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# SUBSURFACE SOIL INVESTIGATION
# PARKWAY PROPERTY
# PARCEL NO. 5529100006
# EL PASO COUNTY, COLORADO

Prepared for:

**Goodwin Knight**
**8605 Explorer Drive, Suite 250**
**Colorado Springs, Colorado 80920**

**Attn: Dave Morrison**

Pleases add PCD File No. PUDSP2111

August 18, 2021

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P. Stegman

SCC/bs

Encl.

Entech Job No. 211100
2MSW/rep/2021/211100ssi

Reviewed by:


Joseph C. Goode Jr., P.E.
President

see checklist and add missing items. Include the mineral deposit paragraph....You may want to reference the Sterling Ranch Fil 2 Report for sample completed

Entech Job No. 191088
F:/AAProjects/2019/191088 Geohaz

see CGS comments also. Please see that constraints and mitigation are carried over to PUDSP standard note on face of PUDSP plan.

Table of Contents



map of site with the constraints/hazards overlayed- make sure units are labeled, so specific units can be identified if a crawlspace is proposed where groundwater may impact.

add missing relative figures

Per ECM Appendix C.2.2.E, provide description of Geological Hazards and Constraints. If there are none, then please state it in the report.

# SUBSURFACE SOIL INVESTIGATION
# PARKWAY PROPERTY
# PARCEL NO. 5529100006
# EL PASO COUNTY, COLORADO

Update accordingly

122 units

## 1.0 INTRODUCTION

Goodwin Knight plans to develop a vacant parcel in El Paso County, Colorado consisting of sixty-one (61) cottages, a clubhouse, and several garages, along with associated site improvements. The property is located at the end of Landover Lane, west of South Powers Boulevard, and East of Sneffels Street in El Paso County, Colorado. The proposed buildings include 18 two story and 43 single story wood frame structures. The site is located adjacent to existing residential and multi-family areas. The approximate location of the project is shown on the Vicinity Map, Figure 1. The test boring locations are shown on the Test Boring Location Map, Figure 2.

This report describes the Subsurface Soil Investigation conducted for the planned development and provides recommendations for foundation design and construction. The Subsurface Soil Investigation included the drilling of twenty test borings randomly spaced access their site at the apartment buildings, clubhouse, swimming pool, and garages collecting samples of soil and conducting a geotechnical evaluation of the investigation findings. All drilling and subsurface investigation activities were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.0.

## 2.0 PROJECT AND SITE DESCRIPTION

122 units

It is Entech's understanding that the project will consist of constructing sixty-one cottages, several detached garages, a clubhouse, and associated site improvements. At the time of drilling, the site for the proposed development was vacant. Grading was not completed. Preliminary plans show cuts up to 11.5 feet and fills of 3 feet. The property has a gentle slope to the southeast. Vegetation consists of field grasses and weeds with some scattered scrub. It appears that some fill has been placed in the central portion of the site with man-made drainages to the south and east of the site. Building loads are anticipated to be light to moderate.

## 3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

Subsurface conditions on the site were explored by drilling twenty test borings at the approximate locations shown on the Test Boring Location Map, Figure 2. The borings were drilled to depths of 20 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted, continuous flight auger-drilling rig supplied and operated by Entech. Boring logs descriptive of the subsurface conditions encountered during drilling are presented in Appendix A. At the conclusion of drilling, and subsequent to drilling, observations for groundwater levels were made in the open boreholes.

Soil and bedrock samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D-1586) using 2-inch O.D. split-barrel and California samplers. Results of the Standard Penetration Test (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil and bedrock samples recovered from the borings were visually classified and recorded on the boring logs. The soil and bedrock classifications were later verified utilizing laboratory testing and grouped by soil type. The soil and bedrock type numbers are included on the boring logs. It should be understood that the soil and bedrock descriptions shown on the boring logs may vary between boring location and sample depth. It should also be noted that the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil and bedrock types and the actual stratigraphic transitions may be more gradual and vary with location. The Test Boring Logs are presented in Appendix A.

Water content testing (ASTM D-2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis Testing (ASTM D-422) and Atterberg Limits testing (ASTM D-4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Volume change testing was performed on selected samples using the Swell/Consolidation and FHA Swell Tests in order to evaluate potential expansion/compression characteristics of the soil and bedrock. Soluble Sulfate Testing was also performed on selected samples to evaluate the corrosive characteristics of the soils. The Laboratory Testing Results are summarized on Table 1 and are presented in Appendix B.

## 4.0 SUBSURFACE CONDITIONS

Two soil types and three bedrock types were encountered in the test borings drilled for the subsurface investigation: Type 1: very clayey sand (SC), Type 2: very sandy to sandy clay (CL), Type 3: very clayey sandstone (SC), Type 4: sandy to very sandy claystone (CL), and Type 5: shale (CL). The soil and bedrock were classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

### 4.1 Soil and Bedrock

Soil Type 1 classified as very clayey sand (SC). The clayey sand was encountered in three borings at the existing ground surface to depths ranging between 3 to 9 feet. Standard Penetration Testing resulted in SPT N-values of 15 to 48 blows-per-foot (bpf), indicating medium to very dense states. Water content and grain size testing resulted in approximately 6 to 17 percent water content and approximately 38 to 46 percent of the soil size particles passing the No. 200 sieve. FHA Swell Testing resulted in swell pressures between 180 and 360 psf, indicating a low expansion potential. Sulfate Testing on the clay and clay-silt resulted in less than 0.01 sulfate by weight, indicating the very clayey sand negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 2 classified as sandy to very sandy clay and sandy clay fill (CL). The very sandy clay and sandy clay fill was encountered all but one of the test borings underlying Soil Type1 or from the surface and a depth of 20 feet in Test Boring Nos. 1, 17 and 19. Standard Penetration Testing resulted in SPT N-values of 8 to 50 bpf, indicating firm to hard consistencies. Water

content and grain size testing resulted in approximately 7 to 21 percent water content and approximately 59 to 76 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing indicated the clay had Liquid Limits between 34 and 41 and Plastic Indexes between 15 and 25. Swell/Consolidation Testing resulted in volume changes between 0.5 and 1.5 percent, swell and 0.3 and 2.1 percent consolidation, indicating low to high swell/consolidation potentials. Sulfate Testing on the clay resulted in less than 0.01 percent sulfate by weight, indicating the sandy clay has negligible potential for concrete degradation due to sulfate attack.

Soil Type 3 classified as clayey sandstone (SC). The sandstone bedrock was encountered in Test Boring Nos. 3 at a depth of 3 feet and extending to 16 feet bgs. Standard Penetration Testing conducted on the sandstone resulted in SPT N-values of greater than 50 blows per foot (bpf), indicating very dense consistencies. Moisture content and grain size testing resulted in approximately 12 percent water content and approximately 47 percent of the soil size particles passing the No. 200 sieve. An Atterberg Limit Test resulted in a Liquid Limit of 37 and a Plastic Index of 19. Swell/Consolidation Testing resulted in volume changes of 0.01 percent, indicating low swell potentials. Sulfate testing on the sandstone resulted in 0.01 percent sulfate by weight, indicating the sandstone has negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 4 classified as sandy to very sandy claystone bedrock (CL). The claystone was encountered in 17 of the test borings ranging from 1 to 18 feet bgs and extending from 1 foot to the termination of the boring. Standard Penetration Testing resulted in SPT N-values of greater that 50 blows per foot (bpf) indicating hard consistencies. Moisture content and grain size analysis resulted in 6 to 17 percent water content and approximately 56 to 78 percent of the soils size particles passing the No. 200 sieve. Atterberg Limit Test resulted in a Liquid Limit of 35 and a Plastic Index of 1790. Swell/Consolidation Testing resulted in volume changes of 0.6 to 3.3 percent indicating low to very high swell properties. FHA Swell Testing resulted in swell pressures between 20 and 1110 psf, indicating a moderate swell expansion potential. Sulfate testing on the claystone resulted in 0.02 percent sulfate by weight, indicating the claystone has negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 5 classified as shale bedrock (SC/CL). The shale was encountered 13 of the 20 test borings underlying the claystone, Soil Type 4. Standard Penetration Testing conducted on the

shale resulted in SPT N-values of greater than 50 blows per foot (bpf) indicating hard consistencies. Moisture content and grain size analysis resulted in 9.1 percent water content and 44 to 66 percent of the soil particles passing the No. 200 sieve. The shale typically has moderate to high swelling properties. Atterberg Limits and Sulfate testing was not conducted on the shale.

### 4.2 Groundwater

Groundwater was encountered in Test Boring Nos. 2, 4, 9, 11, 12, 13, 14, 16 and 17 at depths ranging between 12 to 18 ½ feet. It is anticipated that groundwater will not affect shallow foundations for the slab on grade multi-story and single-story structures or buried utilities proposed on this site. Groundwater may affect areas depending upon grading cuts and within deeper excavations made for installation of utilities. It should be noted that groundwater levels, other than those observed at the time of the subsurface investigation, could change due to season variations, changes in land runoff characteristics and future development of nearby areas.

## 5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

*The following discussion is based on the subsurface conditions encountered in the borings drilled for the planned development. If subsurface conditions differ from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that evaluation and recommendations presented can be reviewed and revised if necessary.*

The site will be developed by constructing sixty-one single family cottages, several detached garages, and a clubhouse. The proposed buildings are expected to have crawlspace type construction with no basements or below grade levels. Given the subsurface conditions encountered at the time of drilling and the site development as described, the buildings can be supported with shallow spread footing foundations bearing on imported structural fill or possibly reconditioned site soils. The extent of overexcavation will be determined after site grading including individual open excavation inspections. Additional testing will be required to evaluate reconditioning the site soils.

shallow bedrock add to geo note constraint

Soil encountered at anticipated foundation depths in the test borings generally consists of hard claystone and firm to very stiff sandy clays. Shallow bedrock was encountered across the majority of the site (at 1 foot in several of the test borings). Excavation of bedrock will likely be required on the site. Areas of deeper bedrock were encountered in the central portion of the site. Fill may be encountered in these areas. The soils in the deep bedrock areas should be further evaluated. Test pits, during site grading, could be used to evaluate the soils.

Sandy clay and claystone will affect the construction/performance of shallow foundation systems. Excavation of stiff clays and claystone should be anticipated for the foundations and utilities. Shale was encountered at depths that will likely not be encountered in building excavations. All topsoil must be removed and the existing subgrade scarified and moisture-conditioned prior to placing fill

add for geo note, state mitigation

Due to expansive soils, overexcavation will likely be required for the proposed structures, if shallow foundations are used. Any fill required for overexcavation or overlot grading should be approved by Entech Engineering and be compacted according to the "Structural Fill" paragraph. Prior to placing fill, the subgrade surface should be scarified, moisture-conditioned and compacted.

add for geo note, state mitigation

Groundwater is not expected to affect the development utilizing shallow foundations on the site. Deep utility excavations may encounter water. Unstable soil conditions should be anticipated if excavations approach water levels. Stabilization with shotrock or geofabric may be required.

It appears that fill was placed in areas for Testing Borings 17 and 19. The standard penetration indicated firm conditions. Test pits during site grading are recommended to verify fill depths in these building areas.

Drilled piers would be an alternative to overexcavation of the expansive soils. Drilled pier depths of 25 feet are anticipated for the site. Design parameters for drilled piers can be provided, if this option is selected.

### 5.1 Footing Subgrade Improvement and Bearing Capacity:

Due to expansive clays and claystone, overexcavation of the soils is required, if shallow foundations are used. A 4-foot overexcavation depth is recommended for the proposed structures. A three (3) foot overexcavation is recommended for the garage structures and retaining walls. The overexcavation depth is from the bottom of the footings. Prior to placing new fill, the subgrade should be scarified, moisture conditioned and compacted.

A discussion of the subsurface conditions encountered in the test borings and the expected effect on foundation performance is provided in the following sections. Sections 5.2 through 5.14 provide foundation design construction recommendations and considerations relative to the subsurface soil conditions encountered on this site.

### 5.2 Shallow Foundations

Provided the above recommendations are followed, the proposed structures can be supported with shallow spread footing foundations with overexcavation of the expansive soils. A maximum allowable bearing pressure of 2600 psf is recommended for foundation members bearing on imported structural fill. For final design, continuous spread footings are recommended to have a minimum width of 16 inches, and individual column footings for main support beams should have minimum plan dimensions of 24 inches on each side in order to avoid punching failure into the supporting subgrade granular soils. Exterior footings should extend a minimum of 30 inches below the adjacent exterior site grade for frost protection. Following the above subgrade preparation recommendations, and adhering to the recommended maximum allowable bearing pressure, it is expected to result in foundation design which should limit total and differential vertical movements to 1 and ½ inches, respectively.

