Geotechnical Exploration Report

MERIDIAN STORAGE
11690 and 11750 Owl Place
Falcon, CO
Parcel ID: 5301001001 & 5301001002

PCD File No. VR-23-9

Prepared for:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Ste 305
Colorado Springs, CO 80920

Prepared By:
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~~April 18, 2023~~ Revised June 21, 2023
Project No. 4430.2300005R1

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~~April 18, 2023~~ Revised June 21, 2023

Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Ste 305
Colorado Springs, CO 80920

Attention: Mr. Grant Dennis

Reference: **Geotechnical Exploration Report**
Meridian Storage
11690 and 11750 Owl Place
Falcon, CO
Project No. 4430.2300005R1

Universal Engineering Sciences (UES) is pleased to submit this Geotechnical Exploration Report for the referenced project. This report includes the results from the field exploration and laboratory testing program along with recommendations for use in preparation of the appropriate design and construction documents for this project.

UES appreciates the opportunity to provide this Geotechnical Exploration Report and looks forward to continuing participation during the design and construction phases of this project. UES also has great interest in providing construction services, including materials testing and inspection services during the construction of this project and will be glad to meet with you to further discuss how we can be of assistance as the project advances.

If there are questions pertaining to this report, or if UES may be of further service, please contact us at your convenience.

Respectfully,
Universal Engineering Sciences (UES)

Trae D. Boman

Trae Boman
Staff Geologist

Thomas M. Vick, P.E., PMP
Regional Principal Engineer

6/21/23

TABLE OF CONTENTS

Table of Contents 3
1 INTRODUCTION 1
2 PROJECT INFORMATION 1
3 SITE EXPLORATION 1
4 SITE CONDITIONS 1
5 SITE GEOLOGY AND SUBSURFACE CONDITIONS 2
5.1 Liquefaction 2
5.2 Collapsible and Expansive Soils 2
5.3 Flooding 3
5.4 Landslides 3
5.5 Groundwater 3
5.6 Ground Subsidence 3
5.7 Avalanche 3
5.8 Radon 3
5.9 Abandoned Mines 3
6 RECOMMENDATIONS 4
6.1 General 4
6.2 Foundations 4
6.3 Site Class 4
6.4 Earthwork 5
6.4.1 General 5
6.4.2 Site Clearing 5
6.4.3 Excavation 5
6.4.4 Fill Materials 6
6.4.5 Fill Placement and Compaction 6
6.4.6 Material Volume Changes 7
6.5 On-Site Pavement 7
6.6 Drainage and Moisture Protection 8
6.7 Floor Slabs 9

6.8 Corrosivity 9
7 OTHER SERVICES 9
8 CLOSURE 10

Figures
Appendix

1 INTRODUCTION

This report presents the results of our geotechnical exploration for the project site located at 11690 and 11750 Owl Place, Falcon, Colorado. The general location of the site is shown on Figure No. 1, Site Vicinity Map.

The purpose of our services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- General geology of the area
- Foundation design and construction
- Floor slab design and construction
- Preliminary pavement design and construction
- Earthwork recommendations

This report is for the purpose of providing geotechnical engineering and/or testing information and requirements. The scope of our services for this project did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic material in structures, soil, surface water, groundwater, or air, below or around this site.

2 PROJECT INFORMATION

It is our understanding that proposed project site consists of two (2) parcels of land with temporary trailers, located in Falcon, Colorado. It is our understanding that a new storage facility is planned for the site, consisting of multiple storage buildings. We expect structures to be metal or wood-frame construction, one to two stories in height with paved drives. We do not anticipate basement levels and expected the finished grade to be within several feet of existing elevations. Maximum column and wall loads are assumed to be on the order of 40 kips and 2.5 kips per lineal foot, respectively.

3 SITE EXPLORATION

The scope of our services for this project included a subsurface exploration program consisting of drilling seven (7) borings to depths of ranging from 5 feet to 25 feet below existing site grades. The borings were logged during drilling and samples were obtained to aid in material classification and for laboratory testing. The approximate locations of the borings are shown on Figure No. 2, Boring Location Plan. The locations of the borings were determined in the field by approximating distances from existing features or improvements. The locations of the borings should be accurate only to the degree implied by the method used. Results of the borings are presented in the Appendix.

4 SITE CONDITIONS

The project site consists of two residential lots approximately 6.23 acres in size. The property is bordered by residential properties to the west and north, Meridian Rd to the east, and Owl Place to the south. The site is largely vacant with light vegetation and a residential building on each parcel.

5 SITE GEOLOGY AND SUBSURFACE CONDITIONS

The project site is in Falcon, CO which is in the Great Plains Physiographic Province. It is in central Colorado approximately 15 miles east, northeast of Colorado Springs. Falcon, CO is bounded on the west by the Southern Rocky Mountains and on the east by the Great Plains. The Rocky Mountains were uplifted by the Laramide Orogeny during the late Cretaceous geologic period. The surficial geology of Falcon, CO area consists of Paleocene bedrock covered by Quaternary deposits. The job site is located approximately 16 miles from the Rampart Range fault.

The natural soils at the site generally consisted of Silty Sand (SM) and Sandy Silt (ML). Soil samples were generally moist to dry. The boring logs and laboratory test results presented in the Appendix should be referred to for more detailed information.

The geology of the USGS Map of the Falcon Quadrangle Geologic Map, El Paso County, Colorado which includes the subject site, shows the surficial geology of the job site as Quaternary alluvium deposits (mapped as Qa1 and Qa3), dated to Late Holocene and Late Pleistocene respectively, underlain by the Black Squirrel Formation (mapped as Tbs), dated to the Upper Cretaceous. The Black Squirrel Formation has three distinct lithologies in the Colorado Springs area: (1) thick bedded, massive, cross bedded, white to tan arkose; (2) thin beds of olive-grey clay-rich, medium grained micaceous and feldspathic sandstone; and (3) thick beds of greenish-grey sandy claystone. The amount of sandstone in the Black Squirrel Formation increases westward.

5.1 LIQUEFACTION

Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Due to most soils being significantly fine grained, and the lack of groundwater within the depths explores, the potential for liquefaction at this site can be considered low.

5.2 COLLAPSIBLE AND EXPANSIVE SOILS

Collapsible soils are defined as any unsaturated soil that goes through a radical rearrangement of particles and great decrease in volume upon wetting, additional loading, or both . According to the Colorado Geologic Survey's collapsible soils hazard map and, the project is in an area that has potential to have collapsible soils. There are historic cases of collapsible soils within 10 miles of the project area. The EG-14 Collapsible Soils in Colorado indicates that due to the soil composition of the project area, there is some risk for collapsible soils.

Expansive soils typically contain clay minerals that are capable of absorbing water. When they absorb water, they increase in volume. According to the Colorado Geologic Survey Map of Areas Susceptible to Differential Heave in Expansive, Steeply Dipping Bedrock, City of Colorado Springs, Colorado (CGS, 1999), the project site is located approximately 12.5 miles from mapped expansive soil areas. Based on local geologic maps (CGS, 2012), the Black Squirrel Formation has claystones within the unit that may be prone to swelling when wet. We recommend that expansive soil testing be performed at the conclusion of grading operations.

5.3 FLOODING

According to the FEMA Flood Hazard and Risk Map (Map Number 08041C0553G) there are flood plains and tributaries to the south of the project area, with a tributary continuing north into the project area. Colorado Geologic Survey field personnel also observed standing water in this unnamed tributary on May 20, 2023. Due to the tributary's location and the observed standing water, we recommend the project engineer consider the potential for flooding in their final design.

5.4 LANDSLIDES

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Due to the low topographic relief, the potential for landslides is considered low.

5.5 GROUNDWATER

No groundwater was encountered during drilling, but some seasonal fluctuation in the groundwater may occur. The DWR Monitoring Well Permit Map shows that the static groundwater level in the monitoring wells ranges from 23 ft to 200 ft in the immediate vicinity of the project area. Due to the depth of the water level, we do not anticipate groundwater to impact the proposed development.

5.6 GROUND SUBSIDENCE

There is no karst or mining related subsidence, according to the Colorado Geological Survey, in the project area. As discussed in the Collapsible and Expansive Soils section above; there is a risk for hydro collapsible soil subsidence in the project area.

