)	825.3	827.5	788.1			
Dry Weight of Soil + Cont. (g)	793.3	774.3	723.2			
Weight of Container (g)	88.0	88.4	88.9			
Moisture Content (%)	4.54	7.76	10.23			
Wet Density (pcf)	124.1	140.0	141.2			
Dry Density (pcf)	118.7	130.0	128.1			

Maximum Dry Density (pcf) **130.4** **Optimum Moisture Content (%)** **8.5**

PROCEDURE USED

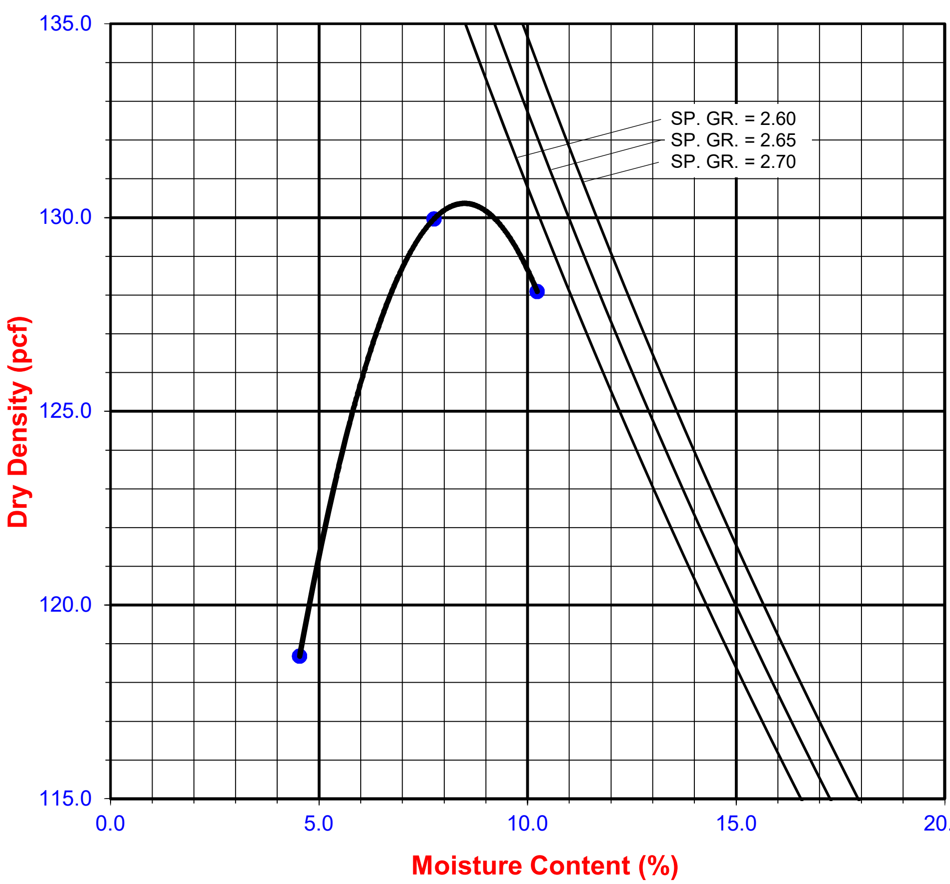
[ ] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[X] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution: 1:64:35
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	10/06/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	10/08/20
Boring No.:	LB-17	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry   [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340   *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5619	5718	5688			
Weight of Mold (g)	3560	3560	3560			
Net Weight of Soil (g)	2059	2158	2128			
Wet Weight of Soil + Cont. (g)	1431.7	1329.4	1166.1			
Dry Weight of Soil + Cont. (g)	1359.4	1246.6	1082.4			
Weight of Container (g)	328.1	327.8	332.8			
Moisture Content (%)	7.0	9.0	11.2			
Wet Density (pcf)	135.9	142.4	140.5			
Dry Density (pcf)	127.0	130.7	126.4			

Maximum Dry Density (pcf) 130.7   **Optimum Moisture Content (%)** 9.0

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

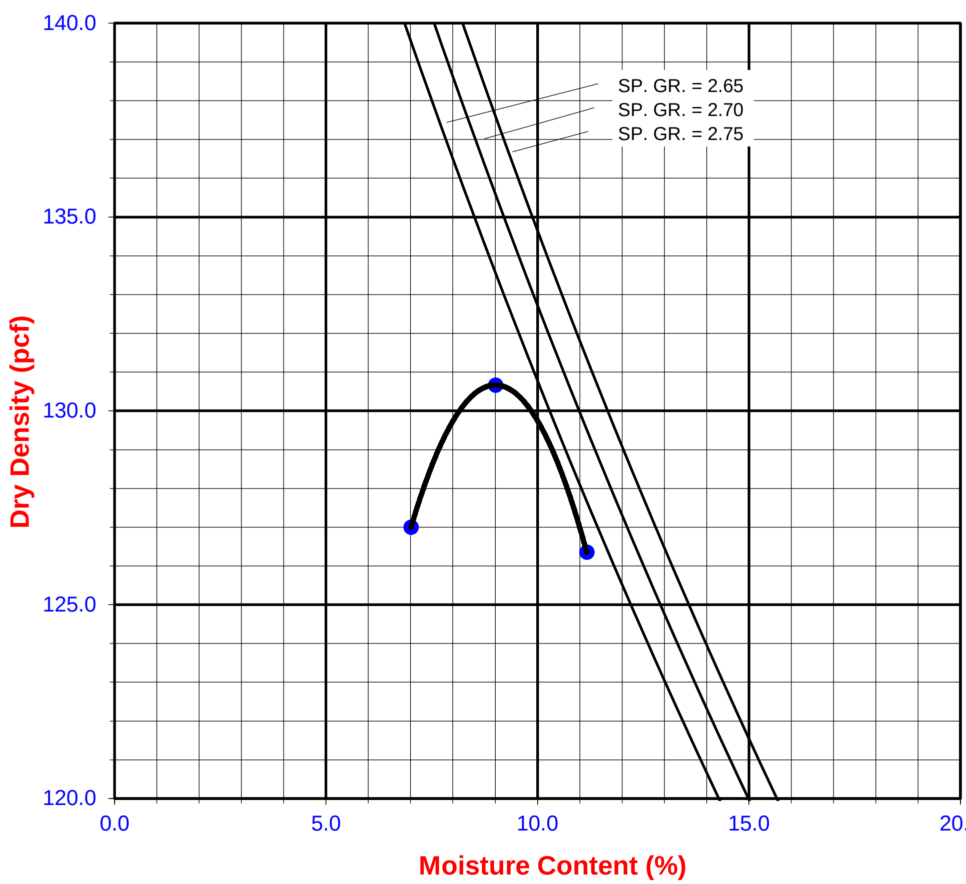
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	10/06/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	10/08/20
Boring No.:	LB-19	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Dark Yellowish Brown.				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5525	5664	5682	5617		
Weight of Mold (g)	3560	3560	3560	3560		
Net Weight of Soil (g)	1965	2104	2122	2057		
Wet Weight of Soil + Cont. (g)	1403.6	1536.4	1261.1	1127.3		
Dry Weight of Soil + Cont. (g)	1333.0	1434.2	1173.4	1031.3		
Weight of Container (g)	327.6	329.3	414.9	326.1		
Moisture Content (%)	7.0	9.2	11.6	13.6		
Wet Density (pcf)	129.7	138.9	140.1	135.8		
Dry Density (pcf)	121.2	127.1	125.5	119.5		

Maximum Dry Density (pcf) 127.3 **Optimum Moisture Content (%)** 9.8

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

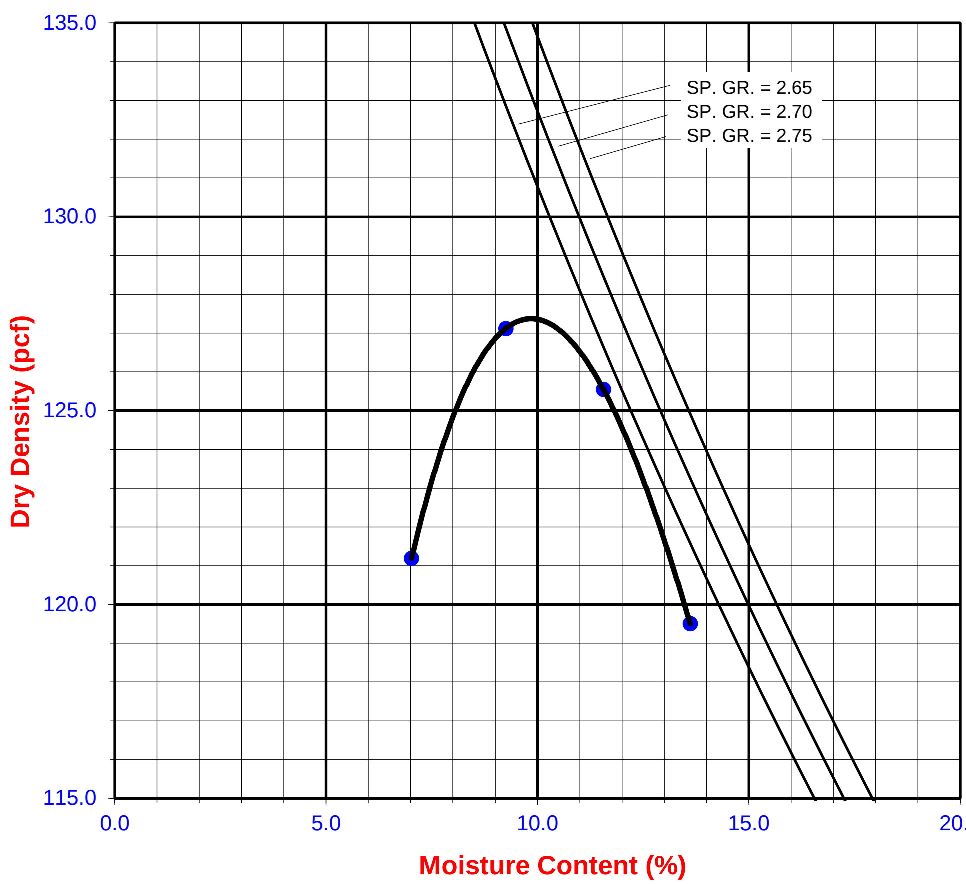
[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
0:45:55
GR:SA:FI

Atterberg Limits:

LL,PL,PI



CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL

ASTM D 1883

Leighton

Project Name:	Meridian D-1 March Aviation	Tested By :	J. Gonzales
Date:	8/13/2020		
Project No. :	12762.002	Height of Drop (in):	18.0
Boring No.:	LB-1	Wt. of Rammer (lbs) :	10.0
Sample No.:	B-1	Height of Sample (in) :	4.584
Depth (ft.) :	0-5	Piston Diameter (in):	1.954
Soil Description :	Silty Sand (SM), Reddish Brown	Load Constant:	5.456932