Foundation walls should be designed to resist lateral pressures generated by the soils on this site. An equivalent hydrostatic fluid pressure (in the active state) of 45 pcf is recommended for the on-site sandy soils and imported sand soils; an equivalent fluid pressure of 50 pcf is recommended for clay soils. It should be noted that these values apply to level backfill conditions. If sloping backfill conditions exist, pressures will increase substantially depending on the conditions adjacent to the walls. Surcharge loading should also be considered in wall designs. Equivalent fluid pressures for sloping conditions should be determined on an individual basis.

Entech should observe overexcavated subgrades as well as the overall foundation excavation subgrade and evaluate if the exposed soil conditions are consistent with those described in this report. Entech should also provide recommendations for additional overexcavation depth, if required, and foundation drainage based on the excavation conditions observed at that time.

As discussed above, drilled pier design parameters can be provided if these foundation systems are selected for the proposed development. It should be noted that groundwater will also likely affect the installation of drilled piers.

### 5.3 Foundation Wall and Retaining Wall Design Values

The following values are recommended for use in designing below grade foundation walls with unbalanced lateral loading and or retaining walls that may be associated with the project.

| Recommended Design Values – Lateral Loading (Clayey Sand)* | |
|---|---|
| Equivalent fluid density for lateral earth pressure (active), pcf | 45 |
| Equivalent fluid density for lateral earth pressure (passive), pcf | 350 |
| Equivalent fluid density for lateral earth pressure (at rest), pcf | 60 |
| Soil density (compacted sand), pcf | 125 |
| Angle of Internal Friction (compacted sand), degrees | 34 |
| Coefficient of sliding between concrete and sand | 0.3 |

| Recommended Design Values – Lateral Loading (Clay)* | |
|---|---|
| Equivalent fluid density for lateral earth pressure (active case), pcf | 50 |
| Equivalent fluid density for lateral earth pressure (passive case), pcf | 300 |
| Equivalent fluid density for lateral earth pressure (at rest case), pcf | 75 |
| Soil density (sandy clay), pcf | 115 |
| Angle of Internal Friction (sandy clay), degrees | 28 |
| Coefficient of sliding between concrete and clay | 0.25 |

*Note: The above lateral loading design values are for level backslope angles and no surcharge loads. If wall backfill is submerged, water pressures must be taken into account as additional wall loading. If backfill slope angles are greater than zero degrees, if the backfill is surcharged,

the design values must be adjusted to account for additional lateral loading. Appropriate drains should be installed.

### 5.4 Seismic Site Classification

Based on the subsurface conditions encountered at the site and in accordance with Section 1613 of the 2015 International Building Code (IBC), the site meets the conditions of a Site Class C.

### 5.5 On-Grade Floor Slabs

On-grade floor slabs, if any, should be supported on compacted, non-expansive, granular structural fill. Slabs should be supported on a 4 to 5-foot layer of granular soil. The fill should be placed according to the structural fill paragraph.

Grade supported floor slabs should be separated from other building structural components and utility penetrations to allow for possible future vertical movement. Interior partition walls should be constructed in such a manner so as not to transfer slab movement into the overlying floor(s) and/or roof members, should slab movement occur. Control joints in grade-supported slabs are recommended at 10 to 15-foot perpendicular spacings to control cracking. If slab movement cannot be tolerated a structural floor system should be used.

identify stormdrain system on the GEC plan and stormwater plans. place note on PUDSP as to ownership and maintenace of these plans

### 5.6 Surface and Subsurface Drainage

Positive surface drainage is recommended around the building's perimeter to minimize infiltration of surface water into the supporting foundation soils. A 10 percent slope adjacent to foundations is recommended where possible. A minimum ground surface slope of 5 percent in the first 10 feet adjacent to exterior foundation walls is recommended for landscaped areas. For paved areas and other impervious surfaces, a minimum slope of 2 percent is adequate. All roof drains and gutter downspouts should be extended to discharge well beyond the building's foundation backfill zone or be connected to a storm sewer system.

To help minimize infiltration of water into the foundation zone, vegetative plantings placed close to foundation walls should be limited to those species having low watering requirements and irrigated grass should not be located within 5 feet of the foundation. Trees should be located a minimum of 10 feet from foundations. Similarly, sprinklers are not recommended to discharge

water within 5 feet of foundations. Irrigation near foundations should be limited to the minimum amount sufficient to maintain vegetation. Application of more irrigation water than necessary can increase the potential for slab and foundation movement. Items such as sidewalks should not be situated as to allow water to be trapped near the foundation.

Perimeter drains are not necessary for slab-on-grade construction provided the slab is positioned above finished exterior site grade. In the event a below grade space is included with buildings, a foundation perimeter drain around that space is recommended. A typical perimeter drain detail is shown in Figure 3. The perimeter drain should be provided with a free gravity outlet or be connected to a sump/pump system.

### 5.7 Concrete Degradation Due to Sulfate Attack

Sulfate solubility testing was conducted on three samples recovered from the test borings to evaluate the potential for sulfate attack on concrete placed below grade. The test results indicated 0.01 to 0.02 percent soluble sulfate (by weight). The test results indicate the sulfate component of the site soils present a negligible exposure threat to concrete placed below the site grade.

Type II cement is recommended for concrete at this site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in the foundation excavation prior to the placement of concrete. If standing water is present in the foundation excavation, it should be removed by ditching to sumps and pumping the water away from the foundation area prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

### 5.8 Foundation Excavation Observation

Subgrade preparation for building foundations should be observed by Entech prior to construction of the footings and floor slabs in order to verify that (1) no anomalies are present, (2) materials of the proper bearing capacity have been encountered or placed, and (3) no soft spots, expansive or organic soil, soil or debris are present in the foundation area prior to concrete placement or backfilling. Entech should make final recommendations for over-

excavation, if required, and foundation drainage at the time of excavation observation, if necessary. Final design parameters for each building should also be determined.

### 5.9 Overlot Grading

Areas to receive fill should have all topsoil, organic material or debris removed. Fill must be properly benched into sloping areas. The surface should be scarified and moisture conditioned to within ±2 percent of its optimum moisture content and compacted to 95 percent of its maximum Standard Proctor Dry Density (ASTM D-698) beneath footings prior to placing new fill. New fill beneath footings should be non-expansive or reconditioned fill and be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) for granular soils. These materials should be placed at a moisture content conducive to compaction, usually ±2 percent of Proctor optimum moisture content. In areas with fill greater than 15 feet, the fill should be compacted to 98 percent of its maximum Modified Proctor Density ASTM D-1557. The placement and compaction of fill should be observed and tested by Entech Engineering, Inc. Imported soils should be approved by Entech Engineering, Inc. prior to being hauled to the site.

Compacted, non-expansive granular soil, free of organics, debris and cobbles greater than 3-inches in diameter, is recommended for structural fill beneath foundation components and floor slabs. All fill placed within the foundation areas should be approved by Entech, and be compacted to a minimum of 95 percent of the soils maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of six inches or less. Fill should be placed at water contents conducive to achieving adequate compaction, usually within ±2 percent of the optimum water content as determined by ASTM D-1557. The subgrade overexcavation should be scarified a minimum of 12 inches, moisture conditioned to 0 to +4 percent and be compacted to a minimum of 95 percent of its Standard Proctor Dry Density, ASTM D-698 for clay and 95 percent compaction, ±2 percent optimum moisture content, utilizing a Modified Proctor dry density ASTM D-1557 for sand. Mechanical methods can be used for placement and compaction of fill; however, heavy equipment should be kept at distance from foundation walls and below slab infrastructure to avoid overstressing. No water flooding techniques of any type should be used for compaction or placement of foundation or floor slab fill material. Entech should approve any imported fill to be used within the foundation area prior to delivery to the site.

### 5.10 Utility Trench Backfill

Fill placed in utility trenches should be compacted according to local specifications. Fill should be placed in horizontal lifts having a compacted thickness of six inches or less and at a water content conducive to adequate compaction, within ±2 percent of optimum water content. Mechanical methods should be used for fill placement; however, heavy equipment should be kept at a distance from foundation walls. No water flooding techniques of any type should be used for compaction or placement of utility trench fill.

Trench backfill placement should be performed in accordance with EL Paso County specifications. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

### 5.11 General Backfill

Any areas to receive fill outside the foundation limits should have all topsoil, organic material, and debris removed. Fill must be properly benched into existing slopes in order to be adequately compacted. The fill receiving surface should be scarified to a depth of 12-inches and moisture conditioned to ±2 percent of the optimum water content, and compacted to a minimum of 95 percent of the ASTM D-1557 maximum dry density before the addition of new fill. Fill should be placed in thin lifts not to exceed 6 inches in thickness after compaction while maintaining at least 95 percent of the ASTM D-1557 maximum dry density. Fill material should be free of vegetation and other unsuitable material and shall not contain rocks or fragments greater than 3-inches. Topsoil and strippings should be segregated from all other fill sources on the site. Fill placement and compaction beneath and around foundations, in utility trenches, beneath roadways or other structural features of the project should be observed and tested by Entech during construction.

### 5.12 Excavation Stability

Excavation sidewalls must be properly sloped, benched and/or otherwise supported in order to maintain stable conditions. All excavation openings and work completed therein shall conform to OSHA Standards as put forward in CFR 29, Part 1926.650-652, (Subpart P).

### 5.13 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the foundation subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to avoid burial of snow, ice or frozen material within the planned construction area.

### 5.14 Construction Observations

It is recommended that Entech observe and document the following activities during construction of the building foundations.

- Excavated subgrades and subgrade preparation.
- Placement of foundation perimeter drains (if installed).
- Placement/compaction of fill material for the foundation components and floor slab.
- Placement/compaction of utility bedding and trench backfill.

## 6.0 CLOSURE

The Subsurface Investigation, geotechnical evaluation and recommendations presented in this report are intended for use by Goodwin Knight with application to the planning of the proposed development, "The Cottages at Mesa Ridge," located at the end of Landover Lane, west of Powers Boulevard, and east of Sneffels Street in El Paso County, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests that it be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