5.7 AVALANCHE

Due to the low topographic relief and distance from the mountain front, the potential for avalanches is considered low.

5.8 RADON

The Colorado Department of Environmental Public Health shows El Paso County has an elevated risk for radon. A full radon investigation was beyond our proposed scope of work but with the proposed construction not having basements we believe the risk to be reduced.

5.9 ABANDONED MINES

The Colorado Division of Reclamation map shows the closest abandoned mine to the project area is the Bacon Mine, an inactive coal mine, 10.6 miles to the south southeast. The next closest mine is over 20 miles away.

6 RECOMMENDATIONS

6.1 GENERAL

Our recommendations assume that the soil conditions are like those disclosed by the explorations. If variations are noted during construction or if changes are made in site plan, structural loading, foundation type or floor level, we should be notified so we can supplement our recommendations, as applicable.

Structural fill was not observed on-site. Any existing fill, discovered during construction would be considered undocumented fill unless observation and testing was performed during placement. All undocumented fill should be removed and replaced with properly compacted fill. The undocumented fill soils can be re-used for documented fill provided almost all oversized material, unsuitable material (as determined by the geotechnical engineer), vegetation and debris are removed, as determined by visual observation by the 3rd party inspector.

6.2 FOUNDATIONS

If the grading recommendations presented in the Earthwork section of this report are complied with, the proposed structures and any block walls or retaining walls may be supported by conventional footings. Foundations should be established on approved native soils at least medium dense in consistency or properly compacted fill.

Foundations should be at least 18 inches wide, and the bottom of the foundations should be established at least 30 inches below the lowest adjacent final compacted subgrade. Foundations, established as recommended, may be designed to impose a net dead- plus live-load pressure of 2,000 pounds per square foot (psf). The bearing value may be increased by 500 psf for each additional 12 inches of embedment. However, the maximum net bearing value should not exceed 3,000 psf. A one-third increase may be used for wind or seismic loads when used with the alternative basic load combination of section 1605.3.2 of the 2018 IBC.

Settlement of the proposed structure, supported as recommended, should be within acceptable limits (less than 1 inch) based on the assumed loads. Differential settlement should be less than ½-inch. However, it is important that recommendations presented in the Drainage and Moisture Protection section of this report be adhered to. Settlement may be further reduced by following the recommendations provided on the Site Improvements section of this report.

6.3 SITE CLASS

The 2018 International Building Code (IBC) requires that a default Site Class D be assumed for seismic design when soil conditions for the top 100 feet are not known in sufficient detail for determination in accordance with Table 20.3-1 of ASCE Standard 7. UES is available to determine the shear wave profile of the top 100 feet underlying the site from ambient noise or refraction microtremor (ReMi) data using standard P-wave geophones. We recommend that the project's structural engineer be consulted to assess whether the increase in site class will provide sufficient benefit to offset the additional cost for this service.

A search of the USGS Earthquake Hazards Program ASCE 7-16 data, as published by the Applied Technology Council (hazards.atcouncil.org), indicated the following spectral acceleration parameters for the location indicated above and a Site Class D:

Table 1: Seismic Design Parameters

Period (s)	MCE_R Ground Motion (g)		Adjusted MCE_R Spectral Response Parameters (g)		Design Spectral Acceleration Parameters (g)		Site Coefficients	
Lat.,. Long.: 38.9471, -104.6090			Site Class: D		Seismic Design Category: B			
0.2	S_S	0.186	S_{MS}	0.298	S_{DS}	0.199	F_a	1.6
0.1	S_1	0.055	S_{M1}	0.133	S_{D1}	0.088	F_v	2.4

6.4 EARTHWORK

6.4.1 General

Earthwork should be performed in accordance with the guidelines presented in Chapter 18 of the 2018 IBC, except where specific recommendations are presented in this report. It is recommended that contractors perform their own reconnaissance of the site. If the contractors have any questions regarding site conditions, site preparation or recommendations in this report, they should contact a representative of Universal Engineering Sciences.

6.4.2 Site Clearing

Strip and remove existing vegetation, debris, undocumented fill, all loose, soft, or disturbed natural soils, and other deleterious materials from proposed building areas, adjacent walks, and slabs, and in areas to be paved. Excavations should extend at least 5 feet beyond the areas to be improved in plan view. If practical, excavations should extend property line to property line. Undocumented fill is defined as any existing fill that was not properly placed, observed, and tested.

Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. If unexpected fills or abandoned structures/improvements are encountered during site clearing, such features should be removed and the excavation thoroughly cleaned and backfilled. All excavations should be observed by the geotechnical engineer prior to backfill placement.

Demolition of existing structures/improvements should include removal of any foundation system and utilities. Any excavations because of demolition and removal should be properly filled.

All materials derived from the demolition of existing structures/improvements should be removed from the site, and not be allowed for use in any fills. In some cases, existing pavements, if properly broken up, can be used in required fills. The geotechnical engineer should determine the suitability for use based on conditions in the field.

6.4.3 Excavation

It is anticipated that excavation of the on-site natural, non-cemented deposits for the proposed project can be accomplished with conventional earthmoving equipment. Contractors, especially those excavating for foundations or utilities, should verify rippability of materials and equipment required.

Temporary unsurcharged construction excavations should be sloped or shored. Slopes should not be steeper than 1½ horizontal to 1 vertical. Slopes may need to be flattened depending on conditions exposed during construction. Exposed slopes should be kept moist (but not saturated) during construction. If there is not enough space for sloped excavations, shoring should be used. Traffic and

surcharge loads should be kept back at least 10 feet from the top of the excavation. Slope stability analysis of embankments (natural or constructed) is not within the scope of this study.

Excavation, trenching and shoring should be conducted in accordance with the U.S. Department of Labor Occupational Safety and Health Administration's (OSHA) Excavation and Trenching Standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650. Safety of construction personnel is the responsibility of the contractor.

Surface runoff should be drained away from excavations and not allowed to pond in the bottom of the excavation. Concrete for foundations should be placed as soon as practical after the excavation is made. That is, the exposed foundation soils should not be allowed to become excessively dry or wet before placement of concrete.

6.4.4 Fill Materials

On-site soils meeting the following criteria, as determined by visual observation by the 3rd party inspector, may be used in required fills:

- Most of the material (90+ percent) is 6 inches or less in maximum dimension.
- The minus 6-inch material is comprised of at least 40 percent by weight of material finer than ¾-inch in size.
- The material is relatively free of debris and organic matter.

In general, material greater than 12 inches in diameter should not be used in fills within 3 feet below the bottom of the footing within building pad areas. Fill containing material greater than 6 inches in diameter should not be used in any utility trenches, behind retaining walls or against foundations or grade beams.

Imported material should be suitable for its intended use. All imported materials should be tested and accepted by the geotechnical firm providing testing during construction, prior to importing. In general, imported soils should be low-expansive (less than 2.0% if tested using a 60 psf load or an expansion index of less than 20), have a maximum solubility of less than 0.50%, a maximum sulfate content of less than 0.50% and a maximum sodium sulfate content less than 0.20%. A chloride content of less than 500 mg/kg is recommended if post-tensioned foundations are planned.

6.4.5 Fill Placement and Compaction

After performing required excavations, the exposed soils should be observed to verify removal of all unsuitable deposits. Exposed soils should then be scarified to a depth of 8 inches, watered or dried as necessary, and compacted as recommended.

Fill materials should be placed in thin, horizontal lifts unless otherwise accepted by the geotechnical engineer. Where the slope ratio of the original ground is steeper than 5 horizontal to 1 vertical, the slope should be benched to create near-level areas for the placement of fill. The maximum allowable height of the bench is 3 feet. Bench excavation should be continued to the top of the existing slope in structural fill areas or the daylight (cut/fill) contact.

All required fill should be placed in loose lifts generally not over 8 to 12 inches in thickness. Materials should be compacted to the following:

- Note: For compaction, fine-grained soils are soils with at least 30% passing the No. 200 Sieve.

All Fill placed deeper than 5 feet below final grade should be compacted to a minimum of 95% at a moisture content of optimum or greater.

- Retaining wall backfill only needs to be compacted to a minimum of 90%.

Structural fill should be observed and tested as necessary to determine compliance with the compaction requirements presented in this report. In general, one compaction test should be performed for approximately every 1,000 cubic yards of fill, one for one foot of fill placed, or change in material.