SAMPLE PREPARATION

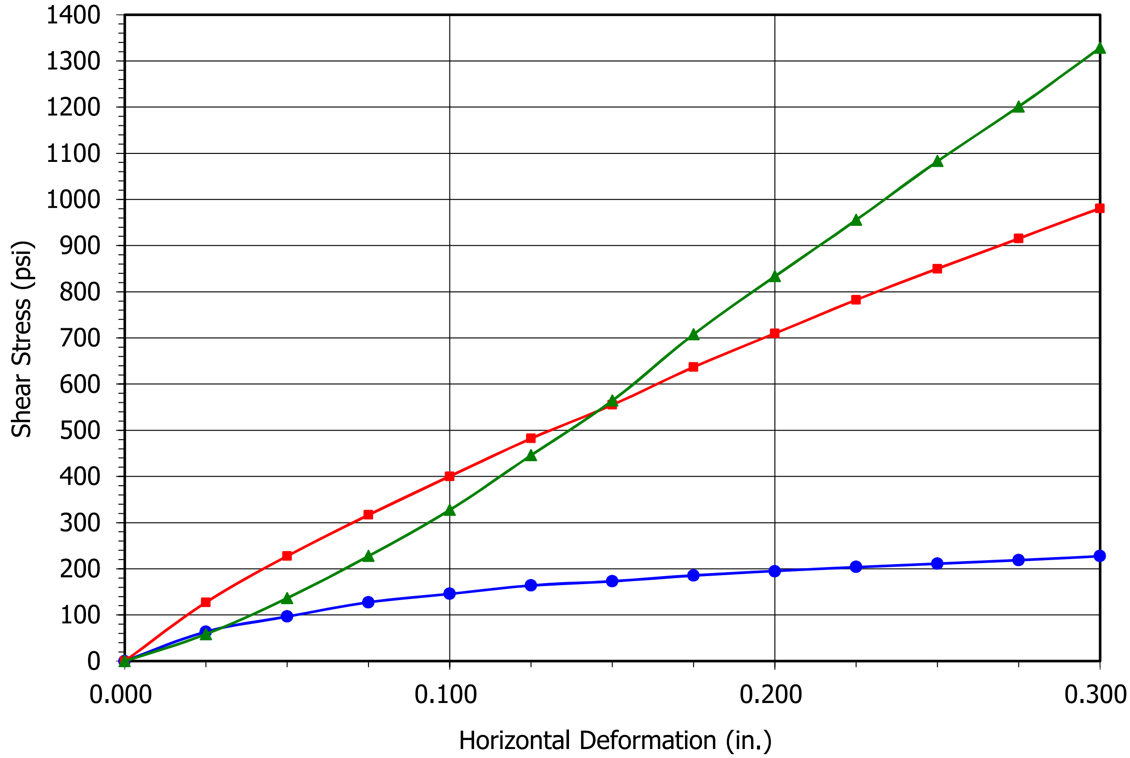
Blows Per Layer	● 10	■ 25	▲ 56
Mold Number	36	32	35
Weight of Wet Soil & Mold (g)	8608	8947	9131
Weight of Mold (g)	4183	4181	4181
Weight of Wet Soil (g)	4425	4766	4950
Mold Factor	0.02936	0.02937	0.02938
Wet Weight Soil + Container (g)	380.4	390.2	289.6
Dry Weight Soil + Container (g)	357.7	366.8	274.0
Weight of Container (g)	39.6	39.6	38.9
Initial Swell / Collapse Reading (in.)	0.2080	0.1140	0.2940

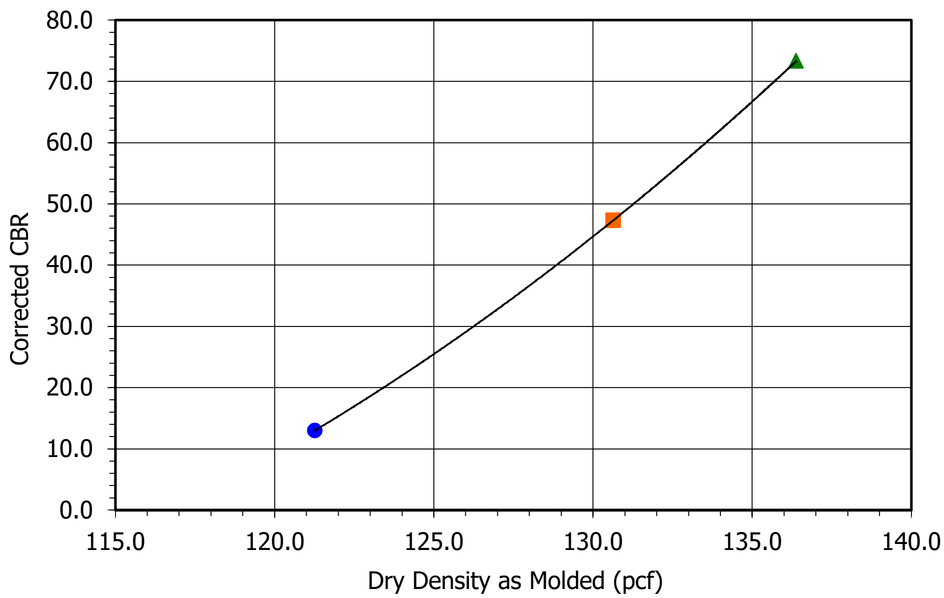
AFTER SOAKING

Final Swell / Collapse Reading (in.)	0.2025	0.1190	0.2980
Wt. Wet Soil + Mold + Base Plate (g)	11898	12128	12267
Weight of Mold+ Base Plate (g)	7280	7267	7264
Weight of Wet Soil (g)	4618	4861	5003
Wet Wt. Soil + Container (g)	355.3	327.7	287.8
Dry Wt. Soil + Container (g)	325.1	304.6	265.1
Weight of Container (g)	39.8	38.7	38.8

LOAD TEST DATA

Penetration (in.)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)
0.000	0.0	0.0	0.0	0.0	0.0	0.0
0.025	35.0	63.7	70.0	127.4	32.0	58.2
0.050	53.0	96.4	125.0	227.5	75.0	136.5
0.075	70.0	127.4	174.0	316.6	125.0	227.5
0.100	80.0	145.6	220.0	400.3	180.0	327.6
0.125	90.0	163.8	265.0	482.2	245.0	445.8
0.150	95.0	172.9	305.0	555.0	310.0	564.1
0.175	102.0	185.6	350.0	636.9	389.0	707.9
0.200	107.0	194.7	390.0	709.7	458.0	833.4
0.225	112.0	203.8	430.0	782.5	525.0	955.4
0.250	116.0	211.1	467.0	849.8	595.0	1082.7
0.275	120.0	218.4	503.0	915.3	660.0	1201.0
0.300	125.0	227.5	539.0	980.8	730.0	1328.4
0.325	129.0	234.7	572.0	1040.9	800.0	1455.8
0.350	133.0	242.0	605.0	1100.9	865.0	1574.1
0.375	137.0	249.3	640.0	1164.6	938.0	1706.9
0.400	140.0	254.8	670.0	1219.2	1000.0	1819.7
0.425	144.0	262.0	704.0	1281.1	1065.0	1938.0
0.450	148.0	269.3	732.0	1332.1	1125.0	2047.2
0.475	151.0	274.8	763.0	1388.5	1185.0	2156.4
0.500	155.0	282.1	790.0	1437.6	1245.0	2265.6





Blows per layer	● 10		■ 25		▲ 56	
Condition	Before	After	Before	After	Before	After
Moisture Content (%)	7.1	10.6	7.2	8.7	6.6	10.0
Dry Density (pcf)	121.3	122.6	130.6	131.4	136.4	133.6
Swell(+)/Collapse(-) (%)	-0.12		0.11		0.09	
Bearing Ratio	13.0		47.3		73.3	

Boring No.: LB-1
Sample No.: B-1
Depth (ft): 0-5
Sample Description:
Silty Sand (SM), Reddish Brown

Leighton

CALIFORNIA BEARING RATIO of LABORATORY-COMPACTED SOIL
ASTM D 1883

Project No.: 12762.002

Meridian D-1 March Aviation

08-20

CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Leighton

Project Name:	Meridian D-1 March Aviation	Tested By :	J. Gonzales
Date:	8/14/2020		
Project No. :	12762.002	Height of Drop (in):	18.0
Boring No.:	LB-7	Wt. of Rammer (lbs) :	10.0
Sample No.:	B-1	Height of Sample (in) :	4.584
Depth (ft.) :	0-5	Piston Diameter (in):	1.954
Soil Description :	Silty Sand (SM), Brown	Load Constant:	5.456932

SAMPLE PREPARATION

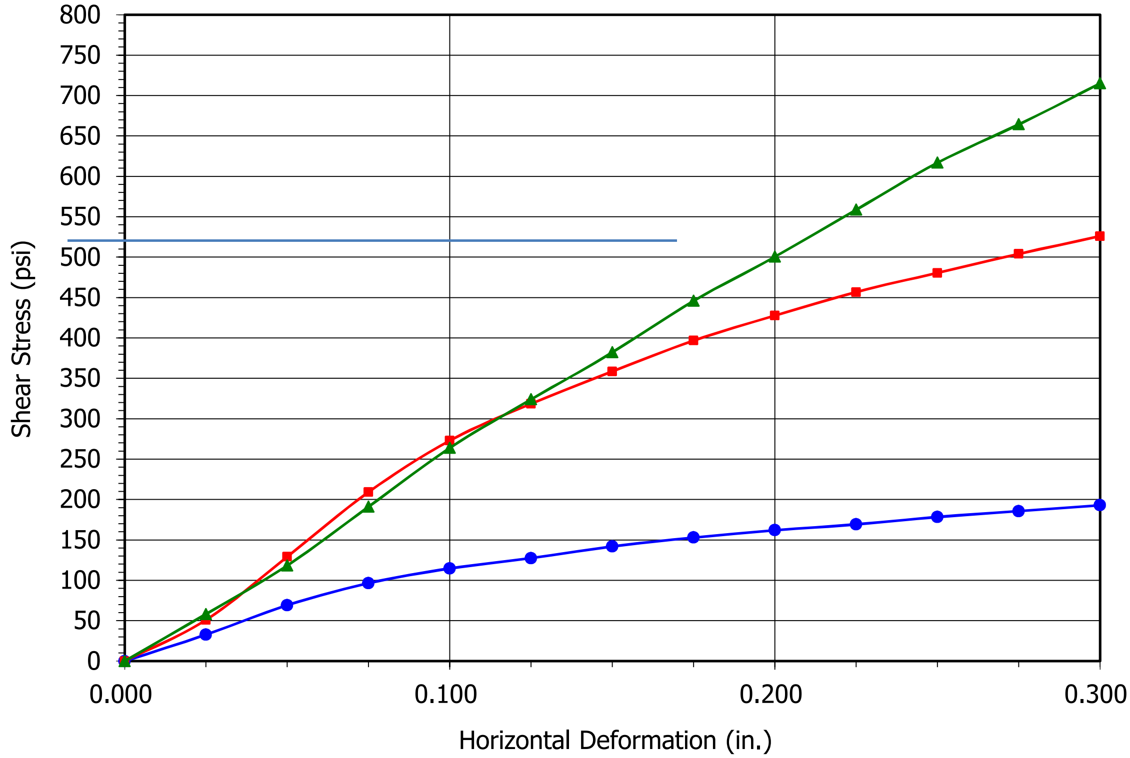
Blows Per Layer	● 10	■ 25	▲ 56
Mold Number	21	23	26
Weight of Wet Soil & Mold (g)	8594	8765	9098
Weight of Mold (g)	4181	4182	4182
Weight of Wet Soil (g)	4413	4583	4916
Mold Factor	0.02940	0.02938	0.02940
Wet Weight Soil + Container (g)	383.8	387.1	354.8
Dry Weight Soil + Container (g)	358.2	360.6	330.7
Weight of Container (g)	39.3	38.1	39.0
Initial Swell / Collapse Reading (in.)	0.1580	0.2700	0.3620

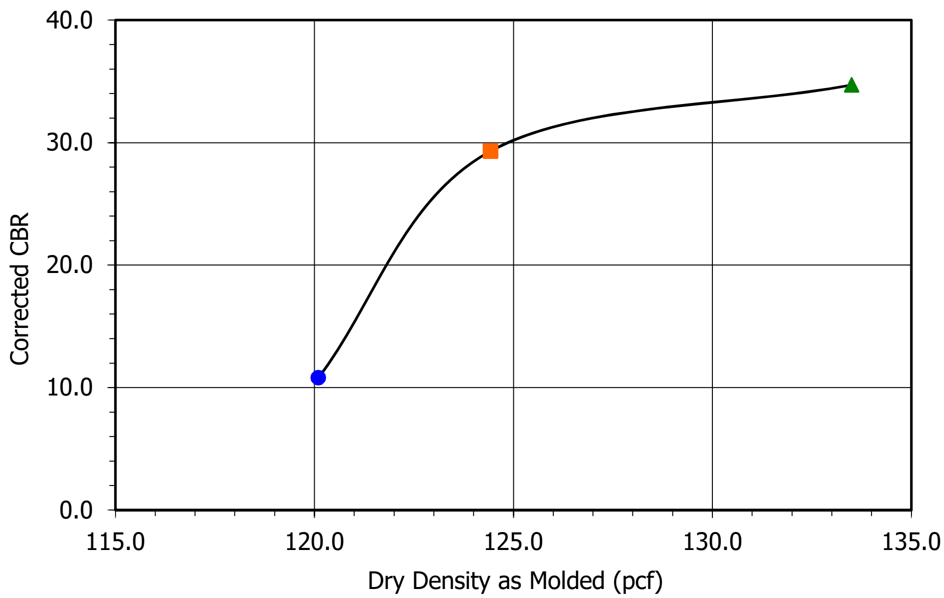
AFTER SOAKING

Final Swell / Collapse Reading (in.)	0.2030	0.2955	0.3830
Wt. Wet Soil + Mold + Base Plate (g)	11924	12132	12269
Weight of Mold+ Base Plate (g)	7298	7260	7290
Weight of Wet Soil (g)	4626	4872	4979
Wet Wt. Soil + Container (g)	339.8	316.3	300.9
Dry Wt. Soil + Container (g)	303.3	285.5	273.5
Weight of Container (g)	38.8	39.5	39.8