# TABLE

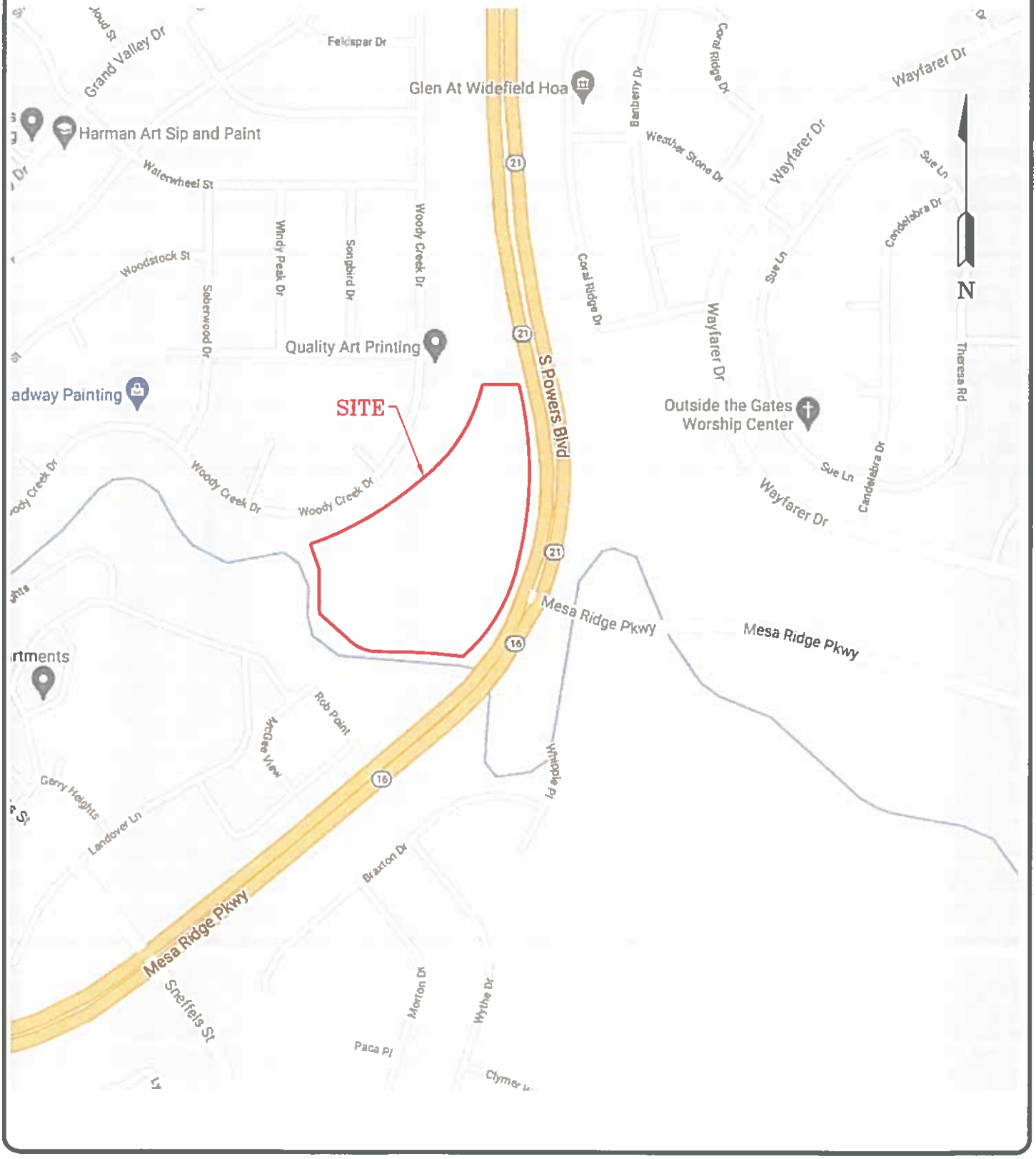
# TABLE 1

## SUMMARY OF LABORATORY TEST RESULTS

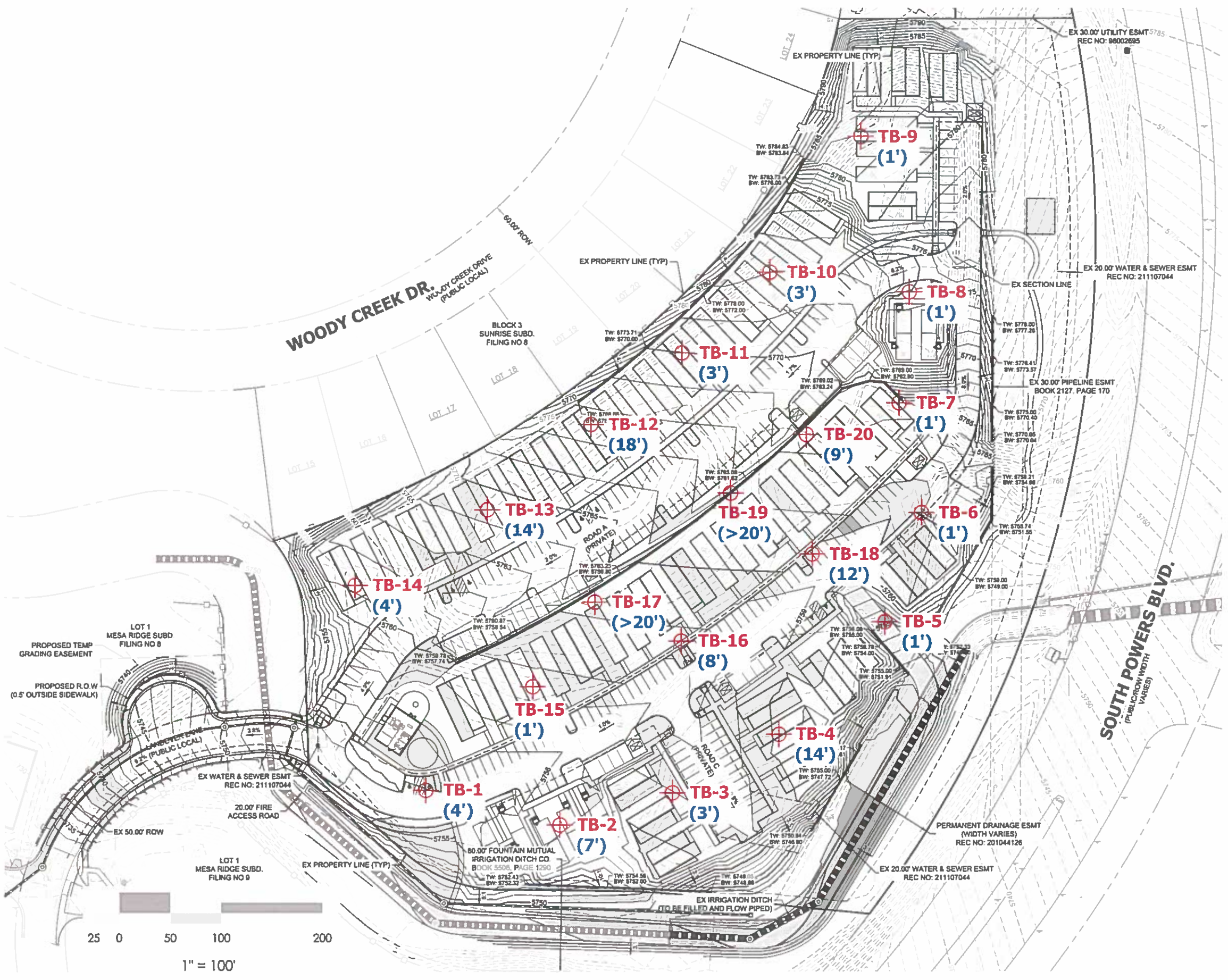
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE
JOB NO. 211100

| SOIL TYPE | TEST BORING NO. | DEPTH (FT) | WATER (%) | DRY DENSITY (PCF) | PASSING NO. 200 SIEVE (%) | LIQUID LIMIT (%) | PLASTIC INDEX (%) | SULFATE (WT %) | FHA SWELL (PSF) | SWELL/ CONSOL (%) | UNIFIED CLASSIFICATION | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4 | 5 | | | 46.1 | | | <0.01 | 180 | | SC | SAND, VERY CLAYEY |
| 1 | 20 | 5 | | | 38.1 | | | | 360 | | SC | SAND, VERY CLAYEY |
| 2A | 17 | 2-3 | 9.0 | 99.1 | 67.8 | 37 | 20 | | | -2.1 | CL | FILL, CLAY, SANDY |
| 2 | 10 | 2-3 | 10.1 | 110.0 | 59.1 | | | | | 1.5 | CL | CLAY, VERY SANDY |
| 2 | 16 | 2-3 | 8.3 | 104.7 | 66.5 | | | | | -0.3 | CL | CLAY, SANDY |
| 2 | 19 | 10 | 20.5 | 104.6 | 64.9 | 34 | 15 | | | 0.5 | CL | CLAY, SANDY |
| 2 | 1 | 2-3 | 13.4 | 119.6 | 75.6 | 41 | 25 | <0.01 | | 1.1 | CL | CLAY, SANDY |
| 3 | 3 | 10 | 12.4 | 113.9 | 47.0 | 37 | 19 | 0.01 | | 0.1 | SC | SANDSTONE, VERY CLAYEY |
| 4 | 2 | 15 | 13.3 | 116.9 | 70.3 | 35 | 17 | 0.02 | | 1.2 | CL | CLAYSTONE, SANDY |
| 4 | 5 | 10 | | | 78.0 | | | | 1110 | | CL | CLAYSTONE, SANDY |
| 4 | 6 | 5 | | | 55.7 | | | | 720 | | CL | CLAYSTONE, VERY SANDY |
| 4 | 7 | 5 | 12.4 | 113.9 | 61.0 | | | | | 1.3 | CL | CLAYSTONE, VERY SANDY |
| 4 | 9 | 10 | | | 63.1 | | | | | | CL | CLAYSTONE, SANDY |
| 4 | 11 | 5 | 8.5 | 127.1 | 68.4 | | | | | 3.3 | CL | CLAYSTONE, SANDY |
| 4 | 12 | 20 | 15.1 | 116.9 | 72.6 | | | | | 0.6 | CL | CLAYSTONE, SANDY |
| 4 | 13 | 10 | | | 63.7 | | | | | | CL | CLAYSTONE, SANDY |
| 4 | 14 | 5 | 10.6 | 97.5 | 53.3 | | | | | | CL | CLAYSTONE, VERY SANDY |
| 4 | 18 | 15 | 11.4 | 117.7 | 53.1 | 30 | 16 | | | | CL | CLAYSTONE, VERY SANDY |
| 5 | 8 | 20 | 9.1 | 97.7 | 66.1 | | | | | | CL | SHALE |

# FIGURES




| | |
|---|---|
| **ENTECH ENGINEERING, INC.** | VICINITY MAP<br>MESA RIDGE PARKWAY<br>EL PASO COUNTY, CO<br>For: GOODWIN KNIGHT |
| 325 ELKTON DRIVE<br>COLORADO SPRINGS, CO. 80907 (719) 531-5599 | DRAWN: JAC \| DATE: 07/29/21 \| CHECKED: KAH \| DATE: 07/29/21 |
| | JOB NO.: 211100<br>FIG NO.: 1 |



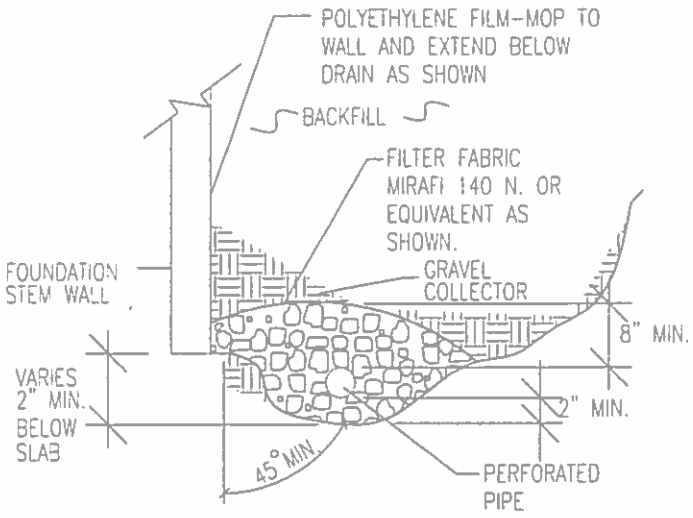

TB- APPROXIMATE TEST BORING LOCATIONS AND NUMBERS (Depth of Bedrock)

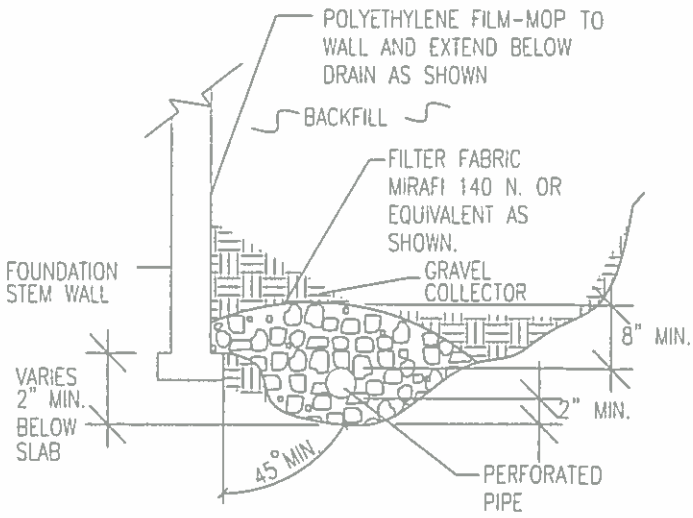
| REVISION | BY |
|---|---|
| | |

ENTECH ENGINEERING, INC.
5905 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907
(719) 531-5599

TEST BORING LOCATION MAP
MESA RIDGE PARKWAY
EL PASO COUNTY, CO
For: GOODWIN KNIGHT

| | |
|---|---|
| DRWN | JAC |
| CHECKED | KAH |
| DATE | 07/28/21 |
| SCALE | 1" = 100' |
| JOB NO. | 211100 |
| FIGURE No. | 2 |




NOTES:

-GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS-85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

-PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4-INCH DIAMETER IS MOST OFTEN USED.

-ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON-PERFORATED PIPE.

-FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

-MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

-DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

PERIMETER DRAIN DETAIL

| DRAWN: | DATE: | DESIGNED: | CHECKED: |
|---|---|---|---|
| | | | |

JOB NO: 211100

FIG NO: 3

# APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 6/11/2021
Job # 211100

REMARKS

DRY TO 18.5', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 1A |
| | | | 21 | 11.7 | 2 |
| 5 | | | 50/9" | 11.1 | 4 |
| 10 | | | 50/5" | 6.5 | 4 |
| 15 | | | 50/5" | 10.7 | 5 |
| 20 | | | 50/3" | 10.3 | 5 |

FILL 0-2', SAND, CLAYEY, RED BROWN

CLAY, SANDY, BROWN, STIFF, MOIST

CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, GRAY BROWN, HARD, MOIST

TEST BORING NO. 2
DATE DRILLED 6/11/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 12.5', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 17 | 9.2 | 2 |
| 5 | | | 31 | 10.9 | 2 |
| 10 | | | 50/5" | 6.6 | 4 |
| 15 | | | 50/5" | 12.3 | 4 |
| 20 | | | 50/3" | 10.5 | 5 |

CLAY, SANDY, BROWN, STIFF TO VERY STIFF, MOIST

CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, GRAY, HARD, MOIST

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TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 6/11/2021
Job # 211100

REMARKS

DRY TO 20', 6/11/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 14 | 5.6 | 1 | SAND, VERY CLAYEY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST |
| 5 | | | 50/7" | 10.4 | 3 | SANDSTONE, VERY CLAYEY, FINE GRAINED, BROWN, VERY DENSE, MOIST |
| 10 | | | 50/6" | 12.5 | 3 | |
| 15 | | | 50/4" | 6.3 | 3 | |
| | | | | | | SHALE, GRAY, HARD, MOIST |
| 20 | | | 50/3" | 9.9 | 5 | |

TEST BORING NO. 4
DATE DRILLED 6/11/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 13', 6/11/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 18 | 12.9 | 1 | SAND, VERY CLAYEY, FINE GRAINED, BROWN, MEDIUM DENSE, MOIST |
| 5 | | | 15 | 16.6 | 1 | |
| 10 | | | 9 | 23.1 | 2 | CLAY, SANDY, SILTY, BROWN, FIRM, MOIST |
| 15 | | | 50/7" | 13.9 | 4 | CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST |
| 20 | | | 50/2" | 8.7 | 5 | SHALE, GRAY BROWN, HARD, MOIST |

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 6/11/2021
Job # 211100

REMARKS

DRY TO 20', 6/11/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| | | | 50/11" | 11.1 | 4 |
| 5 | | | 50/8" | 11.5 | 4 |
| 10 | | | 50/8" | 12.2 | 4 |
| 15 | | | 50/7" | 12.9 | 4 |
| 20 | | | 50/5" | 11.5 | 4 |

CLAY, SANDY, BROWN

CLAYSTONE, SANDY, BROWN, HARD, MOIST

TEST BORING NO. 6
DATE DRILLED 6/11/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 18.5', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| | | | 50/8" | 8.1 | 4 |
| 5 | | | 50/7" | 9.9 | 4 |
| 10 | | | 50/7" | 10.9 | 4 |
| 15 | | | 50/5" | 10.9 | 4 |
| 20 | | | 50/3" | 9.9 | 5 |

CLAY, SANDY, BROWN

CLAYSTONE, SANDY TO VERY SANDY, BROWN, HARD, MOIST

SHALE, GRAY BROWN, HARD, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

| DRAWN: | DATE | CHECKED: | DATE: |
|---|---|---|---|
| | | h | 7.19.21 |

JOB NO. 211100

FIG NO.: A- 3

TEST BORING NO. 7
DATE DRILLED 6/11/2021
Job # 211100

REMARKS

DRY TO 20', 6/11/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| CLAY, SANDY, BROWN | | | | | |
| CLAYSTONE, SANDY, BROWN, | | | | | |
| HARD, MOIST | | | 50/11" | 8.9 | 4 |
| 5 | | | 50/8" | 8.8 | 4 |
| 10 | | | 50/8" | 11.1 | 4 |
| 15 | | | 50/7" | 9.9 | 4 |
| SHALE, GRAY, HARD, MOIST | | | | | |
| 20 | | | 50/5" | 8.3 | 5 |

TEST BORING NO. 8
DATE DRILLED 6/22/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

DRY TO 20', 6/22/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| CLAY, SANDY, BROWN | | | | | |
| CLAYSTONE, SANDY, GRAY | | | | | |
| BROWN, HARD, MOIST | | | 50/8" | 11.5 | 4 |
| 5 | | | 50/7" | 10.8 | 4 |
| 10 | | | 50/6" | 11.9 | 4 |
| SHALE, GRAY, HARD, MOIST | | | | | |
| 15 | | | 50/2" | 7.5 | 5 |
| 20 | | | 50/3" | 8.6 | 5 |

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**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: A- 4

TEST BORING NO. 9
DATE DRILLED 6/22/2021
Job # 211100

REMARKS

WATER @ 17', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| | | | 50/10" | 7.4 | 4 |
| 5 | | | 50/9" | 10.9 | 4 |
| 10 | | | 50/6" | 12.2 | 4 |
| 15 | | | 50/5" | 9.8 | 5 |
| 20 | | | 50/3" | 8.7 | 5 |

CLAY, SANDY, BROWN
CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, GRAY, HARD, MOIST

TEST BORING NO. 10
DATE DRILLED 6/22/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

DRY TO 18', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 22 | 8.3 | 2 |
| 5 | | | 50/8" | 9.1 | 4 |
| 10 | | | 50/6" | 9.6 | 4 |
| 15 | | | 50/5" | 11.2 | 4 |
| 20 | | | 50/6" | 11.0 | 5 |

CLAY, VERY SANDY, BROWN, STIFF, MOIST

CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, GRAY, HARD, MOIST

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COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO: 211100
FIG NO: A- 5

TEST BORING NO. 11
DATE DRILLED 6/22/2021
Job # 211100

REMARKS

WATER @ 13', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 14 | 6.8 | 2 | CLAY, SANDY, TAN, FIRM, MOIST |
| 5 | | | 50 | 9.0 | 4 | CLAYSTONE, SANDY, BROWN, HARD, MOIST |
| 10 | | | 50/10" | 13.0 | 4 | |
| 15 | | | 50/9" | 14.7 | 4 | |
| 20 | | | 50/7" | 11.2 | 4 | |

TEST BORING NO. 12
DATE DRILLED 6/22/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 15', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 17 | 10.2 | 2 | CLAY, SANDY, BROWN, VERY STIFF TO FIRM, MOIST TO VERY MOIST |
| 5 | | | 30 | 6.8 | 2 | |
| 10 | | | 12 | 12.9 | 2 | |
| 15 | | | 8 | 21.1 | 2 | |
| 20 | | | 50/11" | 16.8 | 4 | CLAYSTONE, SANDY, BROWN, HARD, MOIST |

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TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO. 211100
FIG NO. A- 6

TEST BORING NO. 13
DATE DRILLED 6/22/2021
Job # 211100

REMARKS

WATER @ 16', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 34 | 8.5 | 2 | CLAY, SANDY, TAN, VERY STIFF, MOIST |
| 5 | | | 50 | 9.4 | 4 | CLAYSTONE, SANDY TO VERY SANDY, BROWN, HARD, MOIST |
| 10 | | | 50/6" | 11.8 | 4 | |
| 15 | | | 50/7" | 11.9 | 4 | |
| 20 | | | 50/4" | 9.8 | 5 | SHALE, GRAY, HARD, MOIST |

TEST BORING NO. 14
DATE DRILLED 6/22/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 15', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 40 | 9.4 | 2 | CLAY, SANDY, TAN, VERY STIFF, MOIST |
| 5 | | | 50/10" | 9.8 | 4 | CLAYSTONE, VERY SANDY, BROWN, HARD, MOIST |
| 10 | | | 50/7" | 12.3 | 4 | |
| 15 | | | 50/3" | 11.4 | 4 | SHALE, GRAY, HARD, MOIST |
| 20 | | | 50/3" | 9.2 | 5 | |

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**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO. 211100
FIG NO. A-7

TEST BORING NO. 15
DATE DRILLED 6/22/2021
Job # 211100

REMARKS

DRY TO 20', 6/22/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | | | 2 |
| | | | 50/11" | 13.5 | 4 |
| 5 | | | 50/8" | 12.7 | 4 |
| 10 | | | 50/8" | 12.6 | 4 |
| 15 | | | 50/7" | 11.1 | 5 |
| 20 | | | 50/5" | 9.9 | 5 |

CLAY, SANDY, BROWN

CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, VERY SANDY, GRAY, HARD, MOIST

TEST BORING NO. 16
DATE DRILLED 6/22/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

WATER @ 16', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | | | 26 | 8.9 | 2 |
| 5 | | | 31 | 11.6 | 2 |
| 10 | | | 50/10" | 11.5 | 4 |
| 15 | | | 50/6" | 11.7 | 4 |
| 20 | | | 50/2" | 7.9 | 5 |

CLAY, SANDY, TAN, STIFF TO VERY STIFF, MOIST

CLAYSTONE, SANDY, BROWN, HARD, MOIST

SHALE, GRAY, HARD, MOIST

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**TEST BORING LOG**

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100
FIG NO.: A- 8

TEST BORING NO. 17
DATE DRILLED 6/25/2021
Job # 211100

REMARKS

WATER @ 12', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | FILL 0-9', CLAY, SANDY, BROWN, FIRM, MOIST | | 10 | 7.6 | 2A |
| 5 | | | 11 | 11.1 | 2A |
| 10 | CLAY, SANDY, BROWN, FIRM TO VERY STIFF, MOIST | | 11 | 16.5 | 2 |
| 15 | | | 18 | 9.0 | 2 |
| 20 | | | 33 | 16.8 | 2 |

TEST BORING NO. 18
DATE DRILLED 6/25/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

DRY TO 19', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type |
|---|---|---|---|---|---|
| | CLAY, SANDY, BROWN, STIFF TO FIRM, MOIST | | 15 | 10.3 | 2 |
| 5 | | | 22 | 9.5 | 2 |
| 10 | | | 14 | 17.5 | 2 |
| 15 | CLAYSTONE, VERY SANDY TO SANDY, BROWN, HARD, MOIST | | 50/8" | 13.6 | 4 |
| 20 | | | 50/6" | 12.2 | 4 |

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TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO. 211100
FIG NO. A- 9

TEST BORING NO. 19
DATE DRILLED 6/25/2021
Job # 211100

REMARKS

DRY TO 20', 6/25/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 12 | 7.6 | 2A | FILL 0-9', CLAY, SANDY, BROWN, FIRM, MOIST |
| 5 | | | 10 | 10.8 | 2A | |
| | | | | | | CLAY, SANDY, BROWN, STIFF, MOIST |
| 10 | | | 15 | 16.3 | 2 | |
| 15 | | | 17 | 12.9 | 2 | |
| 20 | | | 15 | 19.2 | 2 | |

TEST BORING NO. 20
DATE DRILLED 6/25/2021
CLIENT GOODWIN KNIGHT
LOCATION MESA RIDGE

REMARKS

DRY TO 19.5', 7/1/21

| Depth (ft) | Symbol | Samples | Blows per foot | Watercontent % | Soil Type | |
|---|---|---|---|---|---|---|
| | | | 50 | 7.3 | 2 | CLAY, SANDY, TAN, HARD, MOIST |
| 5 | | | 48 | 6.7 | 1 | SAND, VERY CLAYEY, FINE GRAINED, BROWN, DENSE, MOIST |
| 10 | | | 50/8" | 11.6 | 4 | CLAYSTONE, SANDY, BROWN, HARD, MOIST |
| 15 | | | 50/7" | 12.3 | 4 | |
| 20 | | | 50/6" | 11.1 | 4 | |

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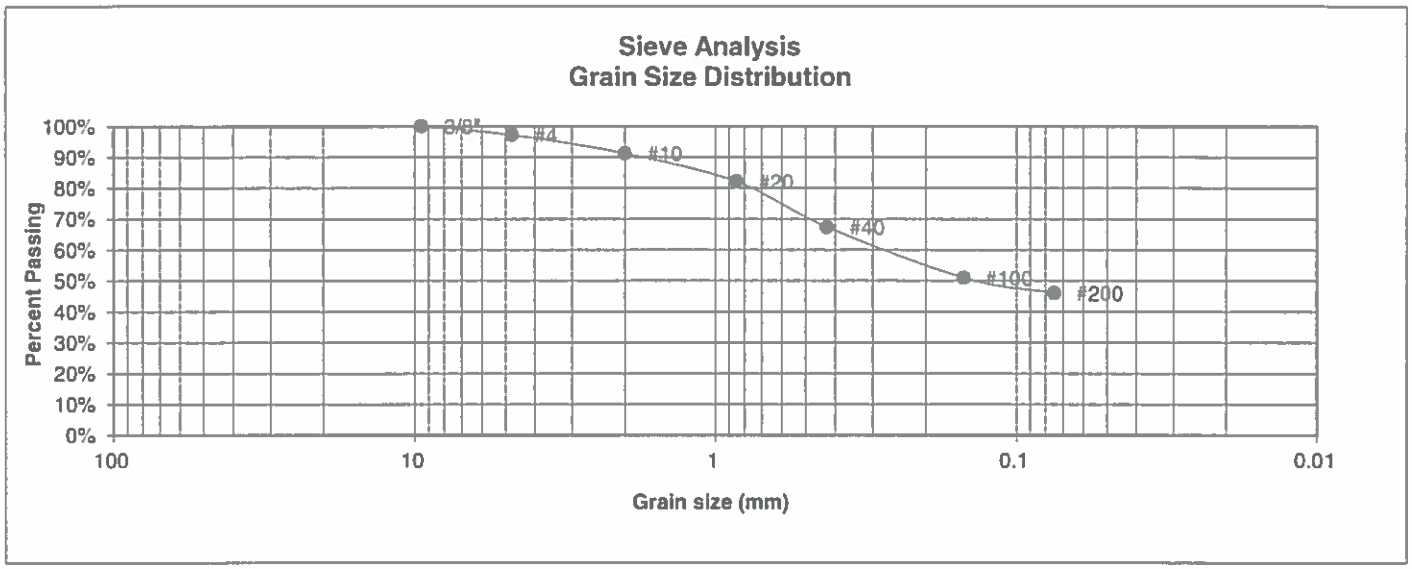
TEST BORING LOG