Table 2: Compaction Criteria

Material	Percent Compaction (ASTM D1557)	Minimum Moisture Content
Fine-grained	90 minimum	Optimum
Granular	95 minimum	-2% of Optimum
Untreated Aggregate Base Course	95 minimum	-2% of Optimum

6.4.6 Material Volume Changes

Laboratory testing was conducted to assess the native soil's capacity to change volume. Native soils were not found to undergo significant changes in volume due to consolidation or expansion.

Clearing and grubbing operations will result in some loss of material. Excavation and recompaction of the on-site soils will result in shrinkage losses. Based on our experience, a shrinkage factor of approximately 5 to 10 percent would be applicable for the upper natural soils when excavated and recompacted. As an example, a shrinkage factor of 10 percent would mean it would require 1.10 cubic yards of excavated material to equal 1.0 cubic yard of properly compacted fill. Scarification and compaction of surface soils will cause additional shrinkage.

6.5 On-Site Pavement

The pavement area subgrade should be properly prepared as outlined in the Earthwork section of this report before placing any asphalt or base materials. Proper drainage of the paved areas should be provided to increase the pavement life. In addition, pavements must be maintained for durability and integrity during their life. Therefore, periodic seal coating, crack sealing, and/or patching may be required.

Near surface soils at the project site generally have an AASHTO classification of A-2 to A-4. We estimate the soils have a minimum CBR value of 10 or less. UES is available to perform a CBR test to determine the exact value which may allow for a less conservative pavement recommendation. Light-duty asphalt pavement sections are recommended for traffic areas subjected exclusively to automobile and pick-up truck traffic. Moderate-duty or thicker asphalt concrete sections are recommended for areas subject to light volume truck traffic. We recommend the following minimum pavement section thickness for on-site paved areas:

Table 3: Pavement Design

Item	Asphalt (in)	Main Corridor & Truck Access
Asphalt	3	4
Untreated Base Course	8	12

Asphalt should conform to local specifications or to APWA requirements as applicable. Untreated base course (UTBC) should conform to city specifications or 1-inch minus UDOT specifications for A-1-a/NP and have a minimum CBR value of 70% as applicable. Subgrade should be compacted to a minimum of 95

percent (ASTM D1557). Field and laboratory testing of asphalt and base materials should be performed to determine whether specified requirements have been met.

The performance of the pavement can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be followed, where possible:

- Site grading at a minimum 2% grade away from the pavements.
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade.
- Consideration should be given to using "desert" landscaping and/or minimizing watering to help prevent surface runoff.
- Placing compacted backfill against the exterior side of curb and gutter.

Portland Cement Concrete (PCC) pavement is recommended in areas of truck traffic. A minimum of 6-inch thickness of PCC pavement is recommended in these areas.

6.6 Drainage and Moisture Protection

Foundation soils should generally not be allowed to become saturated during or after construction, except when necessary to increase moisture contents prior to construction. Infiltration of water into foundation or utility excavations should be prevented during construction. Utility lines should be properly installed and the backfill properly compacted to avoid possible sources for subsurface saturation.

Positive drainage away from the structures should be provided during construction and maintained throughout the life of the structures. Any downspouts, roof drains or scuppers should discharge into splash blocks or extensions and away from the structures. Backfill against footings, exterior walls and in utility trenches should be properly compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Performance of the foundation system recommended in this report is dependent on the ability to keep moisture from penetrating the soils below foundations and slabs. Therefore, we recommend the following:

- Positive drainage should be maintained away from the structures, adjoining concrete slabs and block walls. Positive drainage of 10% minimum shall be maintained for areas adjacent to structures or block walls that are not covered by concrete or asphalt. The 10% should be maintained for 10 feet. Where concrete or asphalt abut structures or block walls, the surface of these materials should be sloped a minimum of 2% away from structures or block walls. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, the slope should be provided to an approved alternate method of drainage.
- No landscaping or sprinklers should be allowed within 5 feet of the buildings or block walls.
- Watering should be kept to a minimum.

If the above recommendations are not followed there would be an increased risk/potential for increasing moisture below foundations and slabs which could result in additional movement and distress to structures and slabs.

6.7 FLOOR SLABS

Moisture protection should be provided by a relatively impervious vapor retarder placed beneath interior slabs. The vapor retarder should be a Class A vapor retarder at least 10 mils in thickness, meeting the requirements of ASTM E1745, and should conform to and be placed in accordance with the requirements of the project structural engineer or architect. If the concrete is to be placed directly on aggregate base, the aggregate base should be moistened (but not saturated) prior to placement of concrete.

Recommendations presented by the American Concrete Institute (ACI 302-1R-96) for slabs-on-grade should be complied with for all concrete placement and curing operations. Improper curing techniques and/or excessive slump (water-cement ratio) could cause excessive drying/shrinkage resulting in random cracking and/or slab curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor coverings.

6.8 CORROSIVITY

Based on test results and Table 19.3.1.1 of ACI 318-14 Section 19.3, the on-site soils classify as having a "S0" sulfate exposure. Please refer to Table 19.3.2.1 of ACI 318-14 for the requirements for concrete by exposure class. Consideration should be given to providing protection to buried metal pipes or use of nonmetallic pipe were permitted by local building codes. Non-corrosive backfill, protective coatings and wrappings, sacrificial anodes, or a combination of these methods could be considered. Universal Engineering Sciences personnel are not experts regarding corrosion and/or corrosion protection and that we recommend a "Corrosion Engineer" be consulted for actual recommendations regarding the necessity and/or method of cathodic protection.

Additionally, we expected the project site to be subject to a seasonal frost depth between 2½ and 3 feet below grade as determined by the Federal Highway Administration National Highway Institute Soils and Foundations, Reference Manual. Vol. I (FHWA-NHI-06-08 8). Therefore, we classify the site as having a Freezing and Thawing exposure of "F3" based on Table 19.3.1.1 of ACI 318-14 Section 19.3 and the expectation that heavily trafficked portions of the site will be subject to de-icing agents during winter months.

7 OTHER SERVICES

Universal Engineering Sciences should be retained to provide a general review of final design plans and specifications in order that grading, and foundation recommendations may be interpreted and implemented. If any changes of the proposed project are planned, the conclusions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

Universal Engineering Sciences should also be retained to provide services during excavation, grading, foundation, and construction phases of work. Observation of foundation excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present. Field and laboratory testing of concrete and soils should be performed to determine whether applicable requirements have been met. In addition, continuous special inspections and tests are required for soils as specified in the 2018 IBC, Table 1705.6.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the locations of the explorations may not become

evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

8 CLOSURE

Our professional services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranties, either expressed or implied, are intended or made. We prepared this report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction techniques to be used on this project.