LOAD TEST DATA

Penetration (in.)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)
0.000	0.0	0.0	0.0	0.0	0.0	0.0
0.025	18.0	32.8	28.0	51.0	32.0	58.2
0.050	38.0	69.2	71.0	129.2	65.0	118.3
0.075	53.0	96.4	115.0	209.3	105.0	191.1
0.100	63.0	114.6	150.0	273.0	145.0	263.9
0.125	70.0	127.4	175.0	318.5	178.0	323.9
0.150	78.0	141.9	197.0	358.5	210.0	382.1
0.175	84.0	152.9	218.0	396.7	245.0	445.8
0.200	89.0	162.0	235.0	427.6	275.0	500.4
0.225	93.0	169.2	251.0	456.8	307.0	558.7
0.250	98.0	178.3	264.0	480.4	339.0	616.9
0.275	102.0	185.6	277.0	504.1	365.0	664.2
0.300	106.0	192.9	289.0	525.9	393.0	715.2
0.325	110.0	200.2	302.0	549.6	422.0	767.9
0.350	114.0	207.5	309.0	562.3	450.0	818.9
0.375	118.0	214.7	318.0	578.7	475.0	864.4
0.400	121.0	220.2	327.0	595.1	501.0	911.7
0.425	125.0	227.5	336.0	611.4	525.0	955.4
0.450	127.0	231.1	346.0	629.6	555.0	1010.0
0.475	130.0	236.6	356.0	647.8	580.0	1055.4
0.500	134.0	243.8	365.0	664.2	600.0	1091.8





Blows per layer	● 10		■ 25		▲ 56	
Condition	Before	After	Before	After	Before	After
Moisture Content (%)	8.0	13.8	8.2	12.5	8.3	11.7
Dry Density (pcf)	120.1	119.5	124.4	127.2	133.5	131.0
Swell(+)/Collapse(-) (%)	0.98		0.56		0.46	
Bearing Ratio	10.8		29.3		34.7	

Boring No.: LB-7
Sample No.: B-1
Depth (ft): 0-5
Sample Description:
Silty Sand (SM), Brown

Leighton

CALIFORNIA BEARING RATIO of LABORATORY-COMPACTED SOIL
ASTM D 1883

Project No.: 12762.002

Meridian D-1 March Aviation

08-20

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By: M. Vinet	Date: 8/6/20
Project No.:	12762.002	Checked By: M. Vinet	Date: 8/11/20
Boring No.:	LB-2	Sample Type: IN SITU	
Sample No.:	R-2	Depth (ft.) 7.5	

Sample Description: Silty, Clayey Sand (SC-SM), Reddish Brown.

Source and Type of Water Used for Inundation: Arrowhead (Distilled)

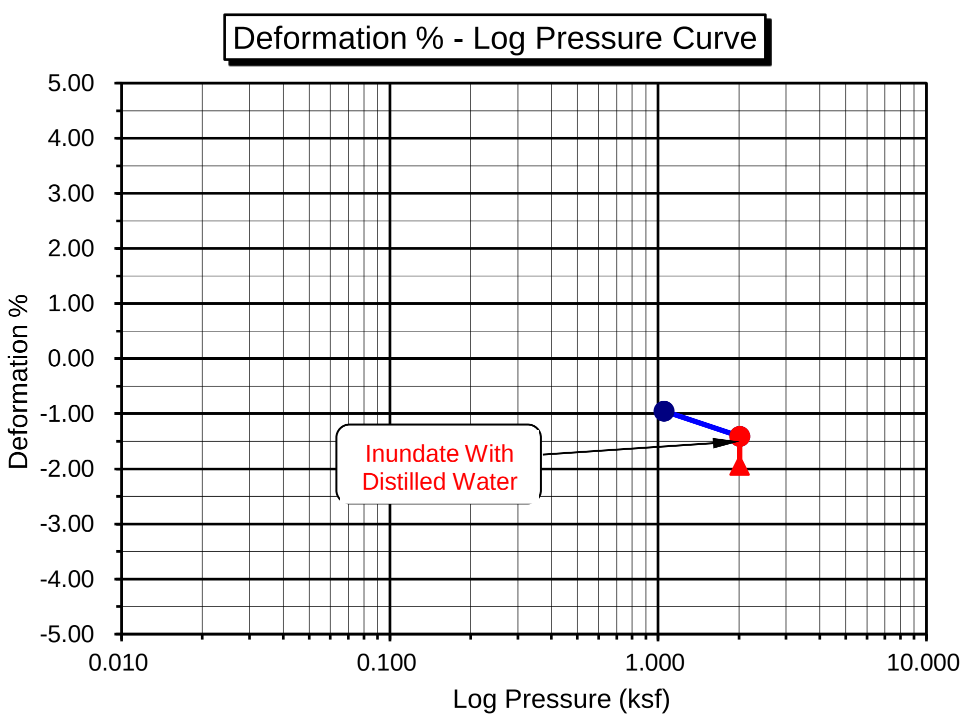
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	114.8
Initial Moisture (%):	14.2
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	117.0
Final Moisture (%) :	16.6
Initial Void ratio:	0.4688
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	81.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0095	0.9905	0.00	-0.95	0.4548	-0.95
2.013	0.0141	0.9859	0.00	-1.41	0.4481	-1.41
H2O	0.0194	0.9806	0.00	-1.94	0.4403	-1.94

Percent Swell / Settlement After Inundation = -0.54



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

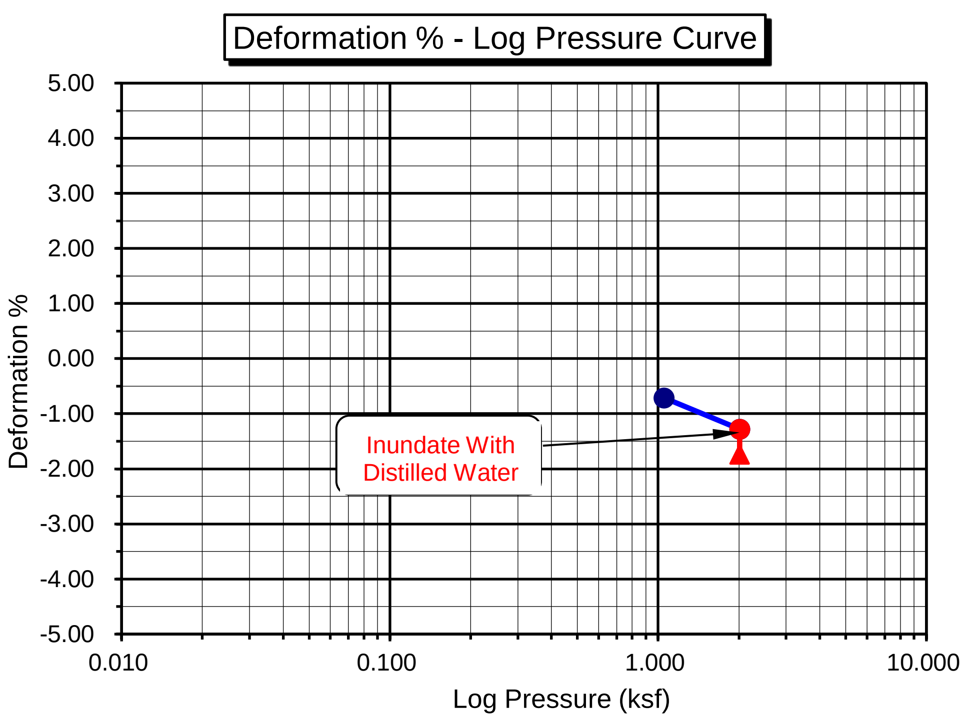
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 8/26/20
Project No.: 12762.002
Checked By: M. Vinet Date: 8/11/20
Boring No.: **LB-6**
Sample Type: IN SITU
Sample No.: **R-3**
Depth (ft.) 10.0
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	121.6
Initial Moisture (%):	11.4
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	123.7
Final Moisture (%) :	13.6
Initial Void ratio:	0.3865
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	79.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0071	0.9929	0.00	-0.71	0.3766	-0.71
2.013	0.0128	0.9872	0.00	-1.28	0.3687	-1.28
H2O	0.0174	0.9826	0.00	-1.74	0.3623	-1.74

Percent Swell / Settlement After Inundation = -0.47



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By: M. Vinet	Date: 8/26/20
Project No.:	12762.002	Checked By: M. Vinet	Date: 8/11/20
Boring No.:	LB-9	Sample Type: IN SITU	
Sample No.:	R-3	Depth (ft.) 10.0	

Sample Description: Silty Sand (SM), Brown.

Source and Type of Water Used for Inundation: Arrowhead (Distilled)

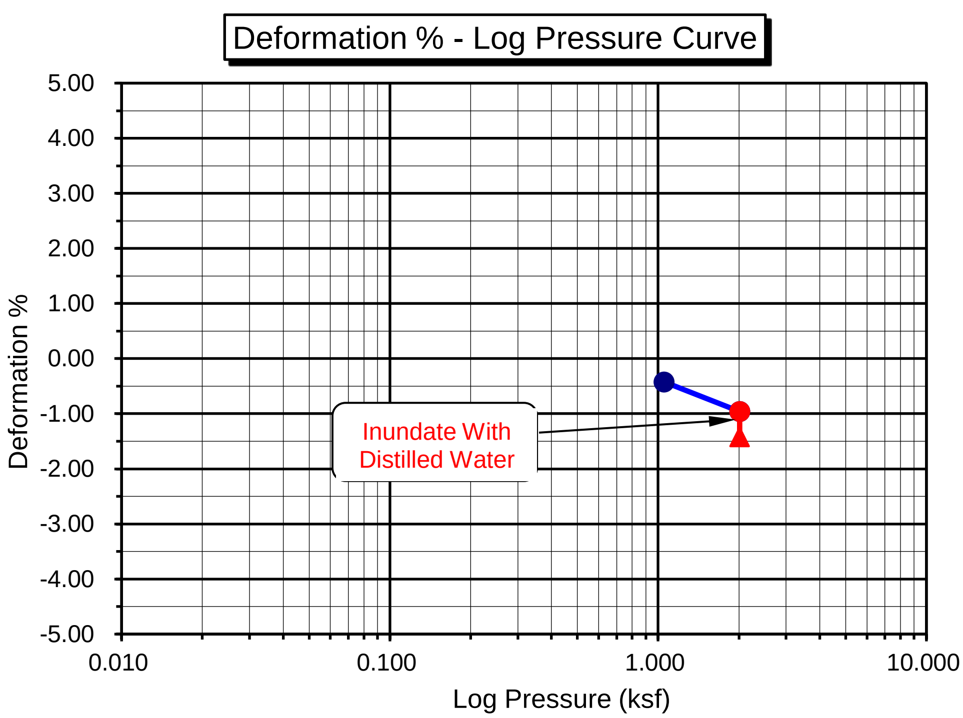
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	114.8
Initial Moisture (%):	14.7
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	116.5
Final Moisture (%) :	16.0
Initial Void ratio:	0.4677
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	84.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0042	0.9958	0.00	-0.42	0.4616	-0.42
2.013	0.0096	0.9904	0.00	-0.96	0.4536	-0.96
H2O	0.0142	0.9858	0.00	-1.42	0.4469	-1.42

Percent Swell / Settlement After Inundation = -0.46



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

Project Name: Meridian D-1 Aviation Geo Inv	Tested By: M. Vinet	Date:	8/26/20
Project No.: 12762.002	Checked By: M. Vinet	Date:	8/11/20
Boring No.: **LB-10**	Sample Type: IN SITU		
Sample No.: **R-3**	Depth (ft.) 10.0		

Sample Description: Silty Sand (SM), Brown.