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/15/21 |

JOB NO. 211100
FIG NO. A- 10

# APPENDIX B: Laboratory Testing Results

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SC | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 1 | PROJECT | MESA RIDGE |
| TEST BORING # | 4 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 97.2% |
| 10 | 91.2% |
| 20 | 82.1% |
| 40 | 67.3% |
| 100 | 50.9% |
| 200 | 46.1% |

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

| Swell | |
|---|---|
| Moisture at start | 11.7% |
| Moisture at finish | 20.4% |
| Moisture increase | 8.6% |
| Initial dry density (pcf) | 103 |
| Swell (psf) | 180 |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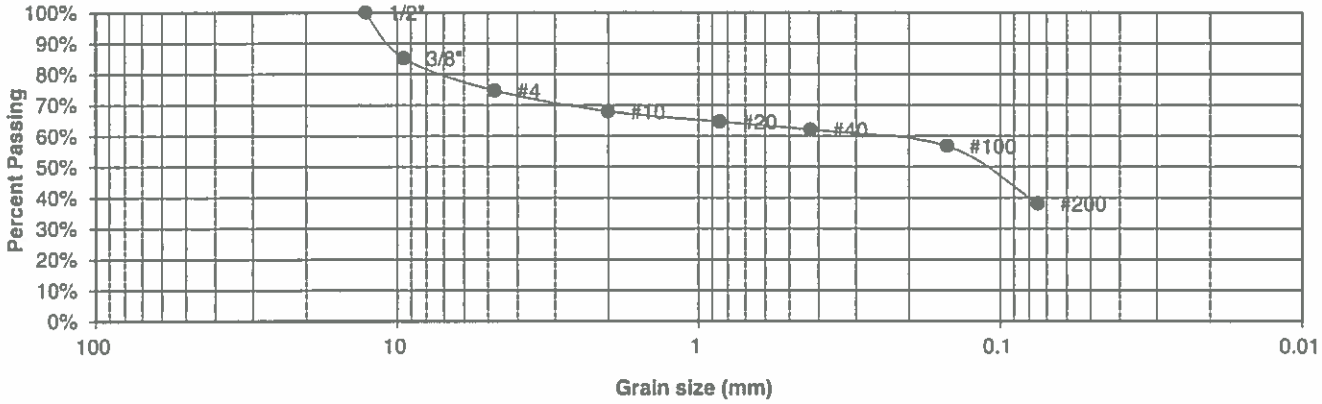
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100

FIG NO.: B-1

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SC | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 1 | PROJECT | MESA RIDGE |
| TEST BORING # | 20 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 85.2% |
| 4 | 74.7% |
| 10 | 68.0% |
| 20 | 64.6% |
| 40 | 62.0% |
| 100 | 56.8% |
| 200 | 38.1% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | |
| Liquid Limit | |
| Plastic Index | |

Swell

| | |
|---|---|
| Moisture at start | 11.3% |
| Moisture at finish | 18.7% |
| Moisture increase | 7.4% |
| Initial dry density (pcf) | 106 |
| Swell (psf) | 360 |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

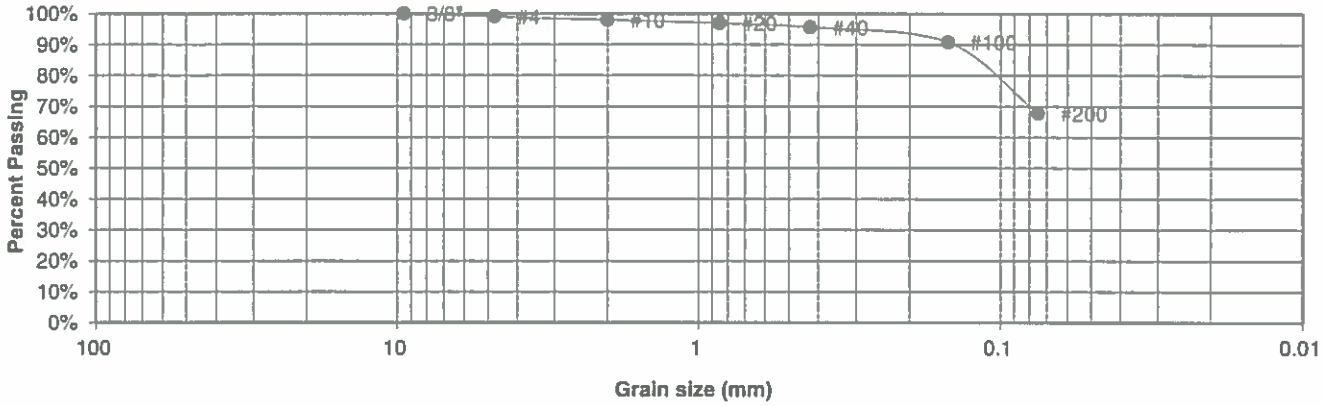

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO. 211100

FIG NO. B-2

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 2A | PROJECT | MESA RIDGE |
| TEST BORING # | 17 | JOB NO. | 211100 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 99.0% |
| 10 | 98.0% |
| 20 | 96.9% |
| 40 | 95.6% |
| 100 | 90.8% |
| 200 | 67.8% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 17 |
| Liquid Limit | 37 |
| Plastic Index | 20 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |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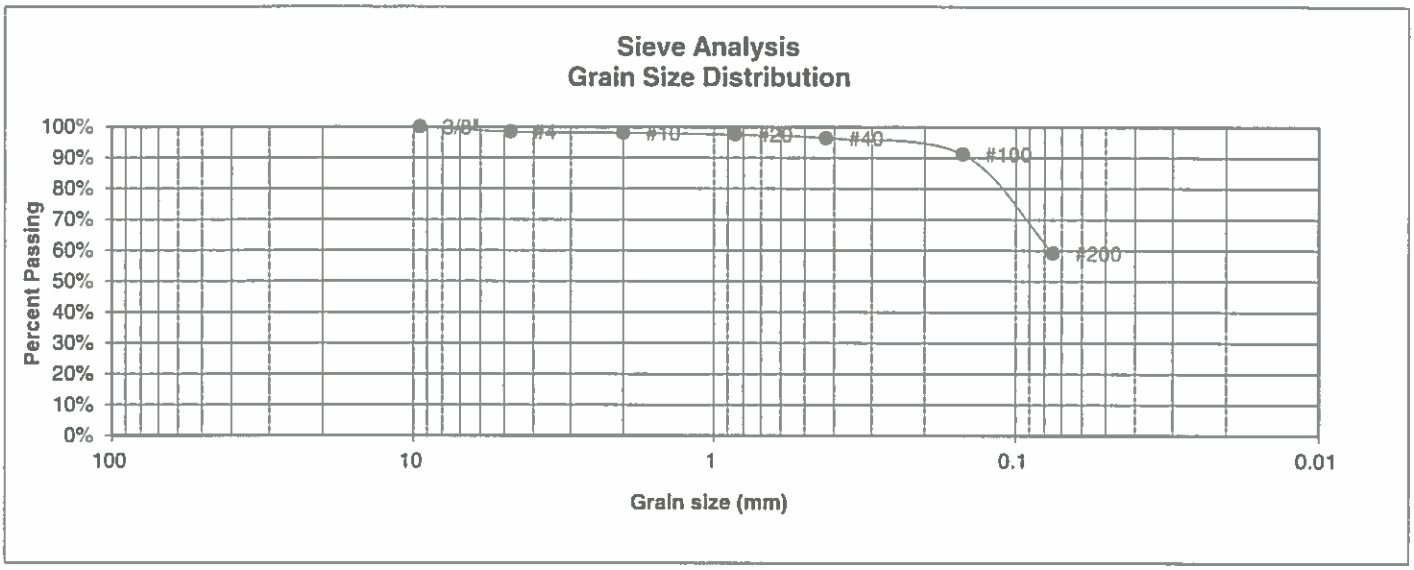
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO. 211100

FIG NO. B-3

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 2 | PROJECT | MESA RIDGE |
| TEST BORING # | 10 | JOB NO. | 211100 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 98.4% |
| 10 | 98.1% |
| 20 | 97.5% |
| 40 | 96.3% |
| 100 | 91.2% |
| 200 | 59.1% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

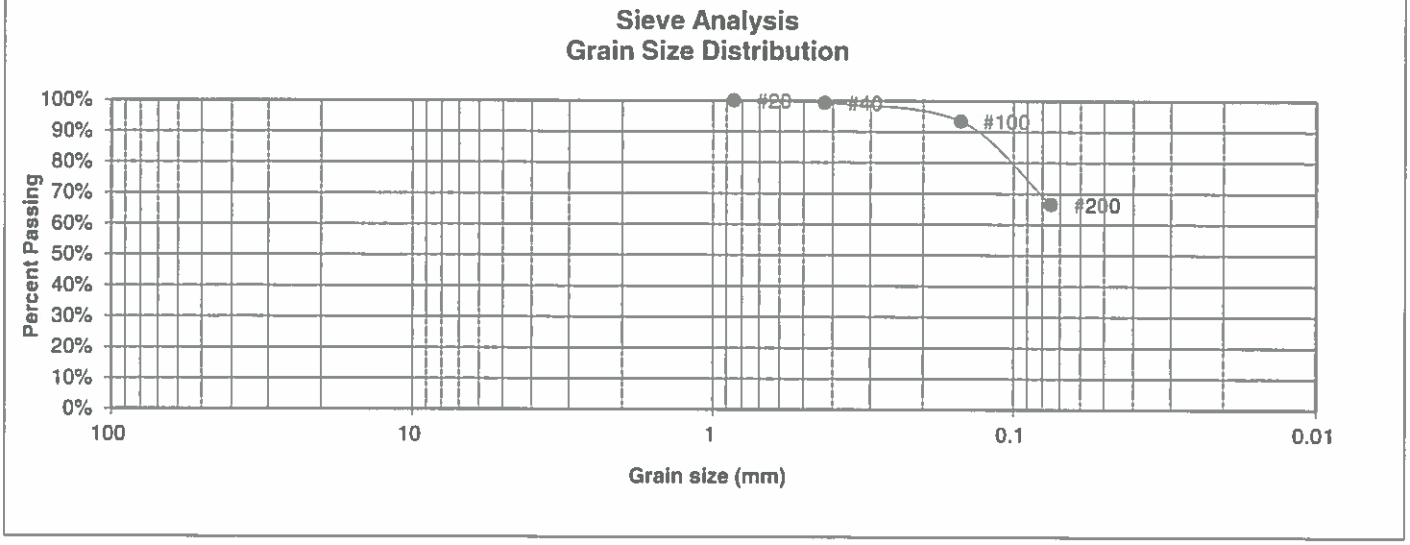
LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | h | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-4

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 2 | PROJECT | MESA RIDGE |
| TEST BORING # | 16 | JOB NO. | 211100 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 99.3% |
| 100 | 93.4% |
| 200 | 66.5% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