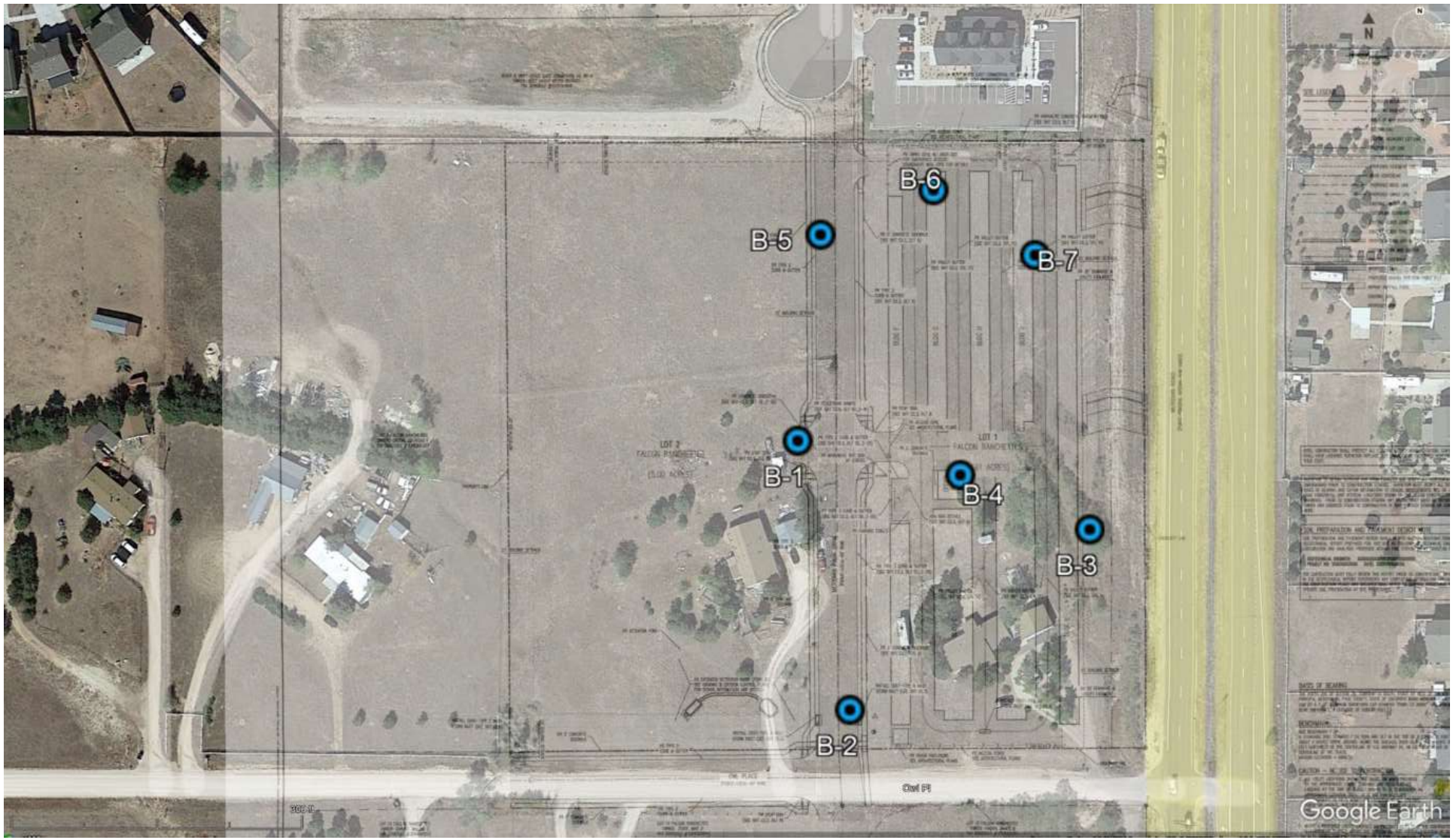
FIGURES

UES™

SITE VICINITY MAP

Meridian Storage
11690 and 11750 Owl Place
Falcon, CO

PROJECT NO. 4430.2300005.0000 | **FIGURE 1**

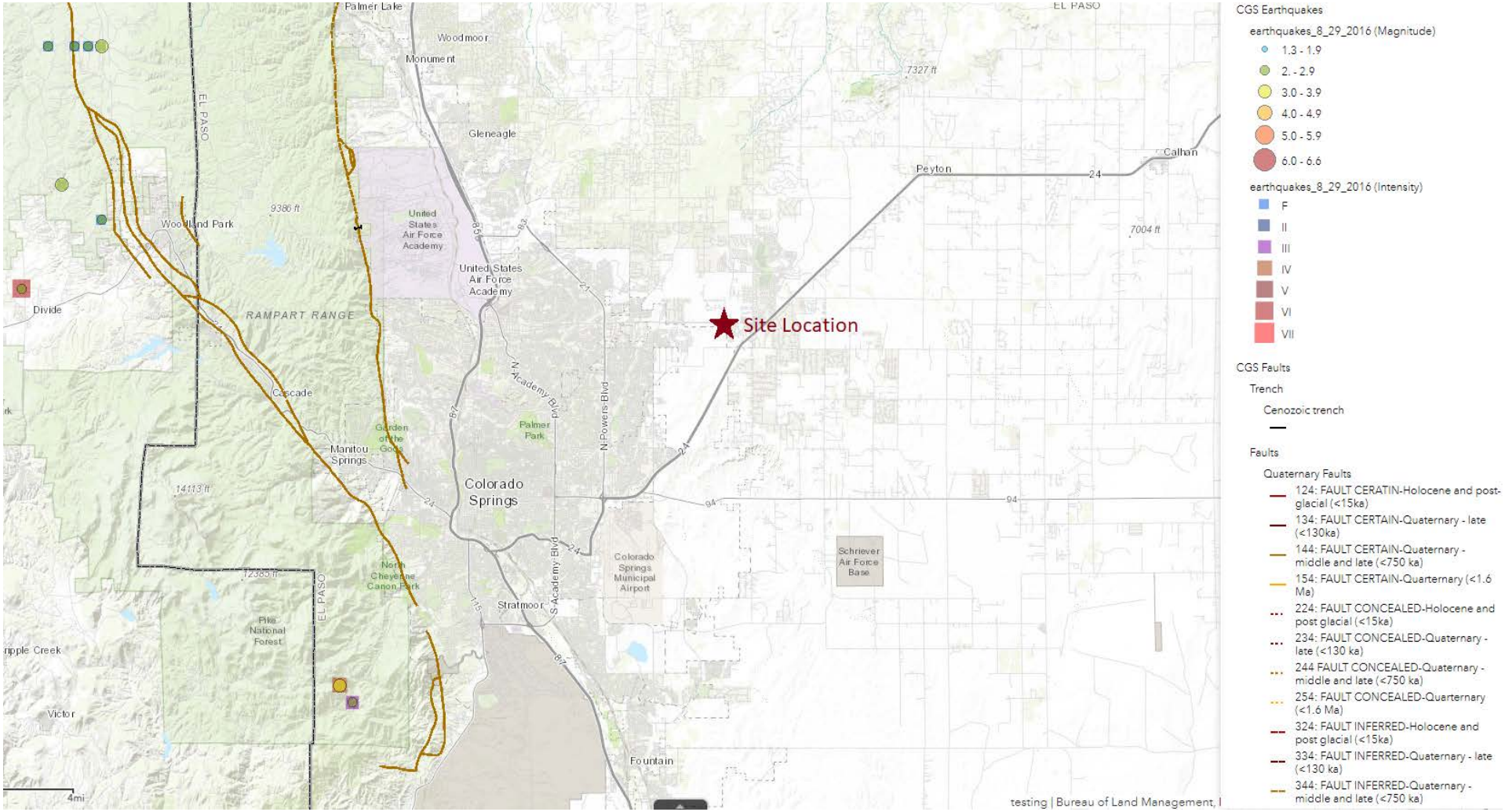


UES™

BORING LOCATION PLAN

Meridian Storage
11690 and 11750 Owl Place
Falcon, CO

PROJECT NO. 4430.2300005.0000	**FIGURE 2**



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Historic Earthquakes and Fault Locations

Meridian Storage
11690 and 11750 Owl Place
Falcon, CO

PROJECT NO. 4430.2300005.0000 | **FIGURE 3**

APPENDIX

Site Exploration

The subsurface conditions of the site were explored by drilling seven (7) borings to target depths of 15 to 50 feet below existing site grade. The borings were drilled using a rotary drill rig.

Soils were logged during drilling and samples were obtained to aid in material classification and for possible laboratory testing. The boring logs are presented on Plates 1 through 9. The number of blows required to drive a 2-inch diameter sampler (SPT) 12 inches using a 140-pound weight dropped 30 inches are shown on the logs. The soils are generally classified by the Unified Soil Classification System.

Laboratory Testing

Laboratory testing was performed on selected samples of on-site soils. Tests were performed in general accordance with applicable ASTM or local standards.

Sieve analyses and Atterberg Limits were performed to determine the grain-size distribution and soil classification of representative materials. The test results are presented on Plates 10 through 14 and summarized in the table below.

Table 5: Laboratory Summary

Sample	Material Description	Liquid Limit	Plasticity Index	Percent Passing No. 200 Sieve
BH-1 @ 2.5	Silty SAND (SM)	---	---	17.4
BH-1 @ 5ft	Silty SAND (SM)	---	---	---
BH-2 @ 5	Sandy SILT (ML)	---	---	53.7
BH-3 @ 5ft.	Clayey SAND (SC)	25	12	42.4
BH-3 @ 15ft.	Sandy SILT (ML)	34	8	---
BH-4 @ 5ft	Silty SAND (SM)	---	---	48.7
BH-4 @ 15 ft	Silty SAND (SM)	---	---	17.9
BH-5 @ 2.5	Silty SAND with gravel (SM)	38	4	49.8
BH-6 @ 2.5ft	Silty SAND (SM)	46	13	19.6
BH-7 @ 7ft	Sandy SILT (ML)	46	17	---

Chemical tests were performed on representative samples by Chemtech-Ford Laboratories. Tests were performed to determine the percent chloride, water soluble sulfate and resistivity, as well as the soil solubility. Test results are presented in the Appendix.