Source and Type of Water Used for Inundation: Arrowhead (Distilled)

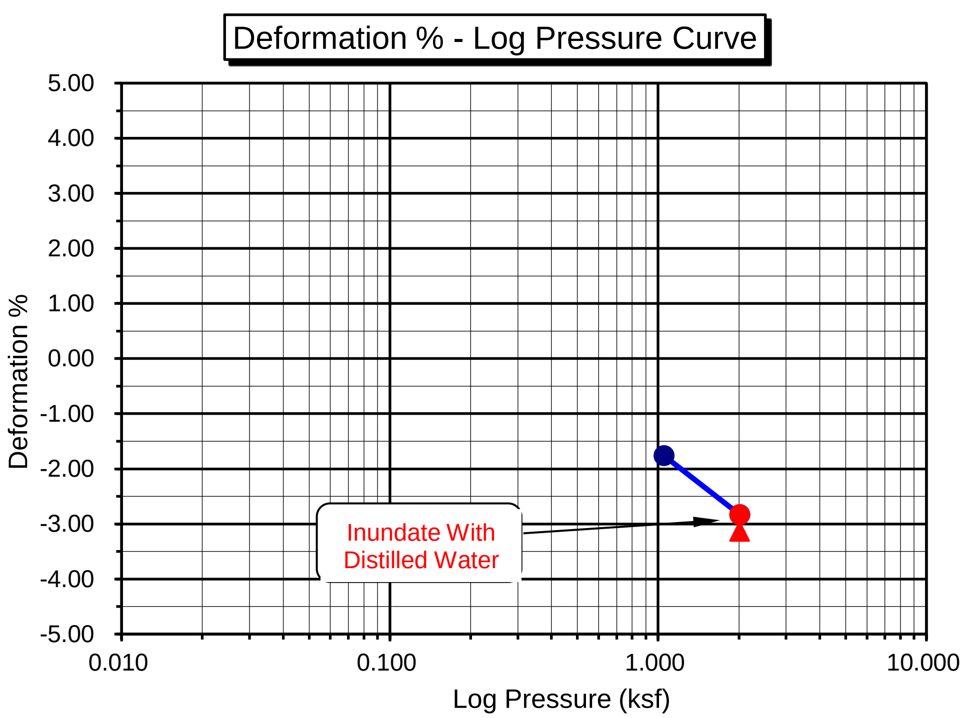
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	115.3
Initial Moisture (%):	14.6
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	119.0
Final Moisture (%) :	15.8
Initial Void ratio:	0.4624
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	85.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0176	0.9824	0.00	-1.76	0.4367	-1.76
2.013	0.0283	0.9717	0.00	-2.83	0.4211	-2.83
H2O	0.0314	0.9686	0.00	-3.14	0.4165	-3.14

Percent Swell / Settlement After Inundation = -0.32



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

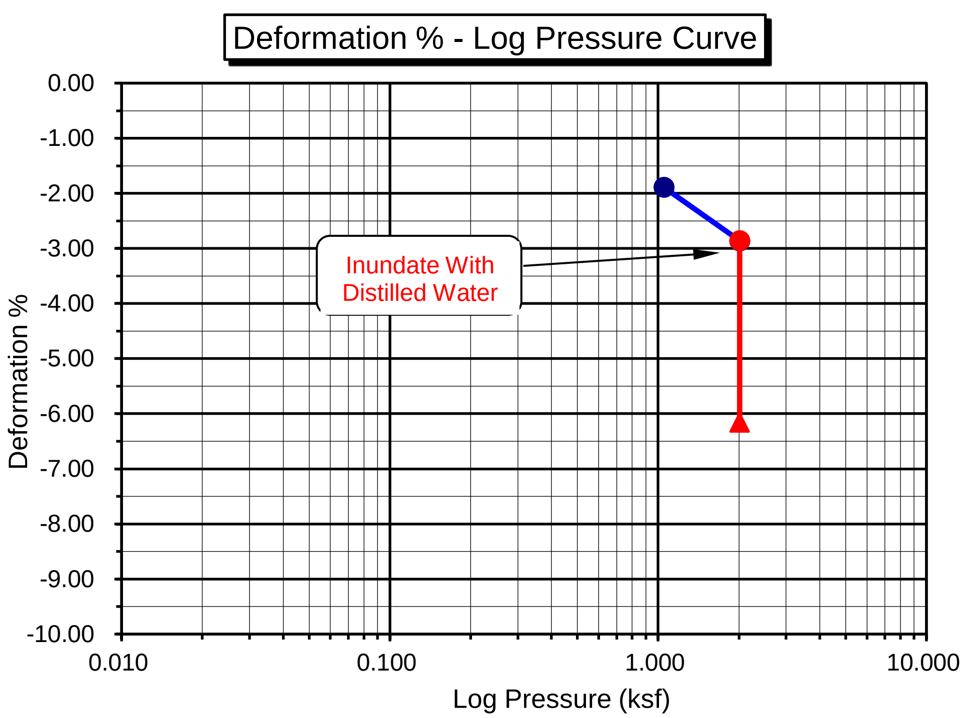
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 8/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 8/11/20
Boring No.: **LB-15**
Sample Type: IN SITU
Sample No.: **R-5**
Depth (ft.) 10.0
Sample Description: Silty Sand (SM), Yellowish Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	109.7
Initial Moisture (%):	9.2
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	116.9
Final Moisture (%) :	18.6
Initial Void ratio:	0.5367
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	46.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0189	0.9811	0.00	-1.89	0.5076	-1.89
2.013	0.0286	0.9714	0.00	-2.86	0.4927	-2.86
H2O	0.0616	0.9384	0.00	-6.16	0.4420	-6.16

Percent Swell / Settlement After Inundation = -3.40



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

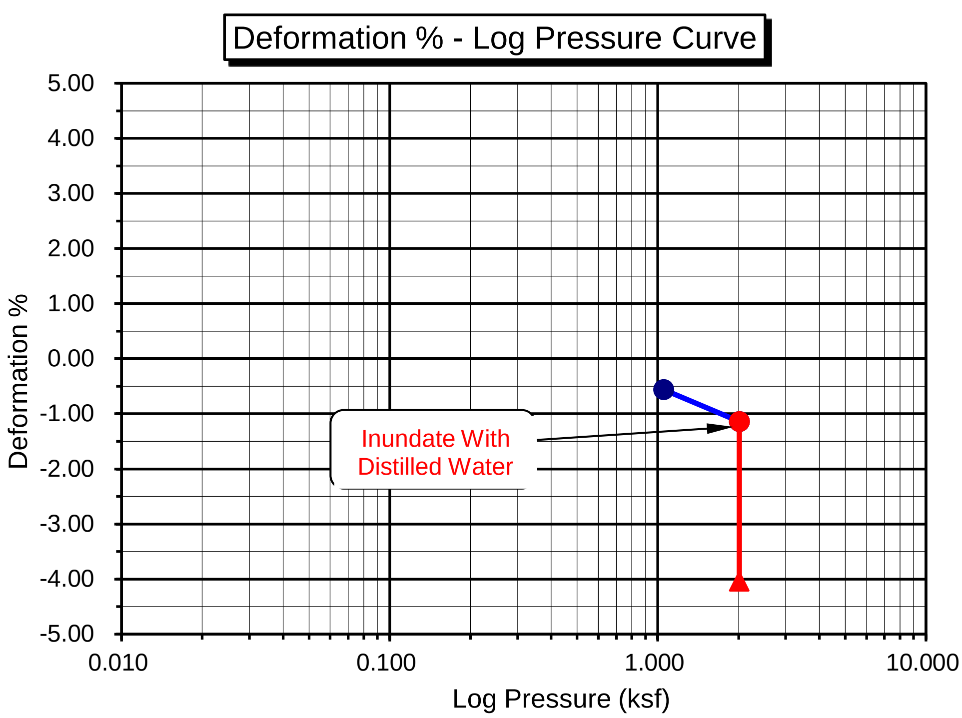
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 10/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 10/8/20
Boring No.: **LB-16**
Sample Type: IN SITU
Sample No.: **R-2**
Depth (ft.) 7.5
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	101.9
Initial Moisture (%):	6.1
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	106.1
Final Moisture (%) :	19.0
Initial Void ratio:	0.6549
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	25.3

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0056	0.9944	0.00	-0.56	0.6456	-0.56
2.013	0.0114	0.9886	0.00	-1.14	0.6360	-1.14
H2O	0.0404	0.9596	0.00	-4.04	0.5880	-4.04

Percent Swell / Settlement After Inundation = -2.93



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

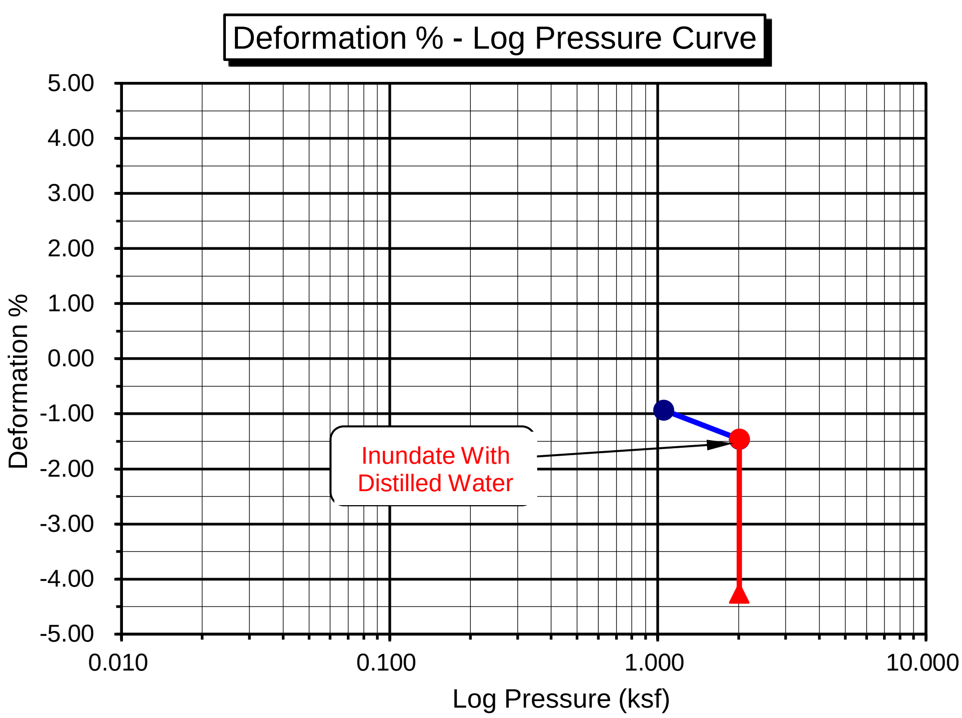
Project Name: Meridian D-1 Aviation Geo Inv — Tested By: M. Vinet — Date: 10/6/20
Project No.: 12762.002 — Checked By: M. Vinet — Date: 10/8/20
Boring No.: **LB-16** — Sample Type: IN SITU
Sample No.: **R-4** — Depth (ft.) 10.0
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	102.7
Initial Moisture (%):	5.3
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	107.2
Final Moisture (%) :	15.7
Initial Void ratio:	0.6419
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	22.3

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0093	0.9907	0.00	-0.93	0.6266	-0.93
2.013	0.0146	0.9854	0.00	-1.46	0.6179	-1.46
H2O	0.0426	0.9574	0.00	-4.26	0.5720	-4.26

Percent Swell / Settlement After Inundation = -2.84



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

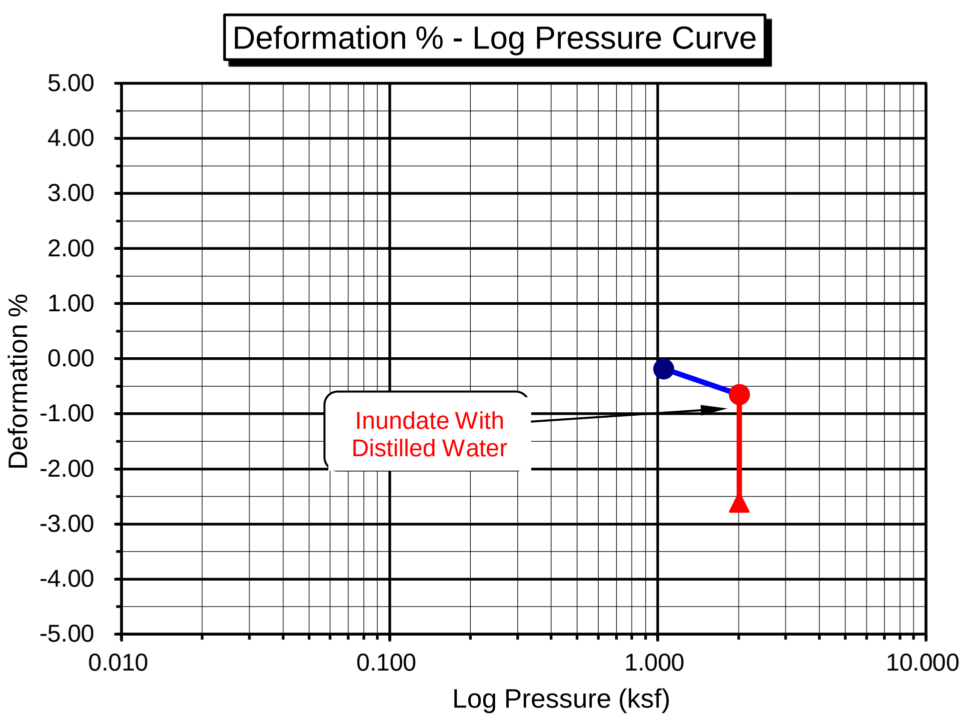
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 10/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 10/8/20
Boring No.: **LB-19**
Sample Type: IN SITU
Sample No.: **R-3**
Depth (ft.) 5.0
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	115.4
Initial Moisture (%):	4.6
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	118.4
Final Moisture (%) :	14.9
Initial Void ratio:	0.4613
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	26.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0018	0.9982	0.00	-0.18	0.4587	-0.18
2.013	0.0065	0.9935	0.00	-0.65	0.4518	-0.65
H2O	0.0261	0.9739	0.00	-2.61	0.4231	-2.61