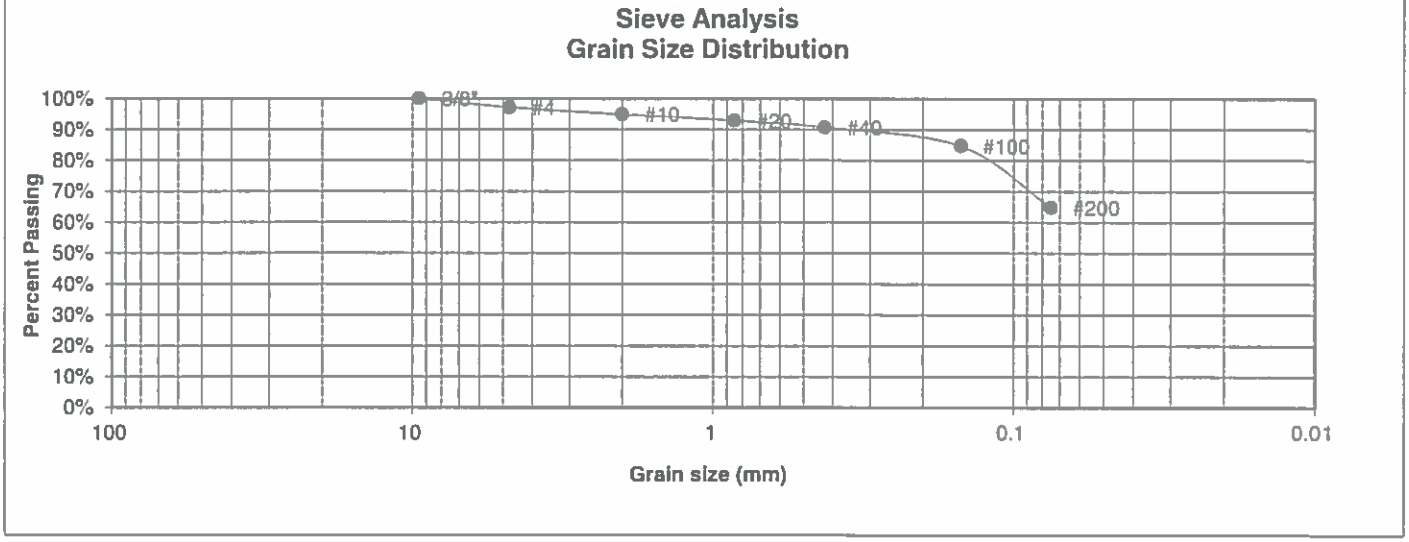

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100

FIG NO.: B-5

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 2 | PROJECT | MESA RIDGE |
| TEST BORING # | 19 | JOB NO. | 211100 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 97.1% |
| 10 | 94.9% |
| 20 | 92.9% |
| 40 | 90.7% |
| 100 | 84.7% |
| 200 | 64.9% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | 19 |
| Liquid Limit | 34 |
| Plastic Index | 15 |

Swell

| | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

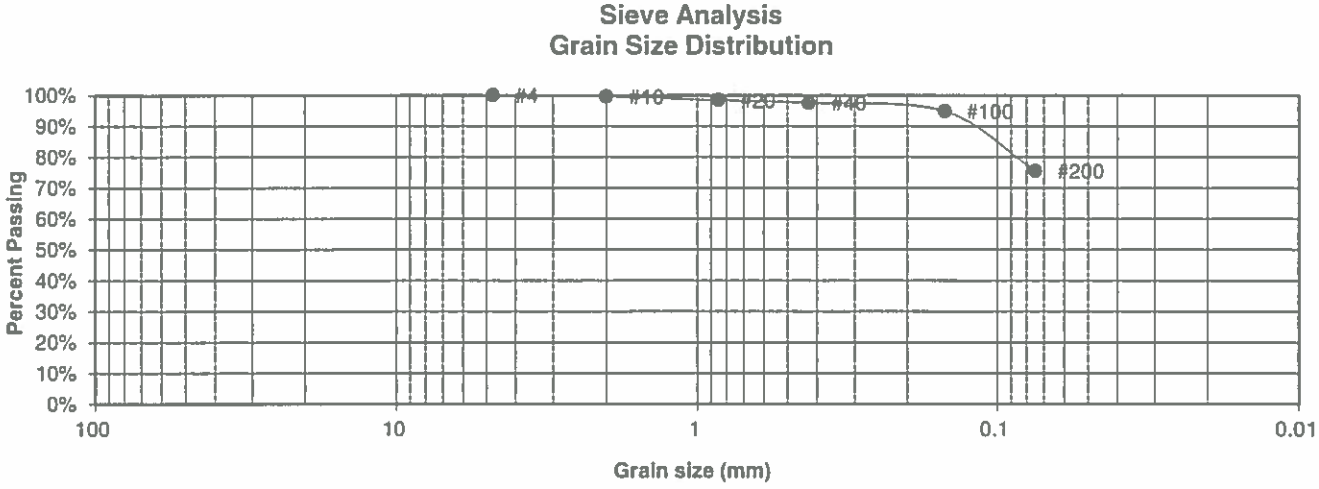

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-6

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 2 | PROJECT | MESA RIDGE |
| TEST BORING # | 1 | JOB NO. | 211100 |
| DEPTH (FT) | 2-3 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 99.6% |
| 20 | 98.4% |
| 40 | 97.5% |
| 100 | 94.8% |
| 200 | 75.6% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 16 |
| Liquid Limit | 41 |
| Plastic Index | 25 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |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COLORADO SPRINGS, COLORADO 80907

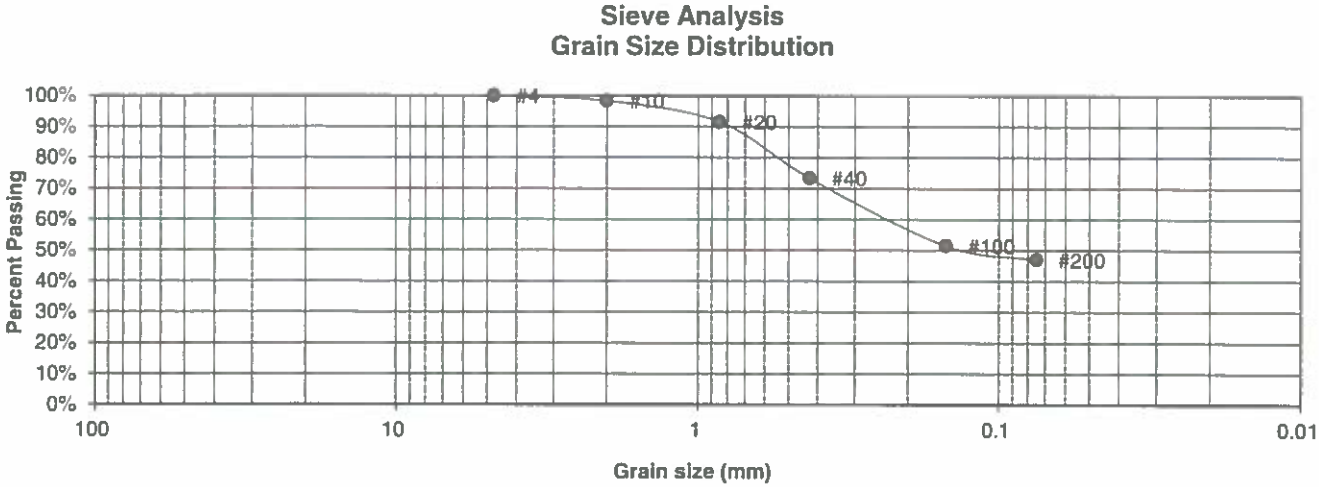

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-7

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SC | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 3 | PROJECT | MESA RIDGE |
| TEST BORING # | 3 | JOB NO. | 211100 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | 100.0% |
| 10 | 98.4% |
| 20 | 91.5% |
| 40 | 73.3% |
| 100 | 51.5% |
| 200 | 47.0% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 18 |
| Liquid Limit | 37 |
| Plastic Index | 19 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |


**ENTECH**
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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

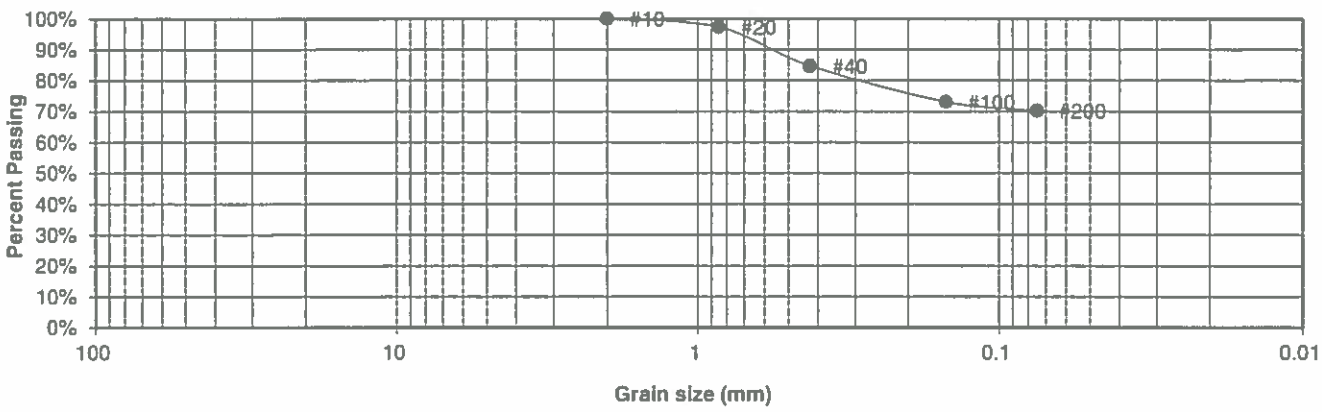

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100

FIG NO.: B-8

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 2 | JOB NO. | 211100 |
| DEPTH (FT) | 15 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | 100.0% |
| 20 | 97.3% |
| 40 | 84.7% |
| 100 | 73.0% |
| 200 | 70.3% |

| Atterberg Limits | |
|---|---|
| Plastic Limit | 18 |
| Liquid Limit | 35 |
| Plastic Index | 17 |

| Swell | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

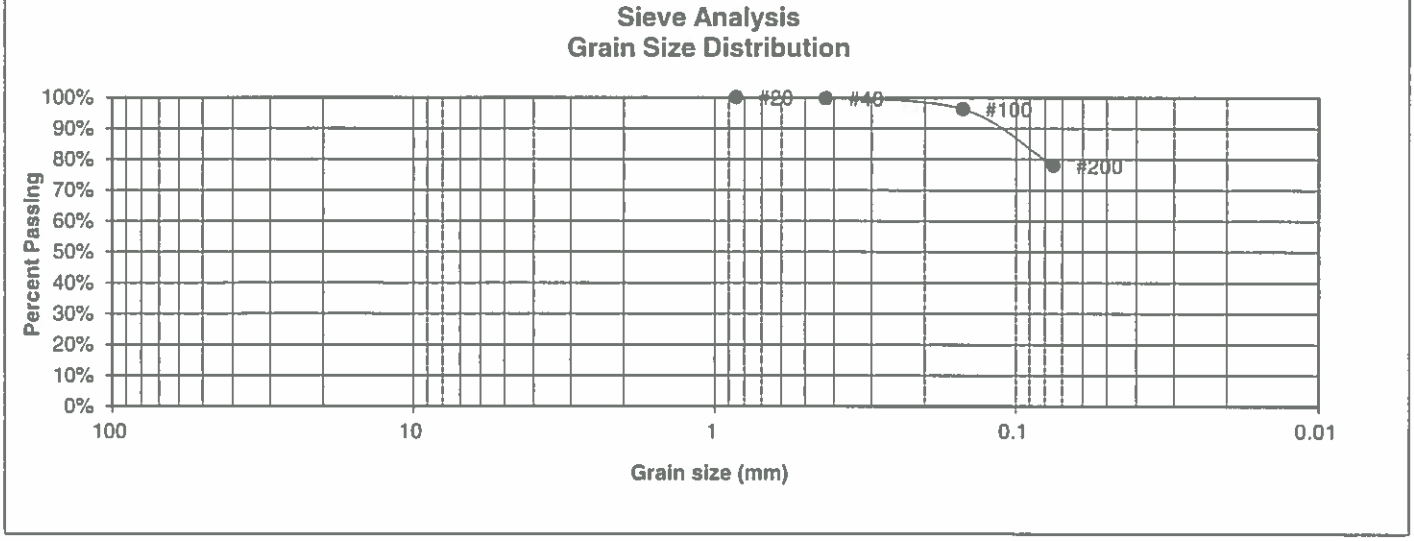

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-9

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 5 | JOB NO. | 211100 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 99.7% |
| 100 | 96.3% |
| 200 | 78.0% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | |
| Liquid Limit | |
| Plastic Index | |

Swell

| | |
|---|---|
| Moisture at start | 15.0% |
| Moisture at finish | 21.3% |
| Moisture increase | 6.4% |
| Initial dry density (pcf) | 104 |
| Swell (psf) | 1110 |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