Soil Boring: BH-1

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.947100 / -104.609140
Boring Diameter: 8.25	Driller: Site Services	Drilling Firm: Site Services Drilling LLC
Hammer Type: Auto	Hammer Weight: 150	Logged By: Thomas McClosky
Max Depth: 26 (ft)	Method: Auger	Reported Depth: 7.5

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6920.05'

Depth (Feet)	Graphic Log	Visual Classifications and Remarks	Samples: Depth of Sample	Samples: Sample Number	Samples: SPT Blow Counts	Lab: % Fines	Lab: Atterberg Limits	Lab: Moisture Content (%)	Lab: Dry Density
		Tan, moist, **Silty Sand** (SM)	2'						
				BH-1 2.5	7 10 14 28	17.4			
5		becoming coarse	5'						
				BH-1 5	21 42 45				

Moisture Content: 0 — 50 — 100
Plastic Limit: 0 — 50 — 100
Liquid Limit: 0 — 50 — 100

SM	California - California Sam
SSS - Standard Split Spoc	-

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Plate 1

Soil Boring: BH-2

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.946284 / -104.608960
Boring Diameter: 8.25	Driller: Ste Services	Drilling Firm: Site Services
Hammer Weight: 140	Logged By: Thomas McClosky	Max Depth: 16 (ft)
Method: Auger	Reported Depth: 17.5	

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6296.00'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts	% Fines	Atterberg Limits	Moisture Content (%)	Dry Density
	Light brown, moist, **Silty Sand** (SM)	2'						
			BH-2-2.5	4 6 13	53.7	27-25-2		
5		5'						
	Tan/grey, moist, **Sandy Silt** (ML)	7'	BH-2-5	17 22 41 50				
	7.5		BH-2-7.5	31 50				
	Brown, moist, **Sandy Silt** (ML)	10'						
10			BH-2-10	50				
	13.0							
	Grey, moist, **Silty Sand** (SM)	15'						
15			BH-2-15	36 50				

Moisture Content: 0 50 100
Plastic Limit: 0 50 100
Liquid Limit: 0 50 100

SM	SSS - Standard Split Spoo
ML	California - California Sam

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Soil Boring: BH-3

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.946834 / -104.608075
Boring Diameter: 8.25	Drilling Firm: Site Services	Hammer Type: Auto
Hammer Weight: 140	Logged By: Thomas McClosky	Max Depth: 27 (ft)
Method: Auger	Reported Depth: 27.5	

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6917.73'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts	% Fines	Atterberg Limits	Moisture Content (%)	Dry Density
0	Light brown, dry, **Silty Sand** (SM)	2'	-	5 5 8 8	42.4	24-13-11		
4.0								
5	Light brown, dry, **Clayey Sand** (SC)	5'	-	11 21 37 50				
		7'	-	43 50				
10		10'	-	27 37 50		33-26-7		
10.0	Tan light brown, moist, **Silty Sand** (SM)							
15		15'	-	27 50				
20		20'	-	50				
25		25'	-	44 50				

Moisture Content: 0 50 100
Plastic Limit: 0 50 100
Liquid Limit: 0 50 100

SM	SSS - Standard Split Spoo
SC	-

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Plate 3

Soil Boring: BH-4

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.947000 / -104.608549
Boring Diameter: 8.25	Checked By: Curt Stripeika	Driller: Site Services
Drilling Firm: Site Services	Hammer Weight: 140	Logged By: Thomas McClosky
Max Depth: 27 (ft)	Method: Auger	Reported Depth: 27.5

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6918.88'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts	% Fines	Atterberg Limits	Moisture Content (%)	Dry Density
0	Brown, dry to moist **Sand** (SM)	2.5'	-	4 6 15 9				
5		5'						
		7'	-	6 12 26 38				
			-	20 50				
10	10.0	10'						
	Grey, moist, **Silty Clay** (CL-ML)		-	24 29 42 45	17.9	31-23-8		
15	15.0	15'						
	Grey, moist, **Silty Sand** (SM), with gravel		-	21 43 50				
20		20'						
			-	37 50				
25		25'						
			-	39 50				

Moisture Content: 0 – 50 – 100
Plastic Limit: 0 – 50 – 100
Liquid Limit: 0 – 50 – 100

SM	SSS - Standard Split Spoo
CL-ML	California - California Sam

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Soil Boring: BH-5

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.947722 / -104.609070
Boring Diameter: 8.25	Checked By: Curt Stripeika	Driller: Site services
Drilling Firm: Site Services	Hammer Type: Auto	Hammer Weight: 140
Logged By: Thomas McClosky	Max Depth: 7 (ft)	Method: Auger
Reported Depth: 7.5		

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6921.77'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts	% Fines	Atterberg Limits	Moisture Content (%)	Dry Density
5	Brown, dry, **Silty Sand** (SM), with gravel	2'	-	14 33 16 50	49.8	37-34-3		
		5'	-	16 36 50				

Moisture Content 0 50 100
Plastic Limit 0 50 100
Liquid Limit 0 50 100

SM

SSS - Standard Split Spoo

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Plate 5

Soil Boring: BH-6

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.947861 / -104.608646
Boring Diameter: 8.25	Checked By: Curt Stripeika	Driller: Site Services
Drilling Firm: Site Services	Hammer Type: Auto	Hammer Weight: 140
Logged By: Thomas McClosky	Max Depth: 7 (ft)	Method: Auger
Reported Depth: 6.5		

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6920.80'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts	% Fines	Atterberg Limits	Moisture Content (%)	Dry Density
5	Brown, dry, **Silty Sand** (SM)	2'	-	12 18 23 46	19.6	46-33-13		
		5'	-	45 50				

Moisture Content: 0 — 50 — 100
Plastic Limit: 0 — 50 — 100
Liquid Limit: 0 — 50 — 100

SM

SSS - Standard Split Spoo

Water Level

Depth	Hour	Date
-	-	-
-	-	-

Soil Boring: BH-7

Universal Engineering Sciences

Project: Meridian Storage
Location: 17750 Owl Place, Peyton, CO.
Project Number: 4430.2300005.0000

Date Started: 03/23/2023	Date Completed: 03/23/2023	Lat/Long: 38.947663 / -104.608275
Boring Diameter: 8.25	Driller: Site Services	Hammer Type: Auto
Hammer Weight: 140	Logged By: Thomas McClosky	Max Depth: 26 (ft)
Method: Auger	Reported Depth: 27.5	

Rig Type: CME-55
Tooling: 8-1/4" Hollowstem Auger
Surface Elevation: 6928.00'

Depth (Feet)	Visual Classifications and Remarks	Depth of Sample	Sample Number	SPT Blow Counts
	Tan, dry, **Sandy Silt** (ML)	2.5'	-	8 9 14 25
5		5'	-	17 32 50
		7.5'	-	10 17 49 21
10		10'	-	45 50
		15'		
15	15.0 Tan, dry, **Silty Sand** (SM)		-	24 50
		20'		
20			-	34 50
		25'		
25	becoming moist to wet		-	50