Percent Swell / Settlement After Inundation = -1.97



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

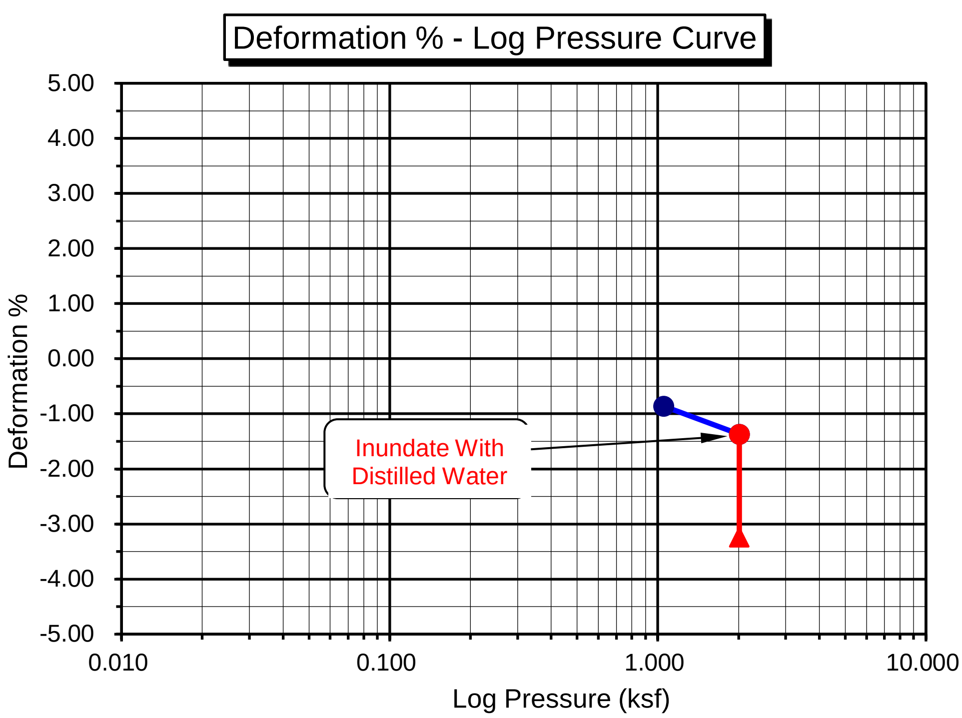
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 10/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 10/8/20
Boring No.: **LB-22**
Sample Type: IN SITU
Sample No.: **R-4**
Depth (ft.) 10.0
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	100.1
Initial Moisture (%):	10.0
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	103.4
Final Moisture (%) :	19.5
Initial Void ratio:	0.6847
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	39.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0086	0.9914	0.00	-0.86	0.6702	-0.86
2.013	0.0137	0.9863	0.00	-1.37	0.6616	-1.37
H2O	0.0324	0.9676	0.00	-3.24	0.6301	-3.24

Percent Swell / Settlement After Inundation = -1.90



Rev. 01-10

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Leighton

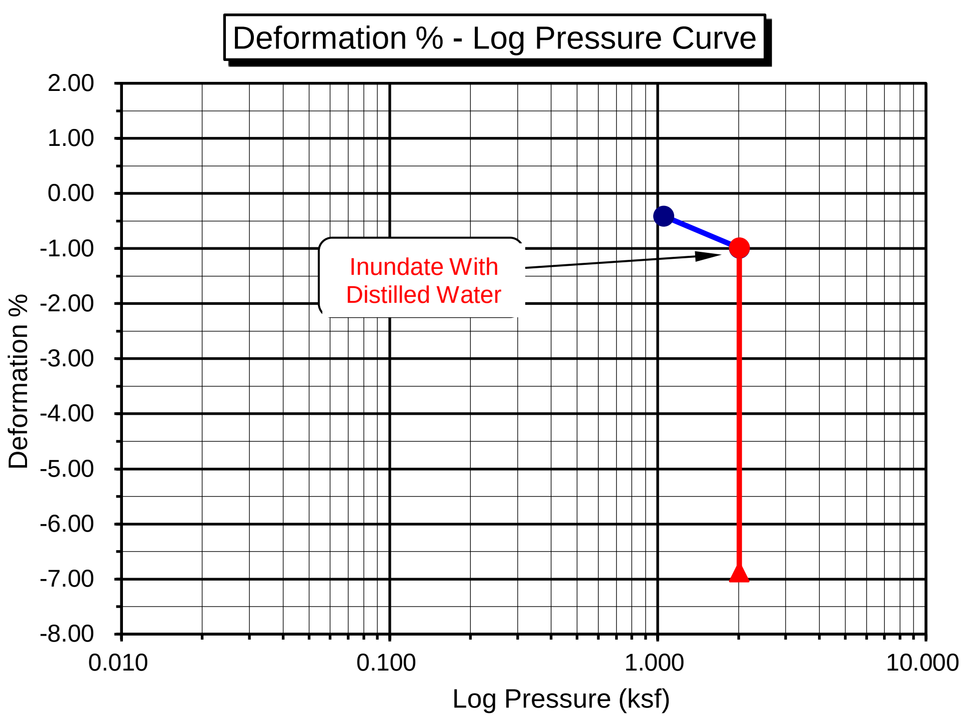
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 10/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 10/8/20
Boring No.: **LB-23**
Sample Type: IN SITU
Sample No.: **R-3**
Depth (ft.) 7.5
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	101.0
Initial Moisture (%):	7.5
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	108.5
Final Moisture (%) :	16.5
Initial Void ratio:	0.6681
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	30.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0041	0.9959	0.00	-0.41	0.6613	-0.41
2.013	0.0099	0.9901	0.00	-0.99	0.6516	-0.99
H_2O	0.0687	0.9313	0.00	-6.87	0.5535	-6.87

Percent Swell / Settlement After Inundation = -5.94



Rev. 01-10

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	8/10/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	8/11/20
Boring No.:	LB-7	Depth:	5.0 - 10.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Brown.				

Dry Wt. of Soil + Cont. (gm.)	1361.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1361.8
Weight Soil Retained on #4 Sieve	18.6
Percent Passing # 4	98.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0012
Wt. Comp. Soil + Mold (gm.)	610.0	634.0
Wt. of Mold (gm.)	190.5	190.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	10	10
Wet Wt. of Soil + Cont. (gm.)	1271.7	634.0
Dry Wt. of Soil + Cont. (gm.)	1248.2	386.6
Wt. of Container (gm.)	971.7	190.5
Moisture Content (%)	8.5	14.7
Wet Density (pcf)	126.5	133.6
Dry Density (pcf)	116.6	116.5
Void Ratio	0.446	0.447
Total Porosity	0.308	0.309
Pore Volume (cc)	63.8	64.0
Degree of Saturation (%) [S meas]	**51.5**	**88.8**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/10/20	8:00	1.0	0	0.5000
8/10/20	8:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/11/20	8:00	1.0	1430	0.5012
8/11/20	9:00	1.0	1490	0.5012

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	1.2
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**1**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo	Tested By:	F. Mina	Date:	10/6/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	10/8/20
Boring No.:	LB-17	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	1577.7
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1577.7
Weight Soil Retained on #4 Sieve	10.2
Percent Passing # 4	99.4

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0140
Wt. Comp. Soil + Mold (gm.)	606.3	631.3
Wt. of Mold (gm.)	190.5	190.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	338.2	631.3
Dry Wt. of Soil + Cont. (gm.)	314.7	383.2
Wt. of Container (gm.)	38.2	190.5
Moisture Content (%)	8.5	15.0
Wet Density (pcf)	125.4	131.1
Dry Density (pcf)	115.6	114.0
Void Ratio	0.458	0.479
Total Porosity	0.314	0.324
Pore Volume (cc)	65.1	68.0
Degree of Saturation (%) [S meas]	**50.1**	**84.7**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
10/6/20	13:00	1.0	0	0.5000
10/6/20	13:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
10/7/20	12:00	1.0	1370	0.5140
10/7/20	13:00	1.0	1430	0.5140

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	14.0
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**14**

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo	Tested By:	F. Mina	Date:	10/6/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	10/8/20
Boring No.:	LB-21	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	1777.7
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1777.7
Weight Soil Retained on #4 Sieve	0.0
Percent Passing # 4	100.0

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0070
Wt. Comp. Soil + Mold (gm.)	619.8	637.7
Wt. of Mold (gm.)	199.3	199.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	350.6	637.7
Dry Wt. of Soil + Cont. (gm.)	327.1	387.6
Wt. of Container (gm.)	50.6	199.3
Moisture Content (%)	8.5	13.1
Wet Density (pcf)	126.8	131.3
Dry Density (pcf)	116.9	116.1
Void Ratio	0.442	0.452
Total Porosity	0.307	0.311
Pore Volume (cc)	63.5	64.9
Degree of Saturation (%) [S meas]	**51.9**	**78.3**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
10/6/20	13:30	1.0	0	0.5000
10/6/20	13:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
10/7/20	13:00	1.0	1400	0.5070
10/7/20	14:00	1.0	1460	0.5070

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	7.0
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**7**

Rev. 03-08

R-VALUE TEST RESULTS
ASTM D 2844

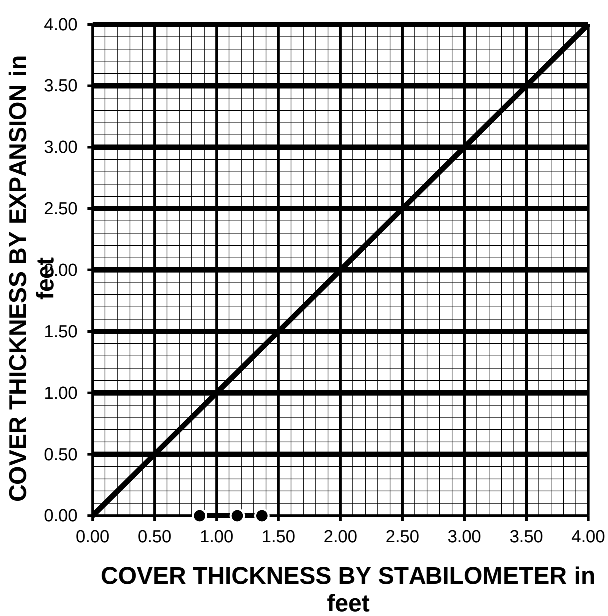
Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	8/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-1	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Silty Sand (SM), Reddish Brown.		