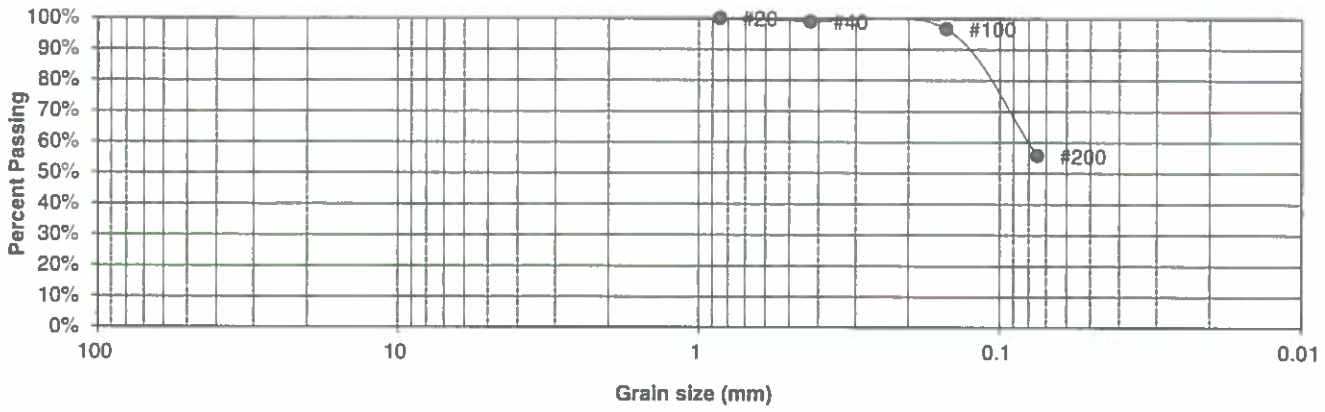
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100

FIG NO.: B-10

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 6 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 99.0% |
| 100 | 96.7% |
| 200 | 55.7% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | |
| Liquid Limit | |
| Plastic Index | |

Swell

| | |
|---|---|
| Moisture at start | 12.9% |
| Moisture at finish | 21.0% |
| Moisture increase | 8.2% |
| Initial dry density (pcf) | 104 |
| Swell (psf) | 720 |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

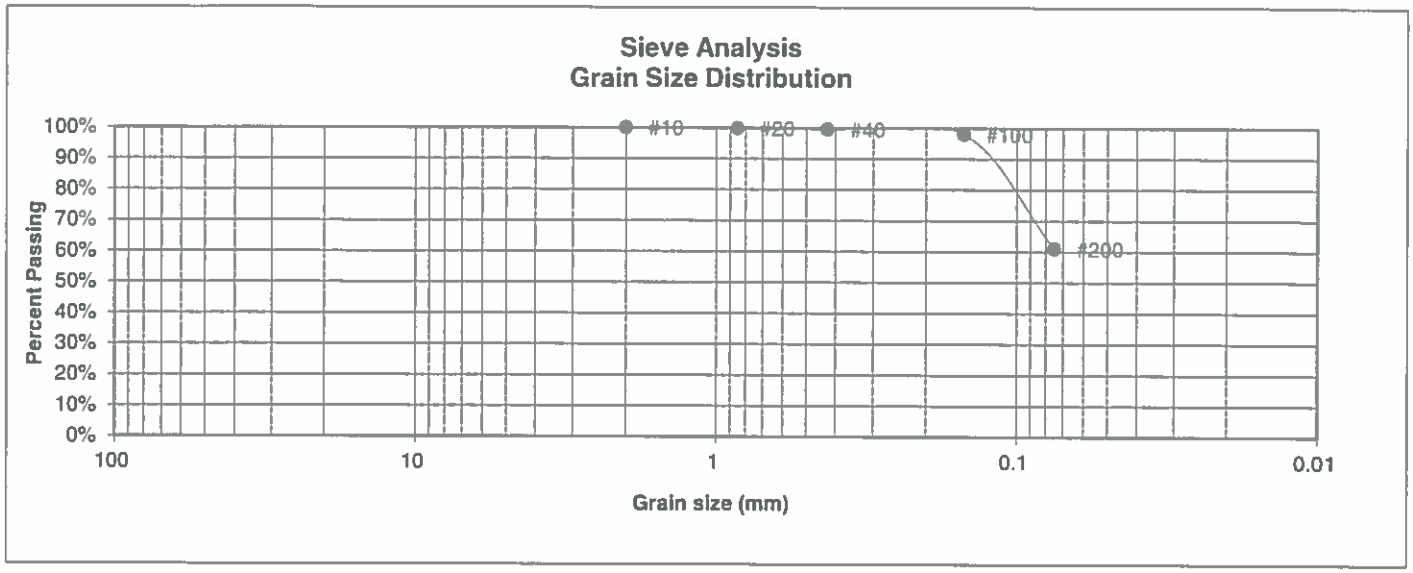

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-11

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 7 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | 100.0% |
| 20 | 99.8% |
| 40 | 99.5% |
| 100 | 98.0% |
| 200 | 61.0% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

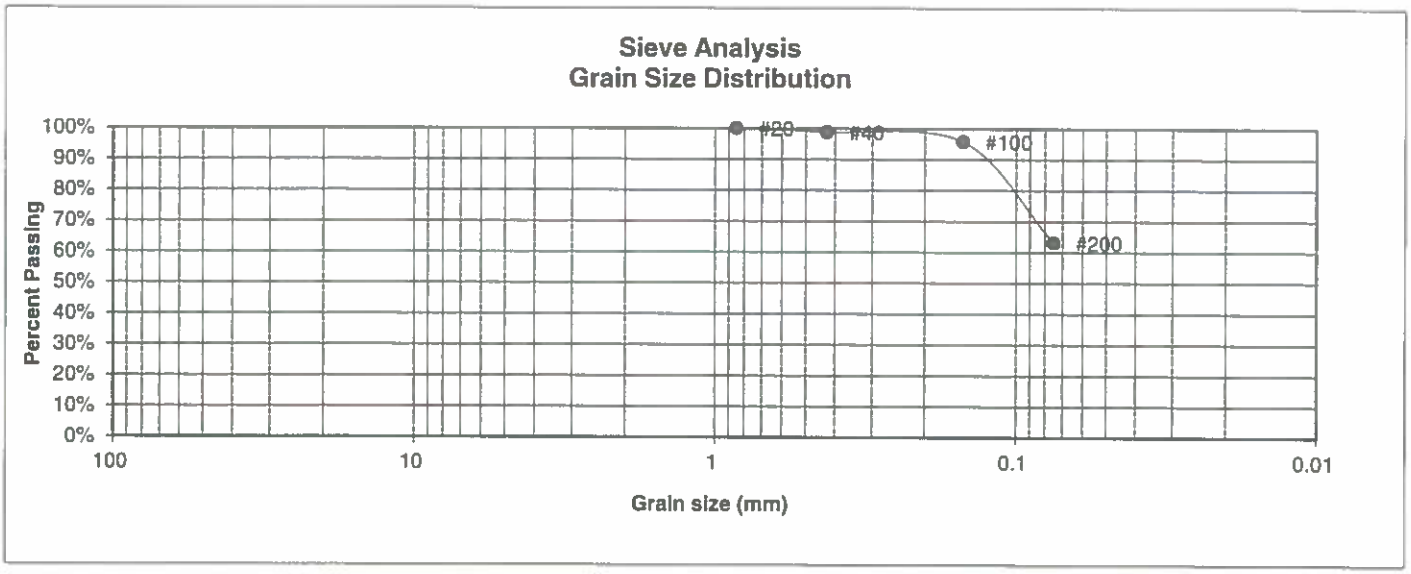

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO. 211100

FIG NO. B-12

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 9 | JOB NO. | 211100 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 98.8% |
| 100 | 95.8% |
| 200 | 63.1% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

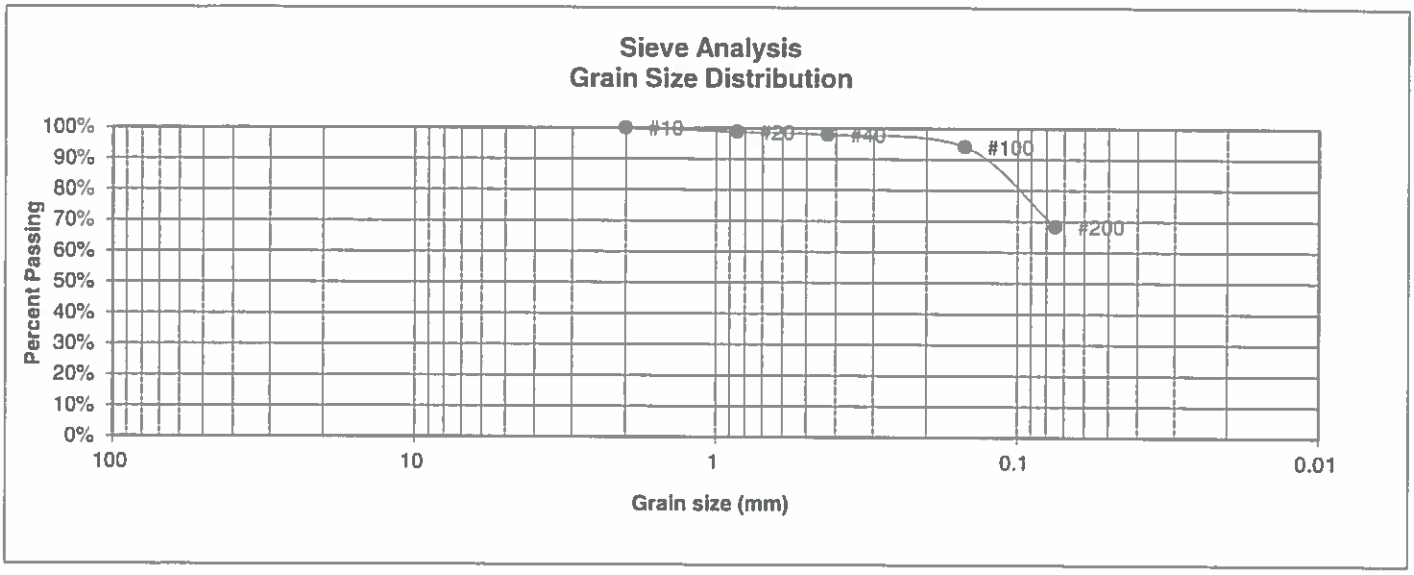

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-13

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 11 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | 100.0% |
| 20 | 98.7% |
| 40 | 97.9% |
| 100 | 94.1% |
| 200 | 68.4% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

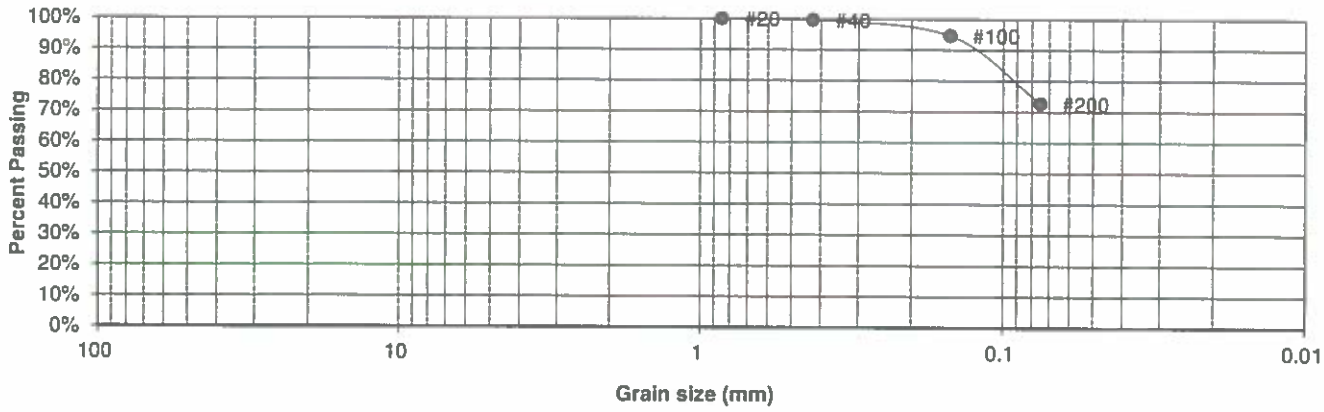

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-14

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 12 | JOB NO. | 211100 |
| DEPTH (FT) | 20 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 99.6% |
| 100 | 94.6% |
| 200 | 72.6% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