Lab: % Fines | Atterberg Limits | Moisture Content (%) | Dry Density

Moisture Content 0 50 100
Plastic Limit 0 50 100
Liquid Limit 0 50 100

ML	SSS - Standard Split Spoo
SM	-

Water Level

Depth	Hour	Date
-	-	-
-	-	-

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

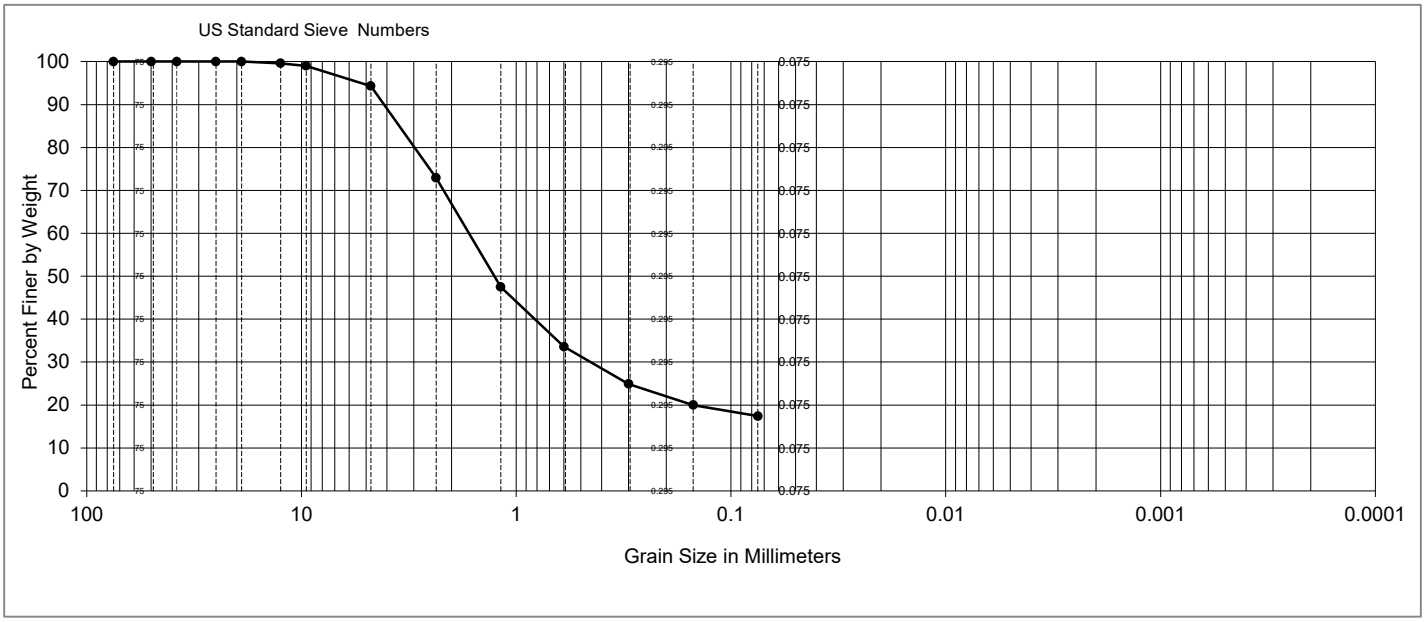
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis

Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
									100	99	94	73	67	48	34	29	25	20	17.4

D10= 0.30 Cc= 1.24 % Gravel = 5.7

D30= 1.69 Cu= 31.5 % Sand = 76.9

D60= 9.01 % Silt & Clay= 17.4

Reviewed By:

Thomas Vick, P.E

Plate 8

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

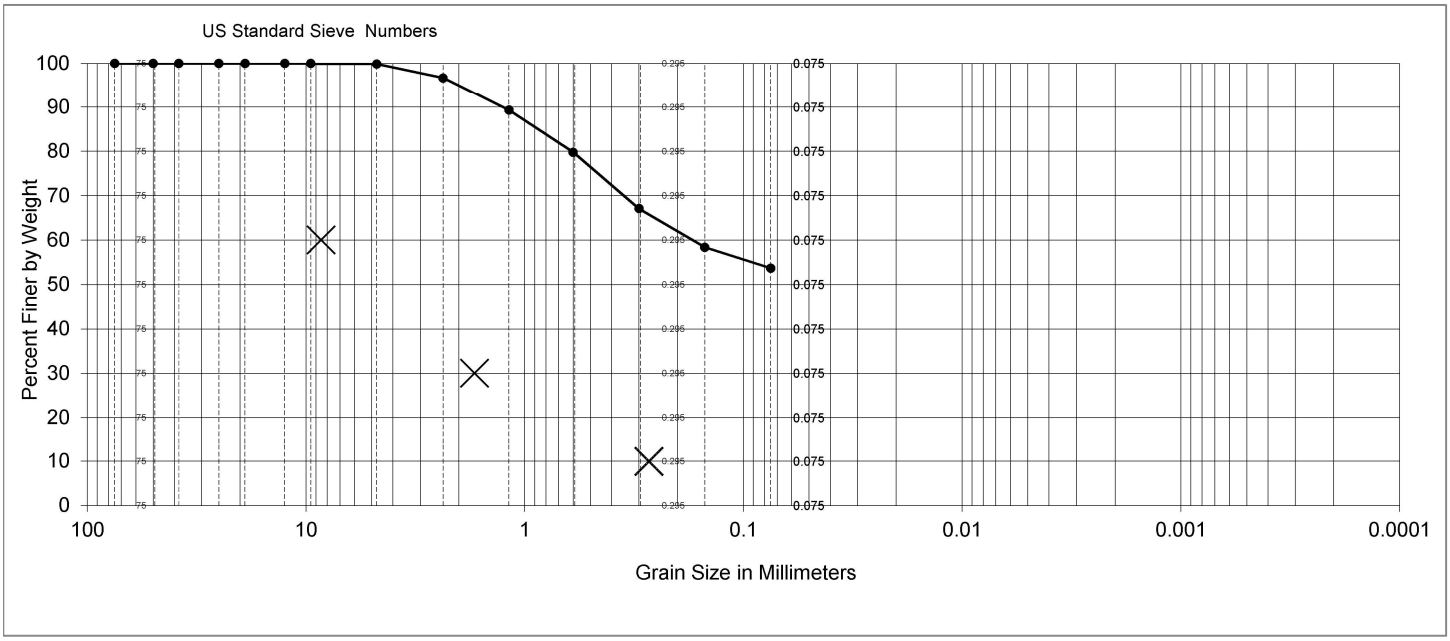
Sample No.: SLC-22-0231

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



D10=	0.27	Cc=	1.24	% Gravel =	0.1
D30=	1.69	Cu=	31.5	% Sand =	46.2
D60=	8.51			% Silt & Clay=	53.7
					100.0%

Reviewed By:

Thomas Vick, P.E

Plate 9

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

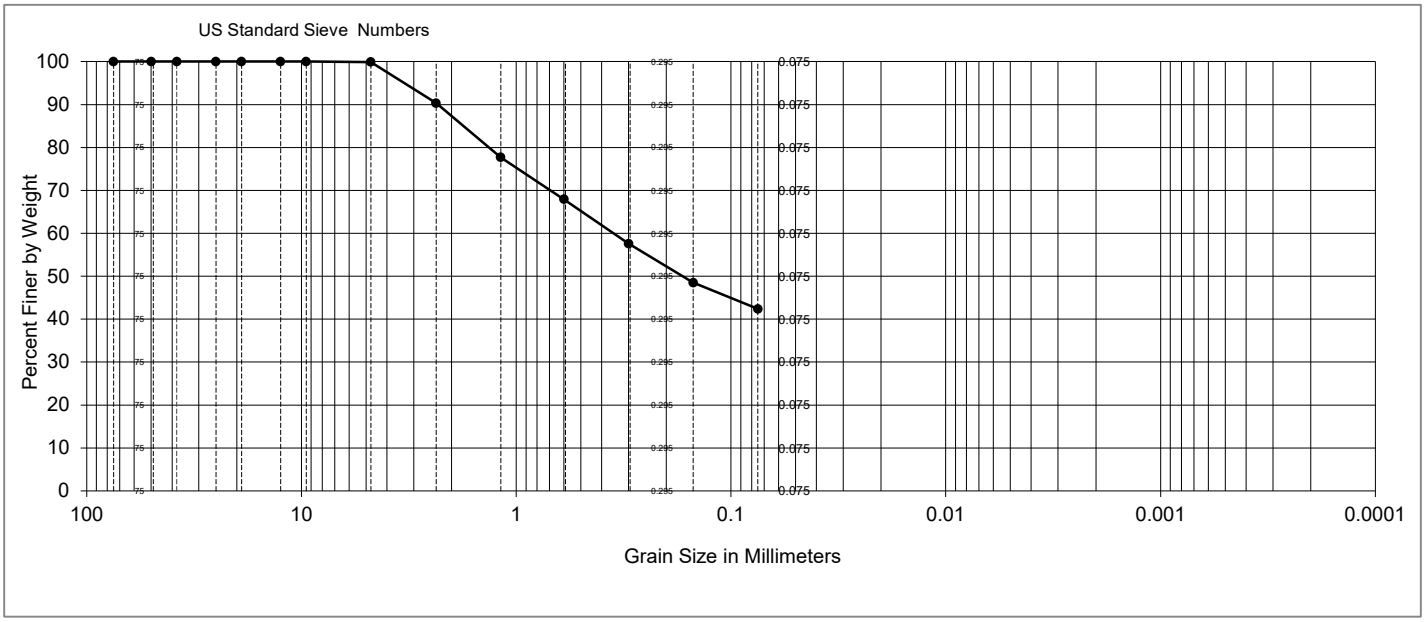
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis
Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
											100	90	87	78	68	63	58	49	42.4