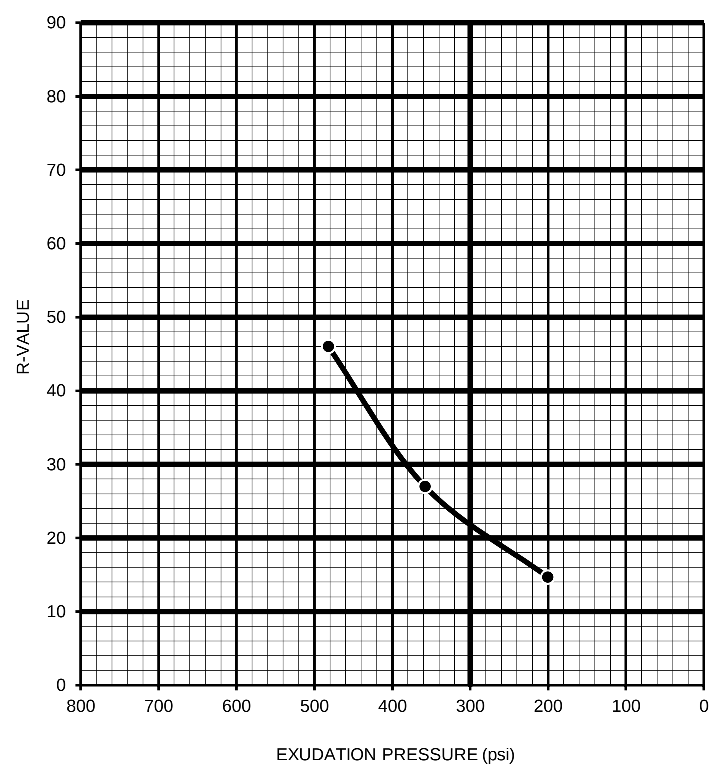
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	7.8	8.8	9.8
HEIGHT OF SAMPLE, Inches	2.45	2.65	2.49
DRY DENSITY, pcf	124.4	121.9	118.9
COMPACTOR AIR PRESSURE, psi	300	175	90
EXUDATION PRESSURE, psi	482	358	200
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	64	99	122
TURNS DISPLACEMENT	4.40	4.48	4.52
R-VALUE UNCORRECTED	46	26	15
R-VALUE CORRECTED	46	27	15

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.86	1.17	1.36
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	N/A
R-VALUE BY EXUDATION:	22
EQUILIBRIUM R-VALUE:	22

R-VALUE TEST RESULTS

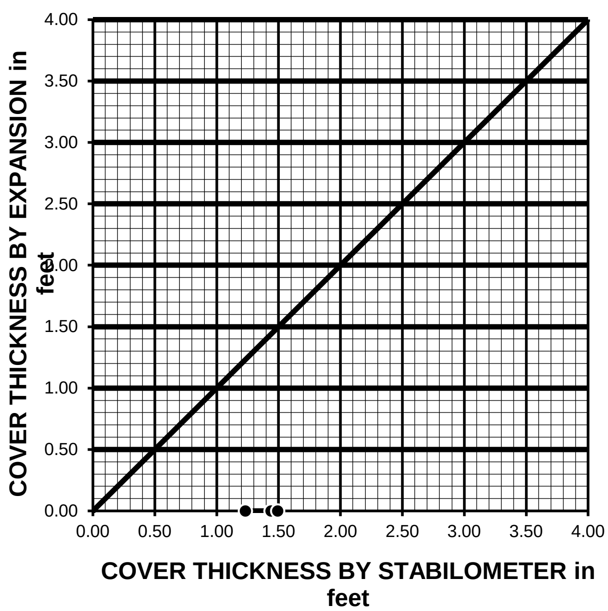
ASTM D 2844

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	10/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-19	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Sandy Silt s(ML), Dark Yellowish Brown.		

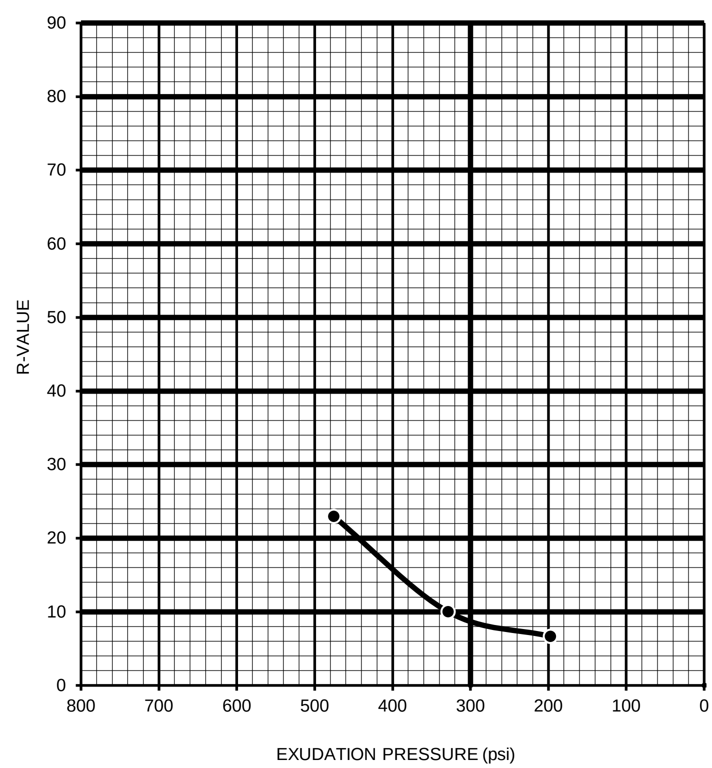
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	12.5	13.5	14.6
HEIGHT OF SAMPLE, Inches	2.48	2.55	2.55
DRY DENSITY, pcf	113.6	113.3	111.0
COMPACTOR AIR PRESSURE, psi	250	125	85
EXUDATION PRESSURE, psi	476	329	197
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	109	133	142
TURNS DISPLACEMENT	3.92	4.38	4.44
R-VALUE UNCORRECTED	23	10	7
R-VALUE CORRECTED	23	10	7

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.23	1.44	1.49
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	N/A
R-VALUE BY EXUDATION:	9
EQUILIBRIUM R-VALUE:	9

R-VALUE TEST RESULTS
ASTM D 2844

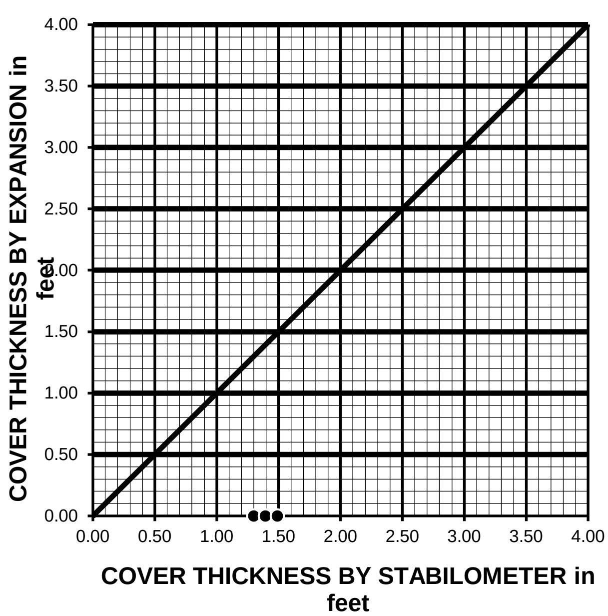
Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	10/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-21	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.		

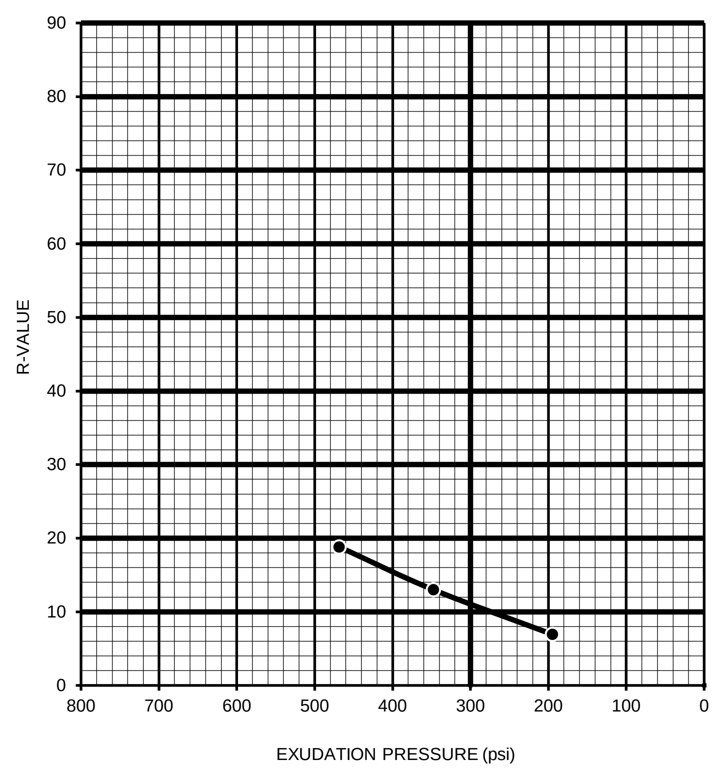
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	9.9	11.0	12.2
HEIGHT OF SAMPLE, Inches	2.47	2.60	2.47
DRY DENSITY, pcf	118.7	116.5	113.9
COMPACTOR AIR PRESSURE, psi	200	125	55
EXUDATION PRESSURE, psi	469	348	195
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	114	127	140
TURNS DISPLACEMENT	4.35	4.70	4.79
R-VALUE UNCORRECTED	19	12	7
R-VALUE CORRECTED	19	13	7

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.30	1.39	1.49
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	N/A
R-VALUE BY EXUDATION:	11
EQUILIBRIUM R-VALUE:	11

Leighton

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By :	F. Mina	Date:	08/11/20
Project No. :	12762.002	Data Input By:	M. Vinet	Date:	08/11/20

Boring No.	LB-7	LB-15		
Sample No.	B-1	B-1		
Sample Depth (ft)	5.0 - 10.0	0 - 5.0		
Soil Identification:	Silty Sand (SM)	Sandy Silt s(ML)		
Wet Weight of Soil + Container (g)	100.00	100.00		
Dry Weight of Soil + Container (g)	100.00	100.00		
Weight of Container (g)	0.00	0.00		
Moisture Content (%)	0.00	0.00		
Weight of Soaked Soil (g)	100.00	100.00		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	1	2		
Crucible No.	1	2		
Furnace Temperature (°C)	850	850		
Time In / Time Out	Timer	Timer		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	25.0236	24.8981		
Wt. of Crucible (g)	25.0189	24.8945		
Wt. of Residue (g) (A)	0.0047	0.0036		
PPM of Sulfate (A) x 41150	193.40	148.14		
PPM of Sulfate, Dry Weight Basis	**193**	**148**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	1.0	0.8		
PPM of Chloride (C -0.2) * 100 * 30 / B	80	60		
PPM of Chloride, Dry Wt. Basis	**80**	**60**		

pH TEST, DOT California Test 643

pH Value	**7.90**	**7.70**		
Temperature °C	21.0	21.0		

SOIL RESISTIVITY TEST
DOT CA TEST 643

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By :	F. Mina Date: 08/11/20
Project No. :	12762.002	Data Input By:	M. Vinet Date: 08/11/20
Boring No.:	LB-7	Depth (ft.) :	5.0 - 10.0
Sample No. :	B-1		

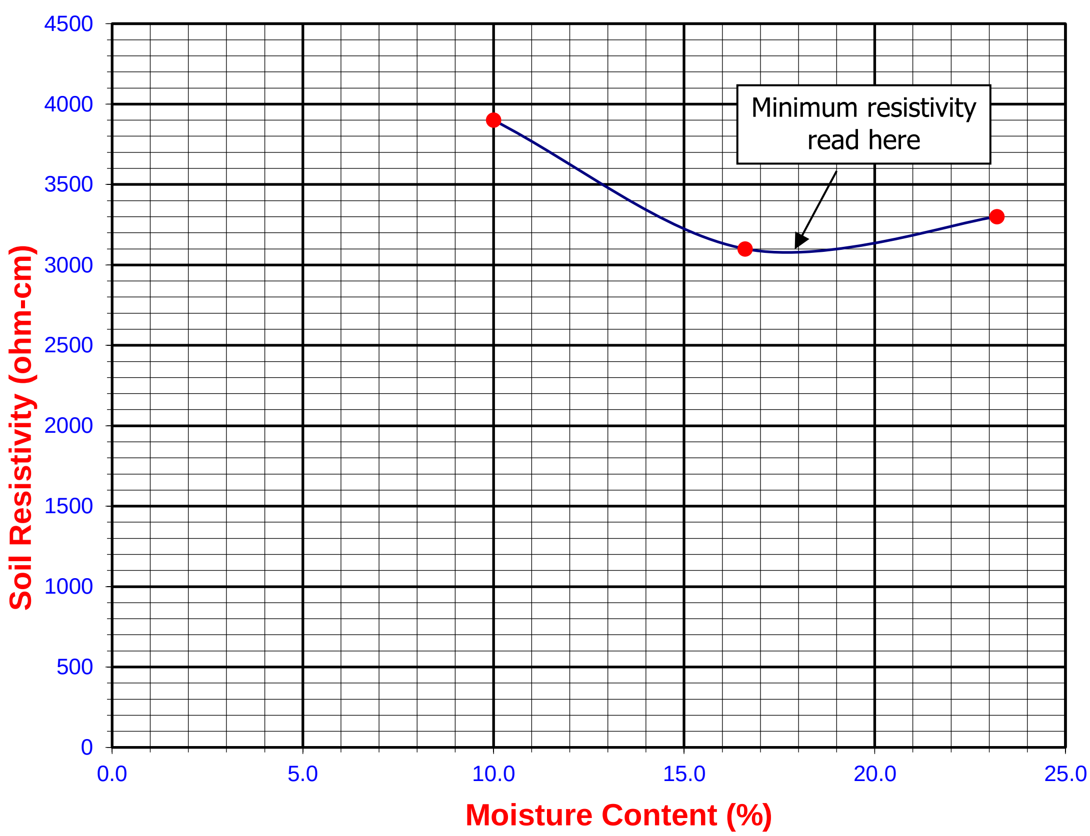
Soil Identification:* Silty Sand (SM)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	3900	3900
2	83	16.60	3100	3100
3	116	23.20	3300	3300
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
3090	**18.0**	**193**	**80**	**7.90**	**21.0**



SOIL RESISTIVITY TEST
DOT CA TEST 643

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By :	F. Mina Date: 08/11/20
Project No. :	12762.002	Data Input By:	M. Vinet Date: 08/11/20
Boring No.:	LB-15	Depth (ft.) :	0 - 5.0
Sample No. :	B-1		

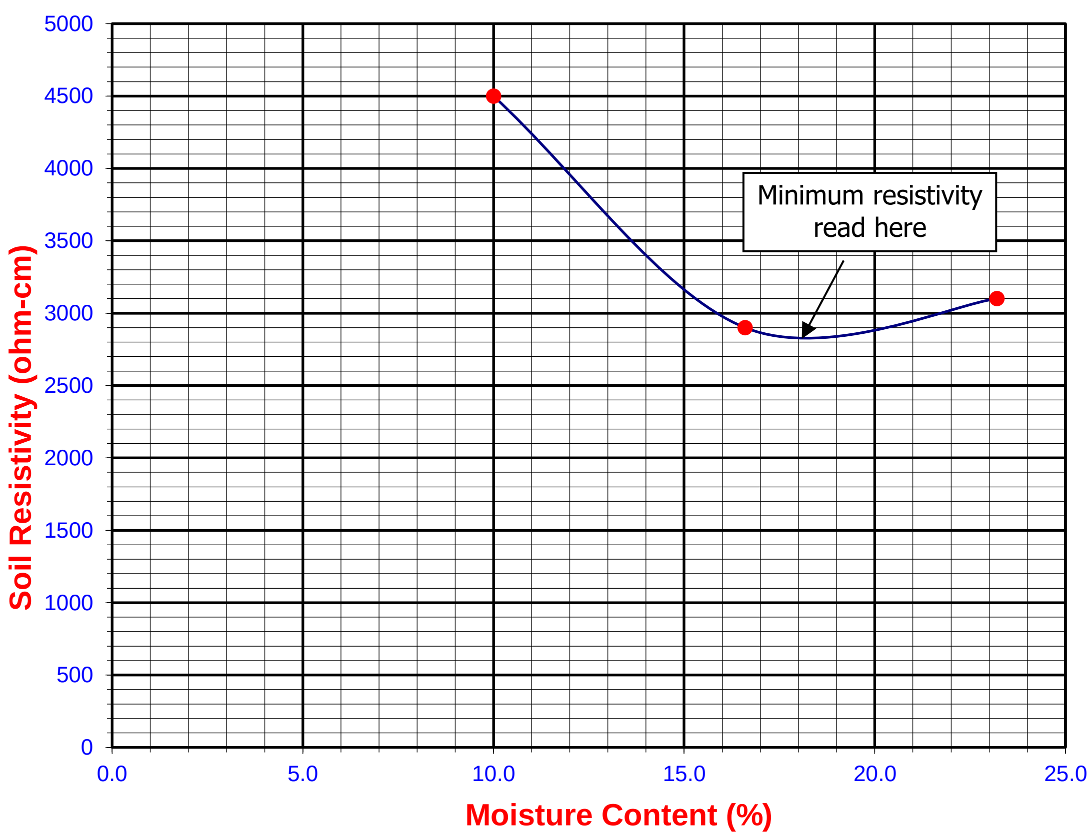
Soil Identification:* Sandy Silt s(ML)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	4500	4500
2	83	16.60	2900	2900
3	116	23.20	3100	3100
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
2810	**18.0**	**148**	**60**	**7.70**	**21.0**



Leighton

TESTS for SULFATE CONTENT

Project Name: Meridian D-1 Aviation Geo Inv   Tested By : M. Vinet   Date: 10/07/20

Project No. : 12762.002   Data Input By: M. Vinet   Date: 10/08/20

Boring No.	LB-17			
Sample No.	B-1			
Sample Depth (ft)	0 - 5.0			
Soil Identification:	SC-SM			
Wet Weight of Soil + Container (g)	100.00			
Dry Weight of Soil + Container (g)	100.00			
Weight of Container (g)	0.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.00			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	5			
Crucible No.	5			
Furnace Temperature (°C)	850			
Time In / Time Out	Timer			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	25.6970			
Wt. of Crucible (g)	25.6925			
Wt. of Residue (g) (A)	0.0045			
PPM of Sulfate (A) x 41150	185.18			
PPM of Sulfate, Dry Weight Basis	**185**			

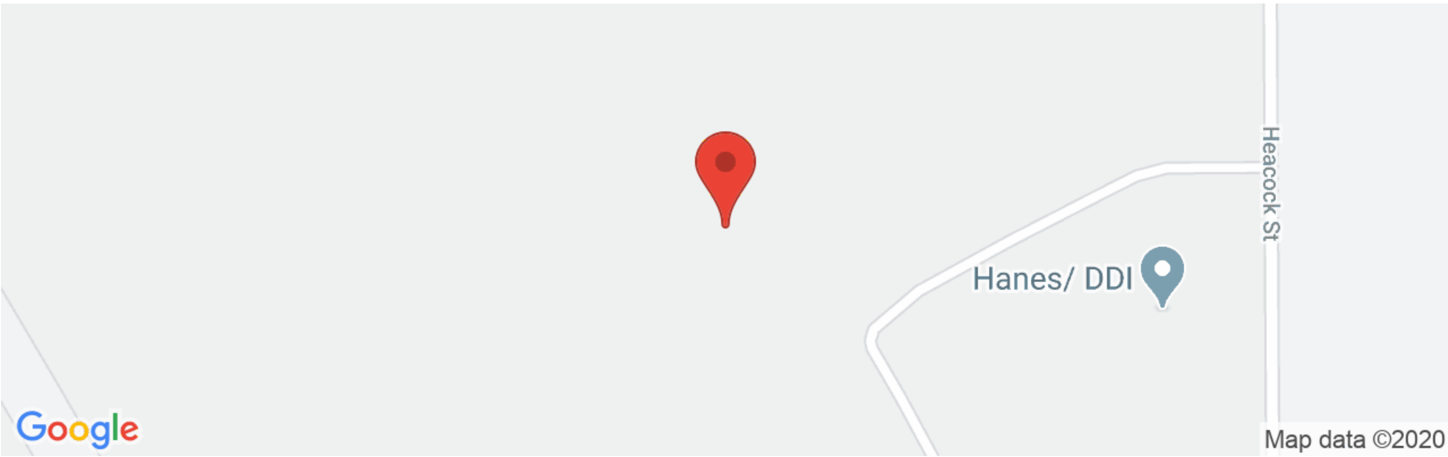
APPENDIX C

SITE SPECIFIC ANALYSIS

OSHPD

D-1 Aviation

Latitude, Longitude: 33.8763, -117.2488



Date	8/11/2020, 2:20:35 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.6	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	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	0.532	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.585	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.604	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.719	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.602	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.661	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.532	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.933	Mapped value of the risk coefficient at short periods
C_{R1}	0.91	Mapped value of the risk coefficient at a period of 1 s

Calculate F_v, S_{M1}, and S_{D1} for Site Class D sites using 2019 CBC and ASCE 7-16

Site Class	D

Structure Conditions	Enter Yes or No (Case Sensitive)
Is this a seismically isolated structure? (See Chapter 17 of ASCE 7-16)	No
Is this a structure with a damping system? (See Chapter 18 of ASCE 7-16)	No

Parameter	Value
S_1 (g)	0.600
F_v (ASCE 7-16 Table 11.4-1)	1.700
S_{M1} (g)	1.020
S_{D1} (g)	0.680

Obtain S1 from maps using web application
SEAOC/OSHPD Seismic Design Maps Tool
ATC Hazards by Location Tool
ASCE 7 Hazard Tool

Long-Period Site Coefficient, F_v

	Mapped Risk-Targeted Maximum Considered Earthquake (MCE $_R$) Spectral Response Acceleration Parameter at 1-s Period					
Site Class	$S_1 \leq 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 = 0.5$	$S_1 \geq 0.6$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.8	0.8	0.8	0.8	0.8	0.8
C	1.5	1.5	1.5	1.5	1.5	1.4
D	2.4	2.2[a]	2.0[a]	1.9[a]	1.8[a]	1.7[a]
E	4.2	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8
F	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8	See Section 11.4.8

Note: Use straight-line interpolation for intermediate values of S_1.

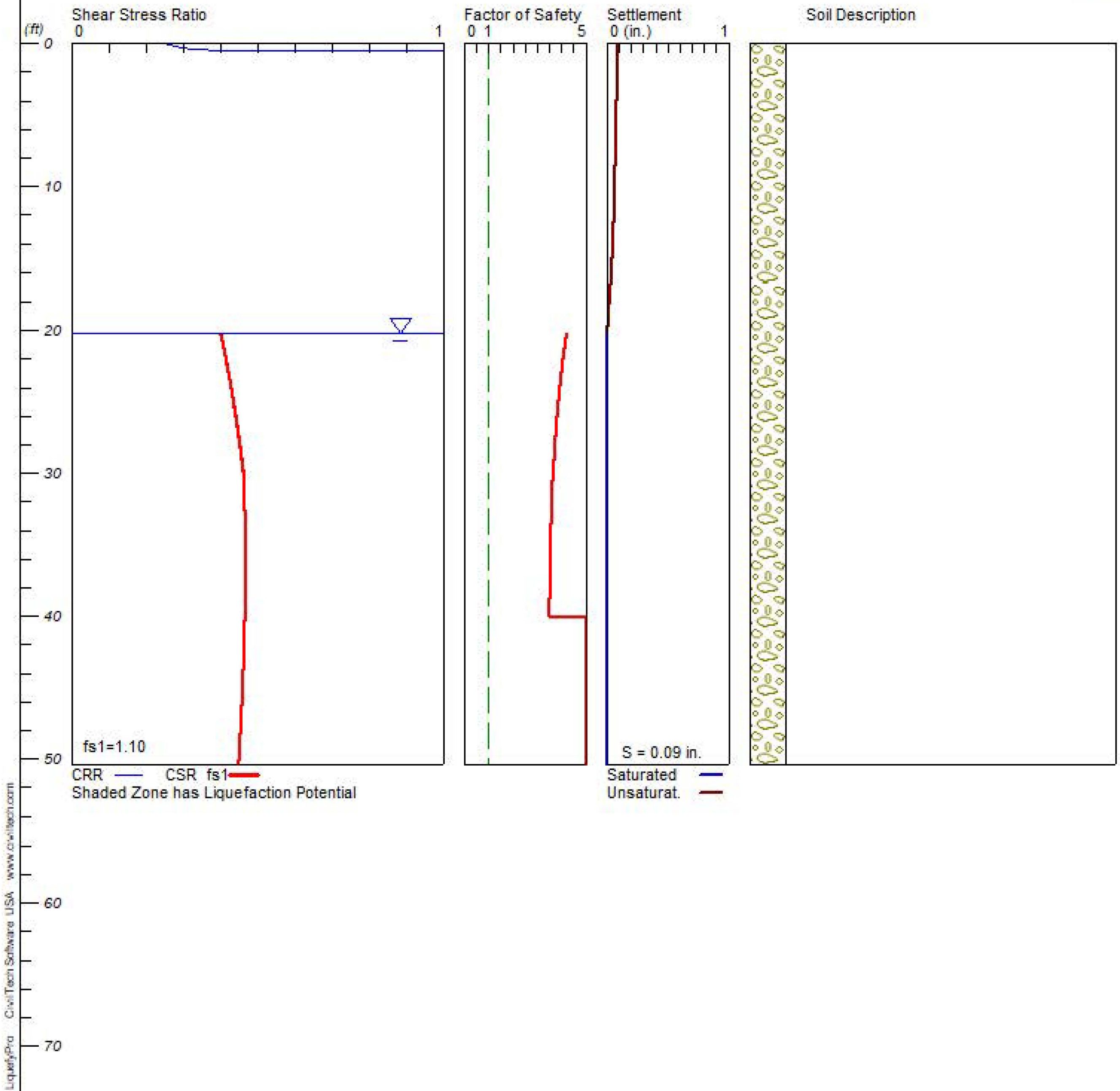
a Also, see requirements for site-specific ground motions in Section 11.4.8.