D10= 0.30 Cc= 1.24 % Gravel = 0.1

D30= 1.69 Cu= 31.5 % Sand = 57.5

D60= 9.01 % Silt & Clay= 42.4

Reviewed By:

Thomas Vick, P.E

Plate 10

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

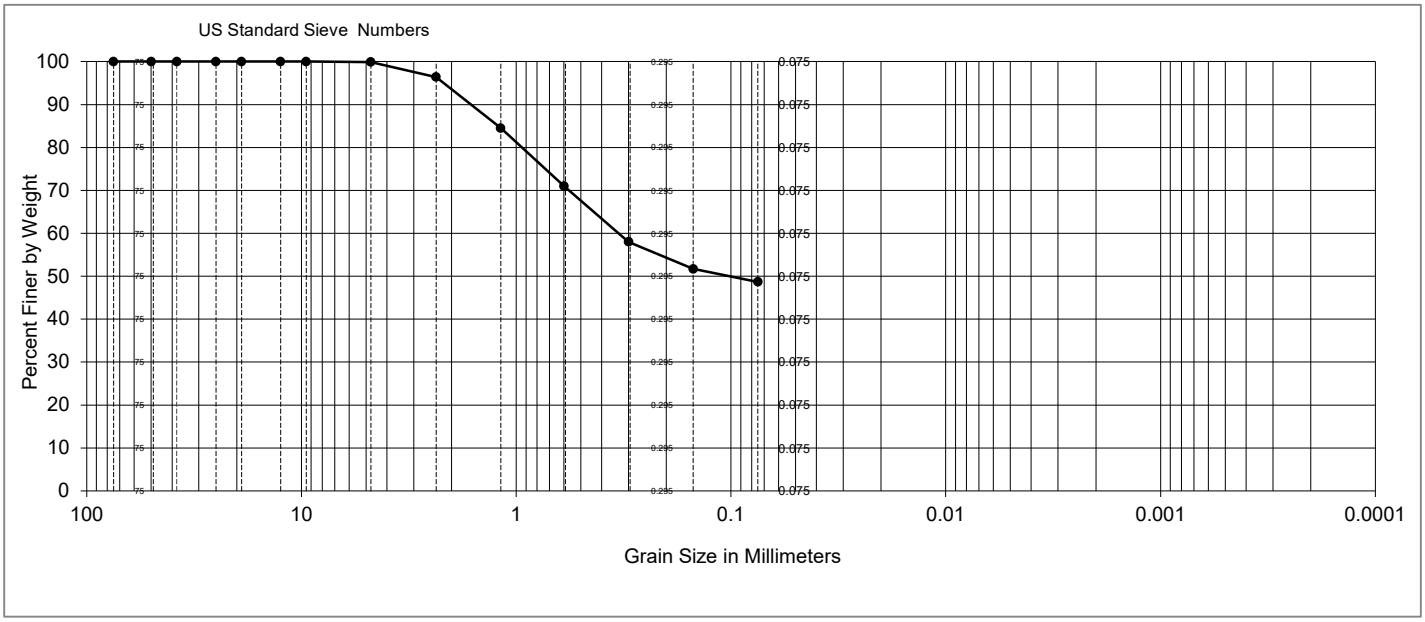
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis

Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
											100	96	94	85	71	64	58	52	48.7

D10= 0.30 Cc= 1.24 % Gravel = 0.1

D30= 1.69 Cu= 31.5 % Sand = 51.2

D60= 9.01 % Silt & Clay= 48.7

Reviewed By:

Thomas Vick, P.E

Plate 11

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

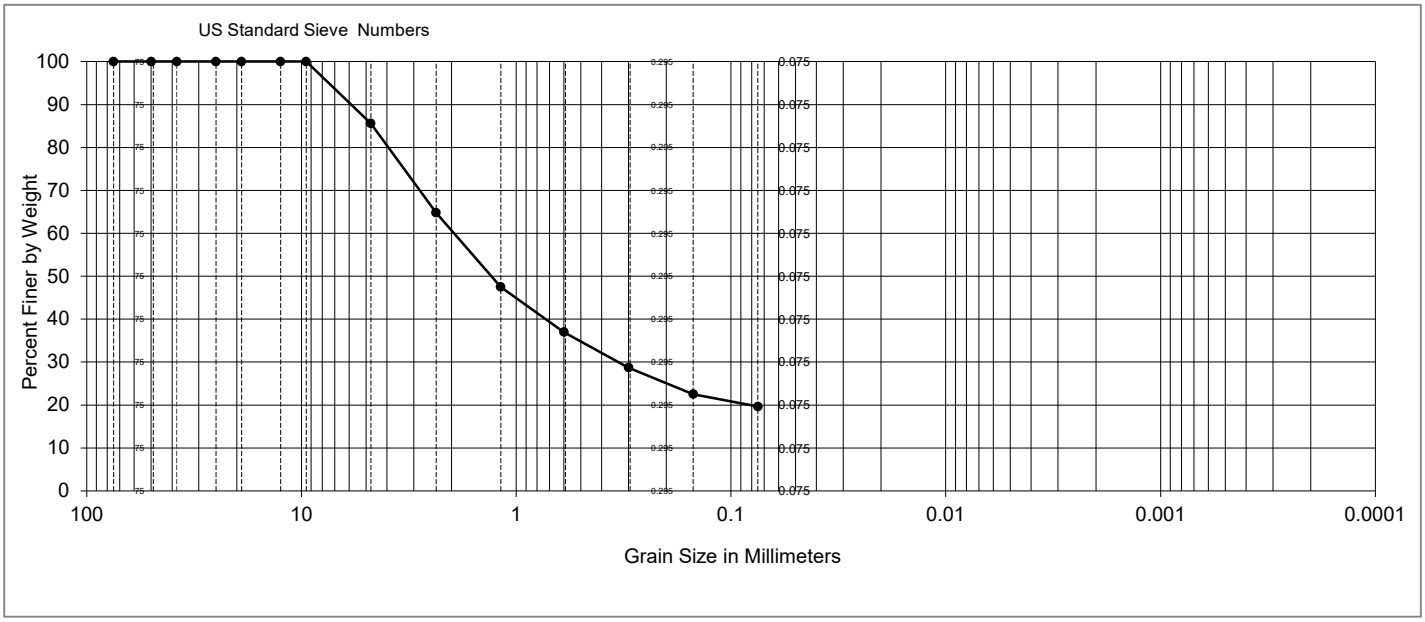
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis
Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
											86	65	60	48	37	33	29	23	19.6

D10= 0.30 Cc= 1.24 % Gravel = 14.4

D30= 1.69 Cu= 31.5 % Sand = 66.0

D60= 9.01 % Silt & Clay= 19.6

Reviewed By:

Thomas Vick, P.E

Plate 12

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

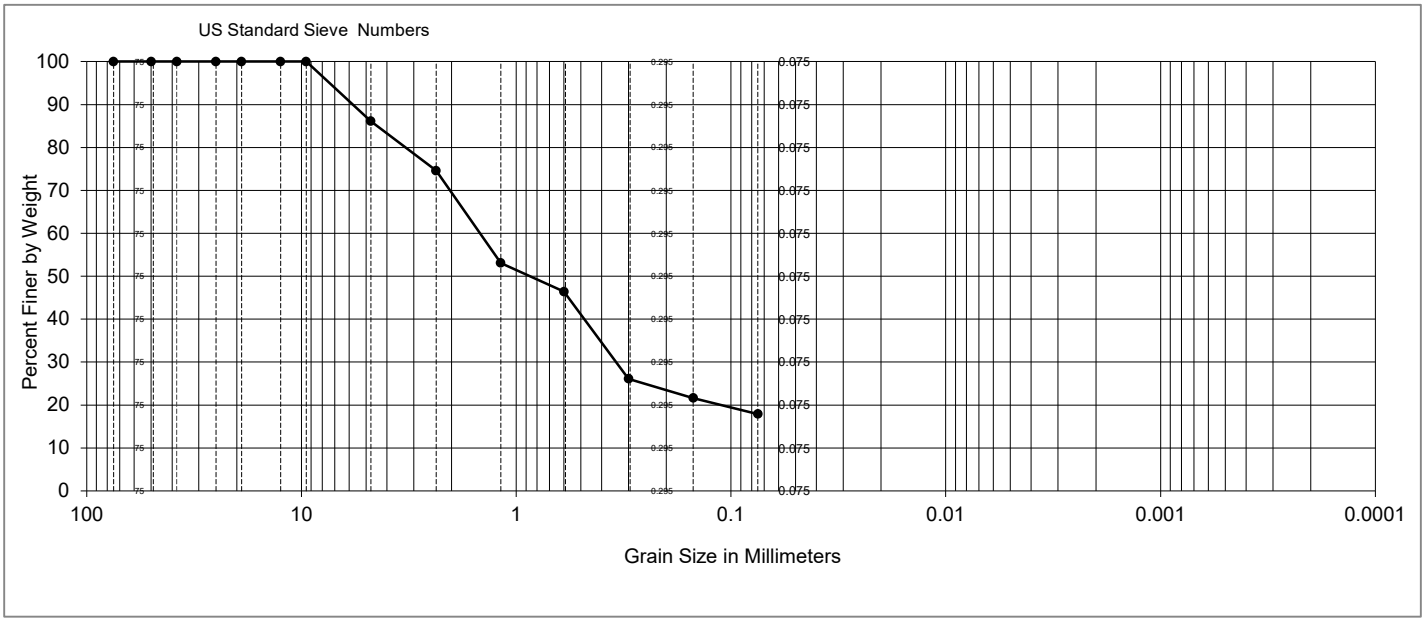
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis

Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
											86	75	62	53	46	36	26	22	17.9

D10= 0.30 Cc= 1.24 % Gravel = 13.9

D30= 1.69 Cu= 31.5 % Sand = 68.2

D60= 9.01 % Silt & Clay= 17.9

Reviewed By:

Thomas Vick, P.E

Plate 13

UNIVERSAL ENGINEERING SCIENCES

Grain Size Distribution Curve and Classification Data
ASTM D2487 and ASTM D422

Report Date:

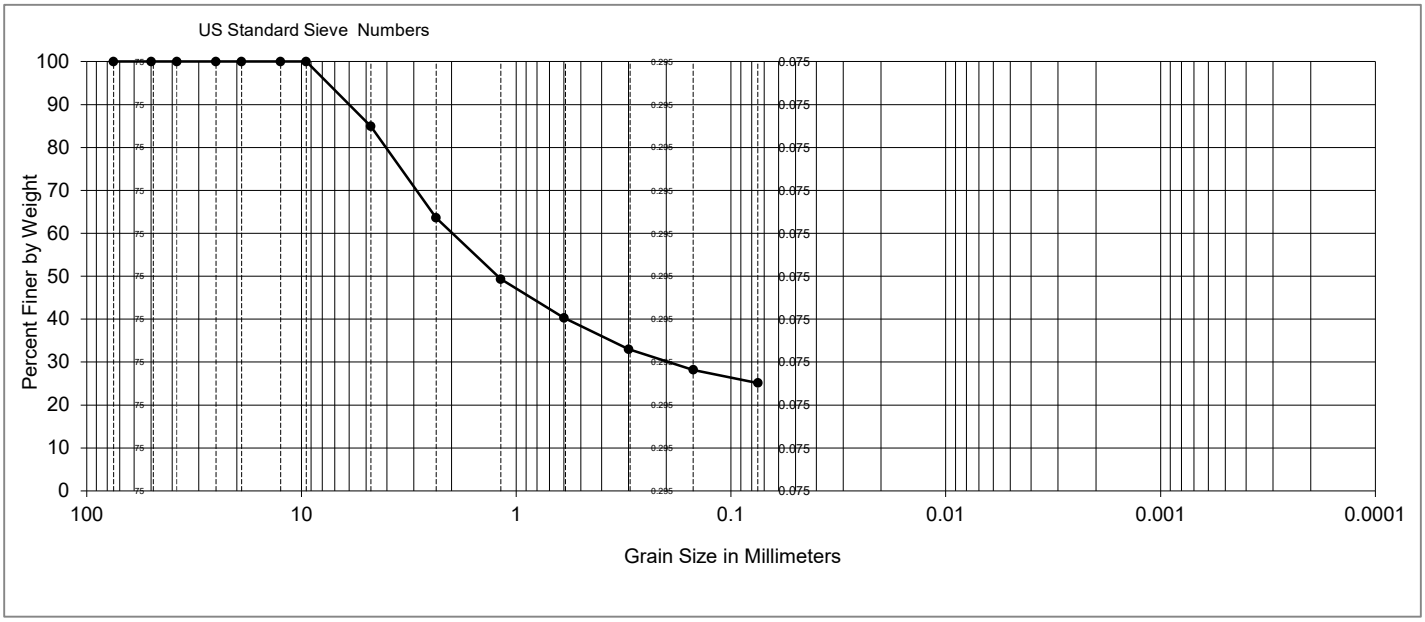
Sample No.: **SLC-22-0231**

Attention:

PROJECT:

INTENDED USE:

Uniform Classification:



Sieve Analysis
Sieve Sizes

6"	4"	3 1/2"	3"	2.5"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#100	#200
											85	64	60	49	40	36	33	28	25.1

D10= 0.30 Cc= 1.24 % Gravel = 15.1

D30= 1.69 Cu= 31.5 % Sand = 59.8

D60= 9.01 % Silt & Clay= 25.1

Reviewed By:

Thomas Vick, P.E

Plate 14

Chemtech-Ford Laboratories
Serving the Intermountain West Since 1953

9632 South 500 West
Sandy, UT 84070
O:(801) 262-7299 F: (866) 792-0093
www.ChemtechFord.com

Certificate of Analysis

Universal Engineering Science
Curt Stripeika
477 Parkland Drive
Sandy, UT 84070

PO#:
Receipt: **3/28/23 14:35 @ 22.8** °C
Date Reported: 4/11/2023
Project Name: **[none]**

Sample ID: **BH-1 @ 2.5-4**

Matrix: **Solid**
Lab ID: **23C2018-01**
Date Sampled: **3/28/23 0:00**
Sampled By: **Thomas McCloskey**

	Result	Units	Minimum Reporting Limit	Method	Preparation Date/Time	Analysis Date/Time	Flag(s)
Inorganic							
Chloride, Soluble (IC)	ND	mg/kg dry	10	EPA 300.0	3/29/23	3/29/23	
Resistivity	217	ohm m	1.0	SSSA 10-3.3	3/30/23	3/30/23	
Sulfate, Soluble (IC)	ND	mg/kg dry	10	EPA 300.0	3/29/23	3/29/23	
Total Solids	95.3	%	0.1	CTF8000	3/29/23	3/30/23	

Plate 14

Chemtech-Ford Laboratories
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www.ChemtechFord.com

Certificate of Analysis

Universal Engineering Science
Curt Stripeika
477 Parkland Drive
Sandy, UT 84070

PO#:
Receipt: **3/28/23 14:35 @ 22.8** °C
Date Reported: 4/11/2023
Project Name: **[none]**

Sample ID: **BH-5 @ 2.5-4.5**

Matrix: **Solid**
Lab ID: **23C2018-02**
Date Sampled: **3/28/23 0:00**
Sampled By: **Thomas McCloskey**

	Result	Units	Minimum Reporting Limit	Method	Preparation Date/Time	Analysis Date/Time	Flag(s)
Inorganic							
Chloride, Soluble (IC)	ND	mg/kg dry	11	EPA 300.0	3/29/23	3/29/23	
Resistivity	20.7	ohm m	1.0	SSSA 10-3.3	3/30/23	3/30/23	
Sulfate, Soluble (IC)	56	mg/kg dry	11	EPA 300.0	3/29/23	3/29/23	
Total Solids	93.2	%	0.1	CTF8000	3/29/23	3/30/23	

Plate 15