LIQUEFACTION/SETTLEMENT ANALYSIS

Meridian Gateway Aviation Center

Hole No.=LB-8 Water Depth=20.16 ft

Magnitude=8.0
Acceleration=0.59g



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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: P:\Leighton - Infocus\12000 - 12999\12762 Meridian D-1 March Aviation\002 Prelim Geot\Analyses\Liquefy LB-8.liq
Title: Meridian Gateway Aviation Center
Subtitle: 12762.002

Surface Elev.=
Hole No.=LB-8
Depth of Hole= 50.42 ft
Water Table during Earthquake= 20.16 ft
Water Table during In-Situ Testing= 20.16 ft
Max. Acceleration= 0.59 g
Earthquake Magnitude= 8.00

Input Data:
Surface Elev.=
Hole No.=LB-8
Depth of Hole=50.42 ft
Water Table during Earthquake= 20.16 ft
Water Table during In-Situ Testing= 20.16 ft
Max. Acceleration=0.59 g
Earthquake Magnitude=8.00
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.1
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	7.80	135.00	35.00
10.00	45.00	135.00	35.00
15.00	31.20	132.00	40.00
20.00	17.40	132.00	40.00
25.00	37.20	132.00	40.00
30.00	60.00	130.00	10.00
35.00	70.00	130.00	10.00
40.00	60.00	130.00	NoLiq
50.00	60.00	130.00	NoLiq

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.09 in.
Total Settlement of Saturated and Unsaturated Sands=0.09 in.
Differential Settlement=0.044 to 0.058 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.25	0.42	5.00	0.00	0.09	0.09
5.00	1.69	0.42	5.00	0.00	0.08	0.08
10.00	1.69	0.41	5.00	0.00	0.06	0.06
15.00	1.69	0.41	5.00	0.00	0.04	0.04
20.00	1.69	0.40	5.00	0.00	0.00	0.00
25.00	1.69	0.44	3.88	0.00	0.00	0.00
30.00	1.69	0.46	3.66	0.00	0.00	0.00
35.00	1.67	0.47	3.56	0.00	0.00	0.00
40.00	1.64	0.47	3.52	0.00	0.00	0.00
45.00	2.00	0.46	5.00	0.00	0.00	0.00
50.00	2.00	0.45	5.00	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

_

1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands

S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

APPENDIX D

EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

Standard Details

D-1.0 GENERAL

D-1.1 Intent

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

D-1.2 Role of Leighton Consulting, Inc.

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

D-1.3 The Earthwork Contractor

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide

Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

D-2.0 PREPARATION OF AREAS TO BE FILLED

D-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

D-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section D-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

D-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

D-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

D-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

D-3.0 FILL MATERIAL

D-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

D-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

D-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section D-3.1, and be free of hazardous materials (“contaminants”) and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

D-4.0 FILL PLACEMENT AND COMPACTION

D-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section D-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

D-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

D-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

D-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

D-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

D-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton

Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

D-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

D-6.0 TRENCH BACKFILLS

D-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

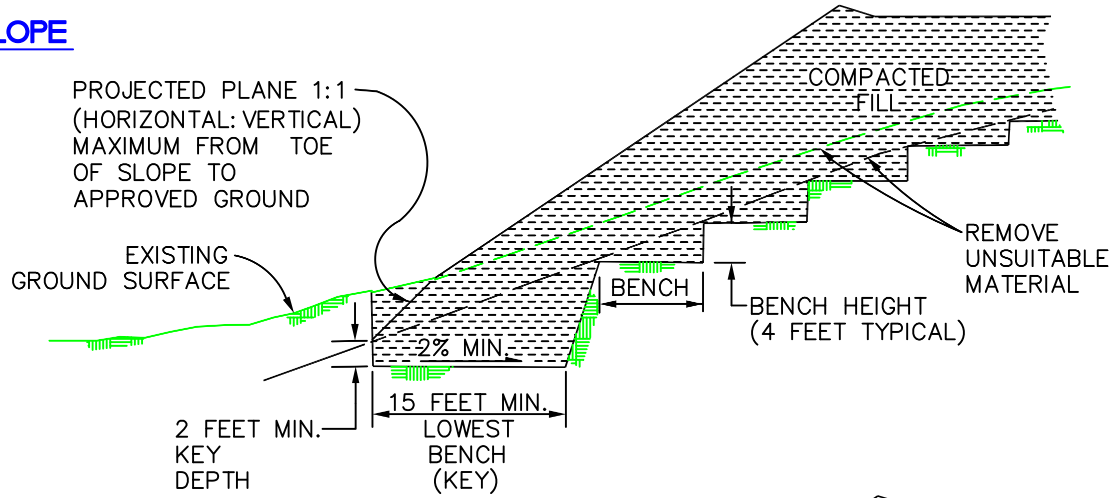
D-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

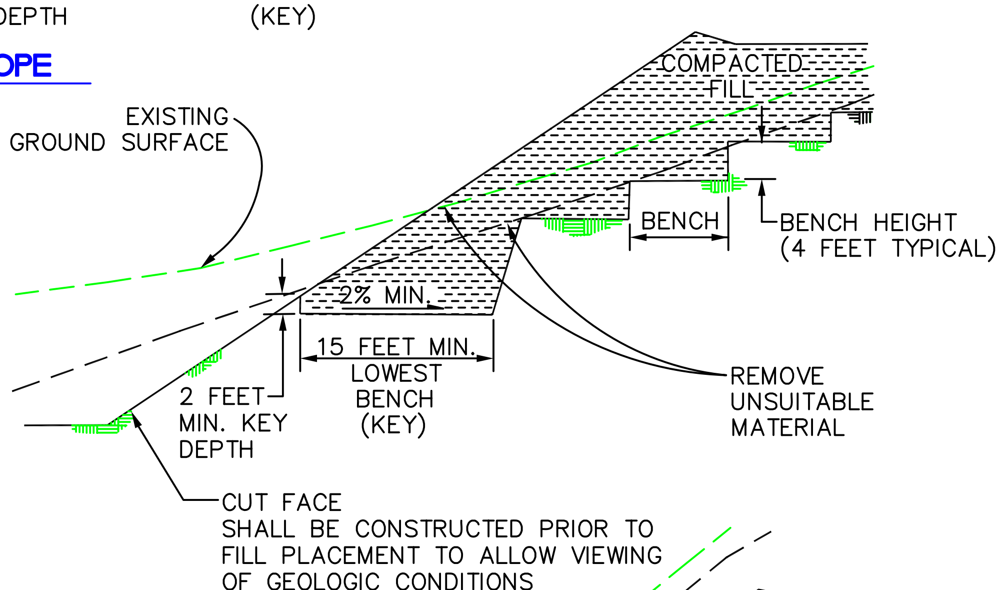
D-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.

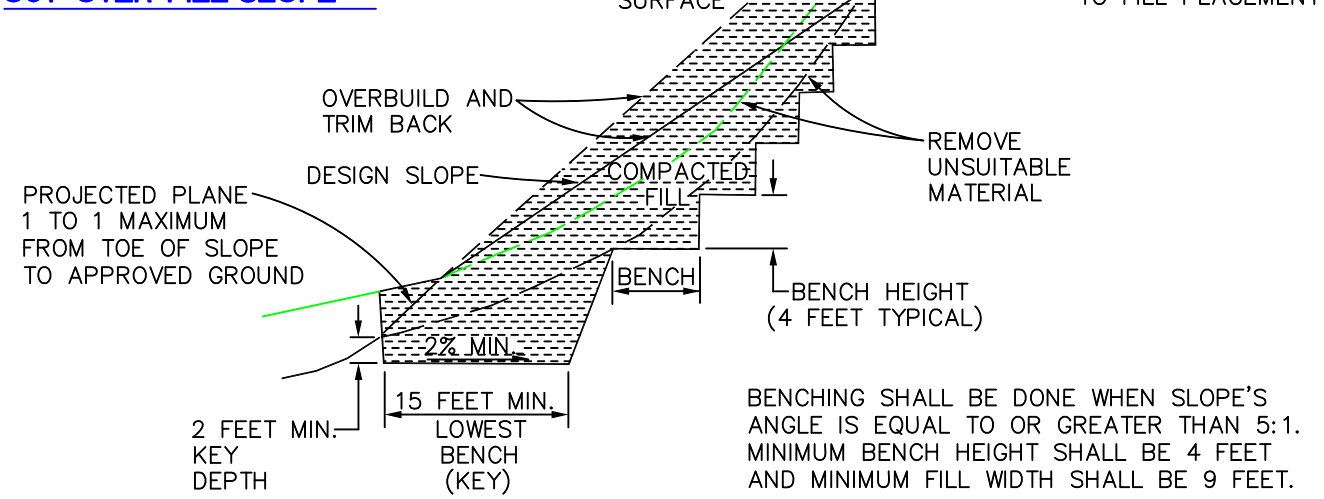
FILL SLOPE



FILL-OVER-CUT SLOPE



CUT-OVER-FILL SLOPE



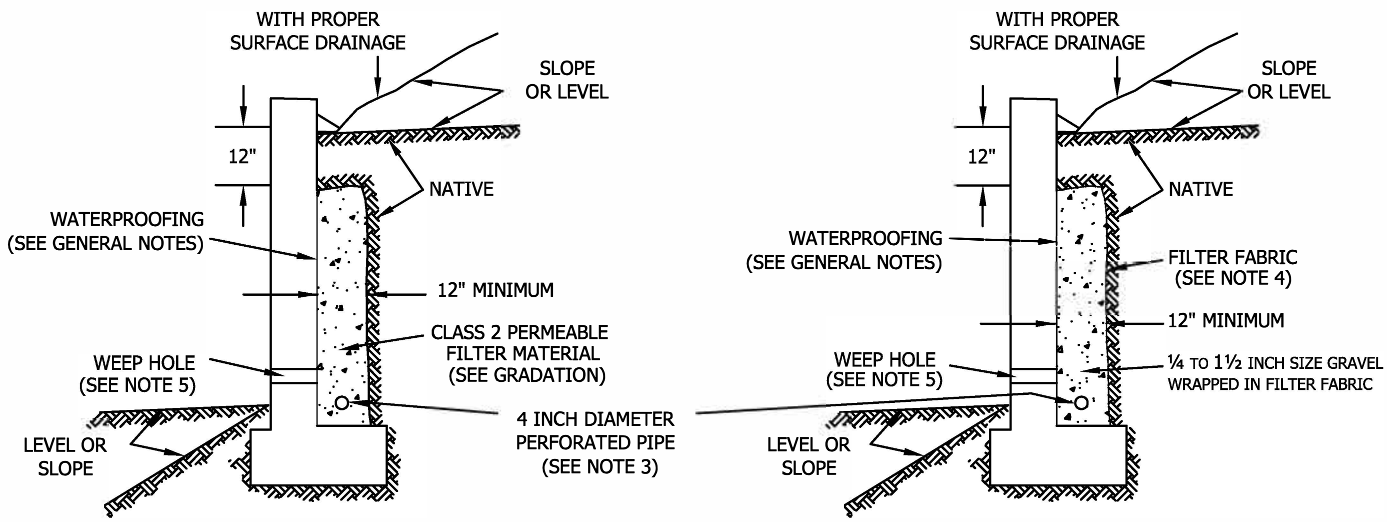
BENCHING SHALL BE DONE WHEN SLOPE'S ANGLE IS EQUAL TO OR GREATER THAN 5:1. MINIMUM BENCH HEIGHT SHALL BE 4 FEET AND MINIMUM FILL WIDTH SHALL BE 9 FEET.

KEYING AND BENCHING	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS A	Leighton

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

OPTION 1: PIPE SURROUNDED WITH CLASS 2 PERMEABLE MATERIAL

OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton

APPENDIX E

GBA - IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

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

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

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