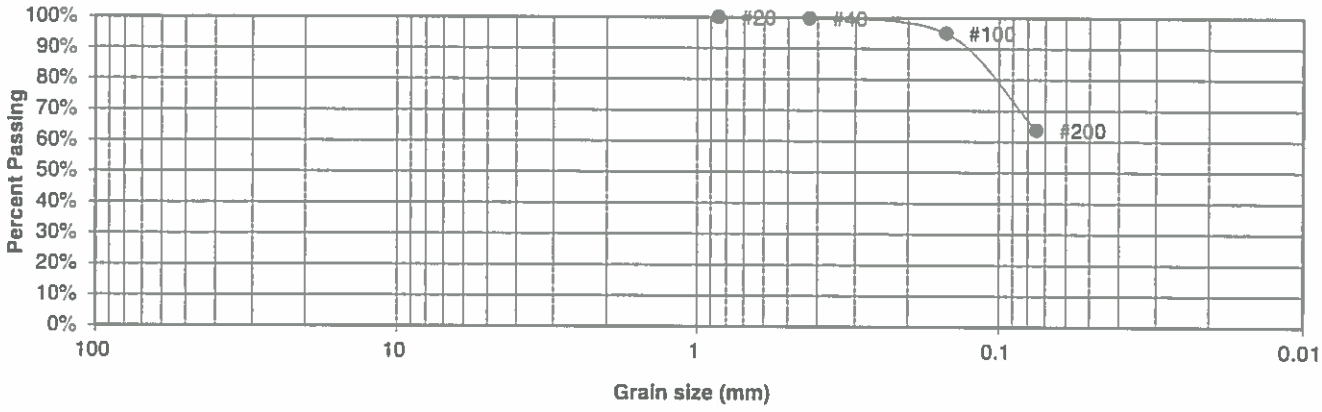

LABORATORY TEST RESULTS

| DRAWN: | DATE | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-15

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 13 | JOB NO. | 211100 |
| DEPTH (FT) | 10 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | |
| 4 | |
| 10 | |
| 20 | 100.0% |
| 40 | 99.7% |
| 100 | 95.0% |
| 200 | 63.7% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

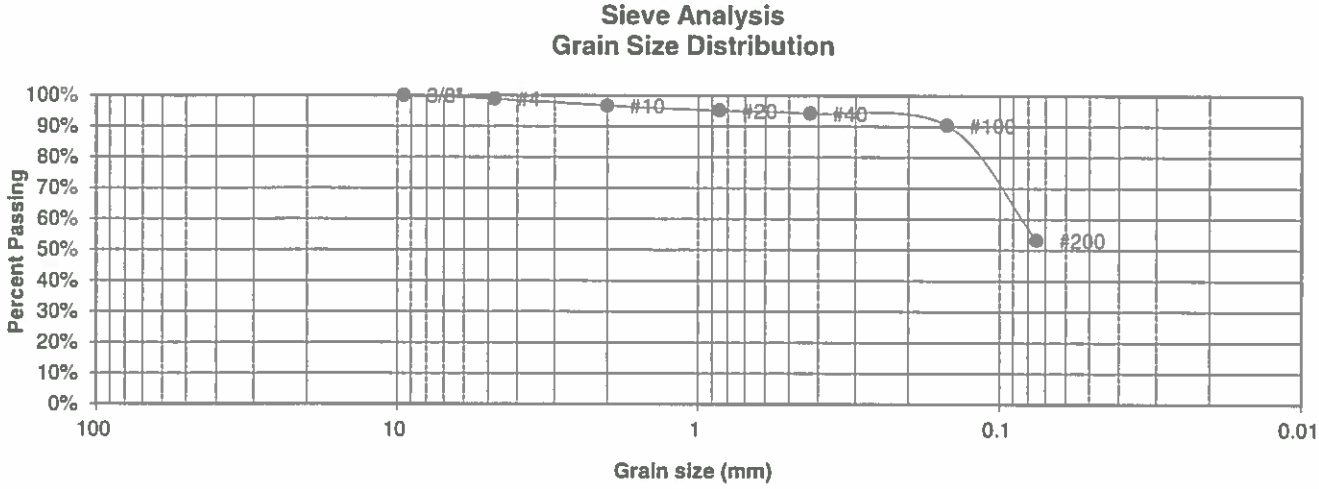

LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-16

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 14 | JOB NO. | 211100 |
| DEPTH (FT) | 5 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 98.8% |
| 10 | 96.7% |
| 20 | 95.1% |
| 40 | 94.2% |
| 100 | 90.4% |
| 200 | 53.3% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

**ENTECH ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

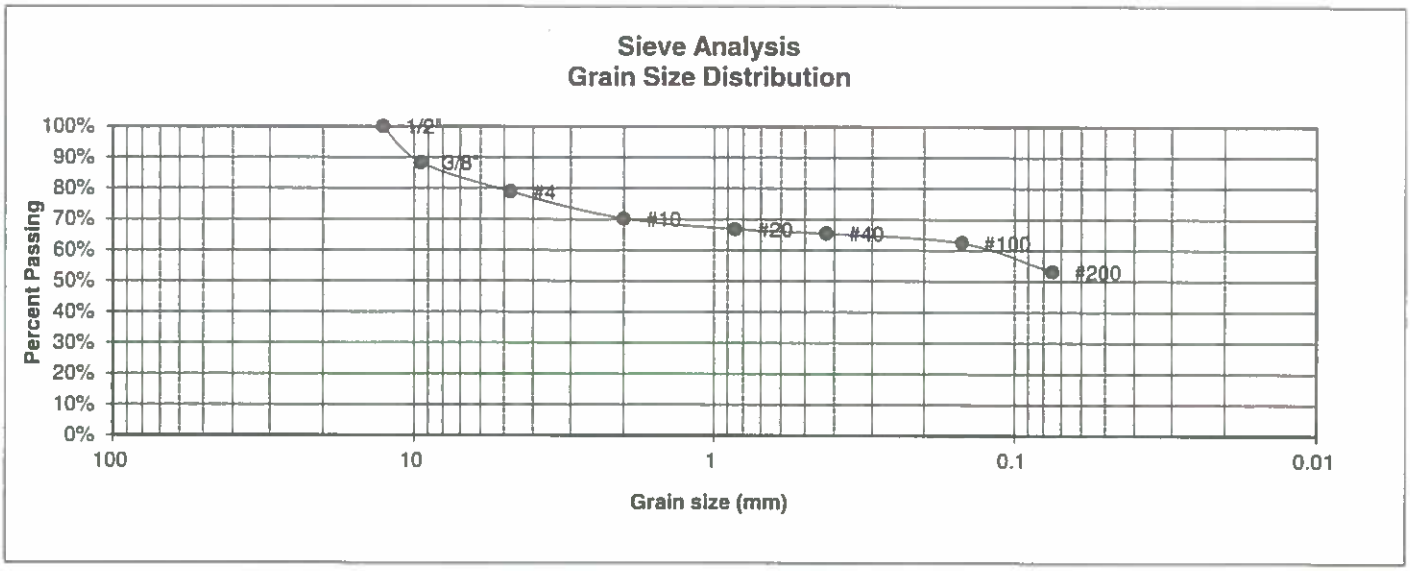
LABORATORY TEST RESULTS

| DRAWN: | DATE | CHECKED | DATE |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-17

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 4 | PROJECT | MESA RIDGE |
| TEST BORING # | 18 | JOB NO. | 211100 |
| DEPTH (FT) | 15 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 88.3% |
| 4 | 78.9% |
| 10 | 70.2% |
| 20 | 66.9% |
| 40 | 65.4% |
| 100 | 62.4% |
| 200 | 53.1% |

Atterberg Limits

| | |
|---|---|
| Plastic Limit | 14 |
| Liquid Limit | 30 |
| Plastic Index | 16 |

Swell

| | |
|---|---|
| Moisture at start | |
| Moisture at finish | |
| Moisture increase | |
| Initial dry density (pcf) | |
| Swell (psf) | |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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

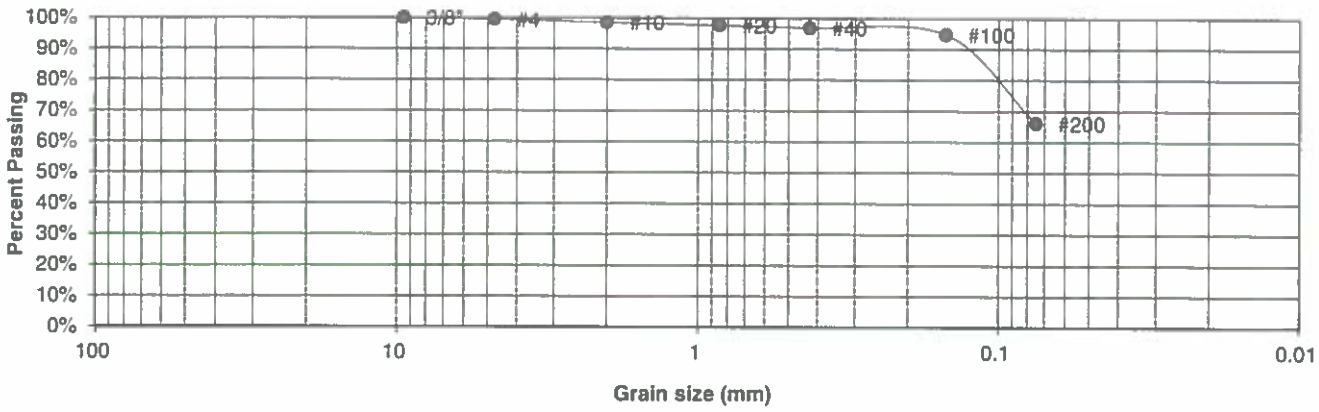
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100

FIG NO.: B-18

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | CL | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 5 | PROJECT | MESA RIDGE |
| TEST BORING # | 8 | JOB NO. | 211100 |
| DEPTH (FT) | 20 | TEST BY | BL |

**Sieve Analysis**
**Grain Size Distribution**




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | |
| 3/8" | 100.0% |
| 4 | 99.4% |
| 10 | 98.5% |
| 20 | 97.6% |
| 40 | 96.8% |
| 100 | 94.8% |
| 200 | 66.1% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)


**ENTECH**
**ENGINEERING, INC.**
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

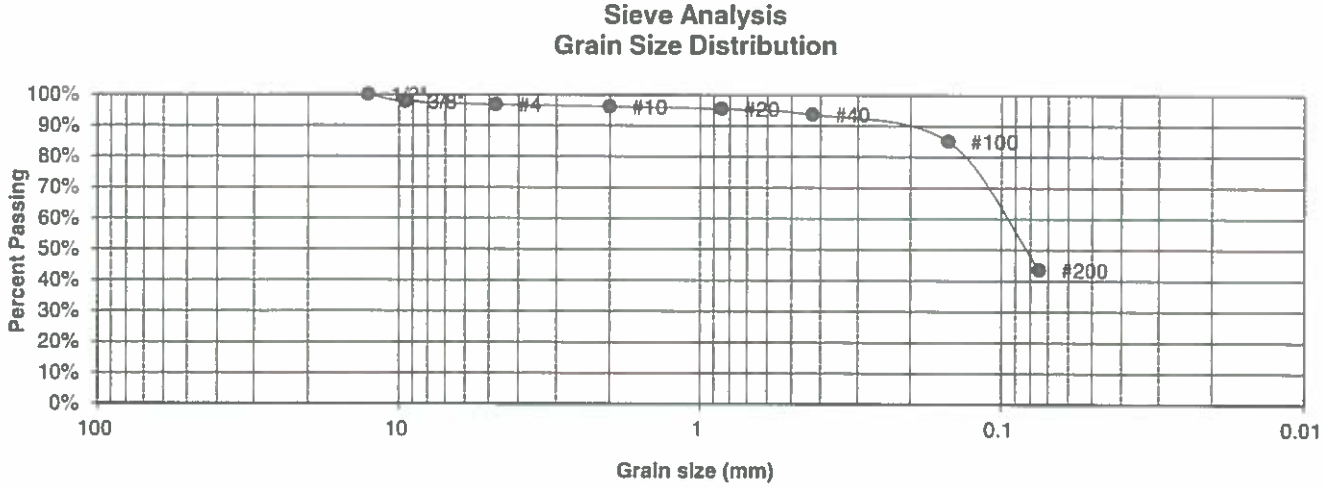

LABORATORY TEST RESULTS

| DRAWN | DATE | CHECKED | DATE |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO: 211100

FIG NO: B-19

| | | | |
|---|---|---|---|
| UNIFIED CLASSIFICATION | SC | CLIENT | GOODWIN KNIGHT |
| SOIL TYPE # | 5 | PROJECT | MESA RIDGE |
| TEST BORING # | 15 | JOB NO. | 211100 |
| DEPTH (FT) | 15 | TEST BY | BL |




| U.S. Sieve # | Percent Finer |
|---|---|
| 3" | |
| 1 1/2" | |
| 3/4" | |
| 1/2" | 100.0% |
| 3/8" | 97.7% |
| 4 | 96.8% |
| 10 | 96.1% |
| 20 | 95.4% |
| 40 | 93.7% |
| 100 | 85.0% |
| 200 | 43.6% |

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907


LABORATORY TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

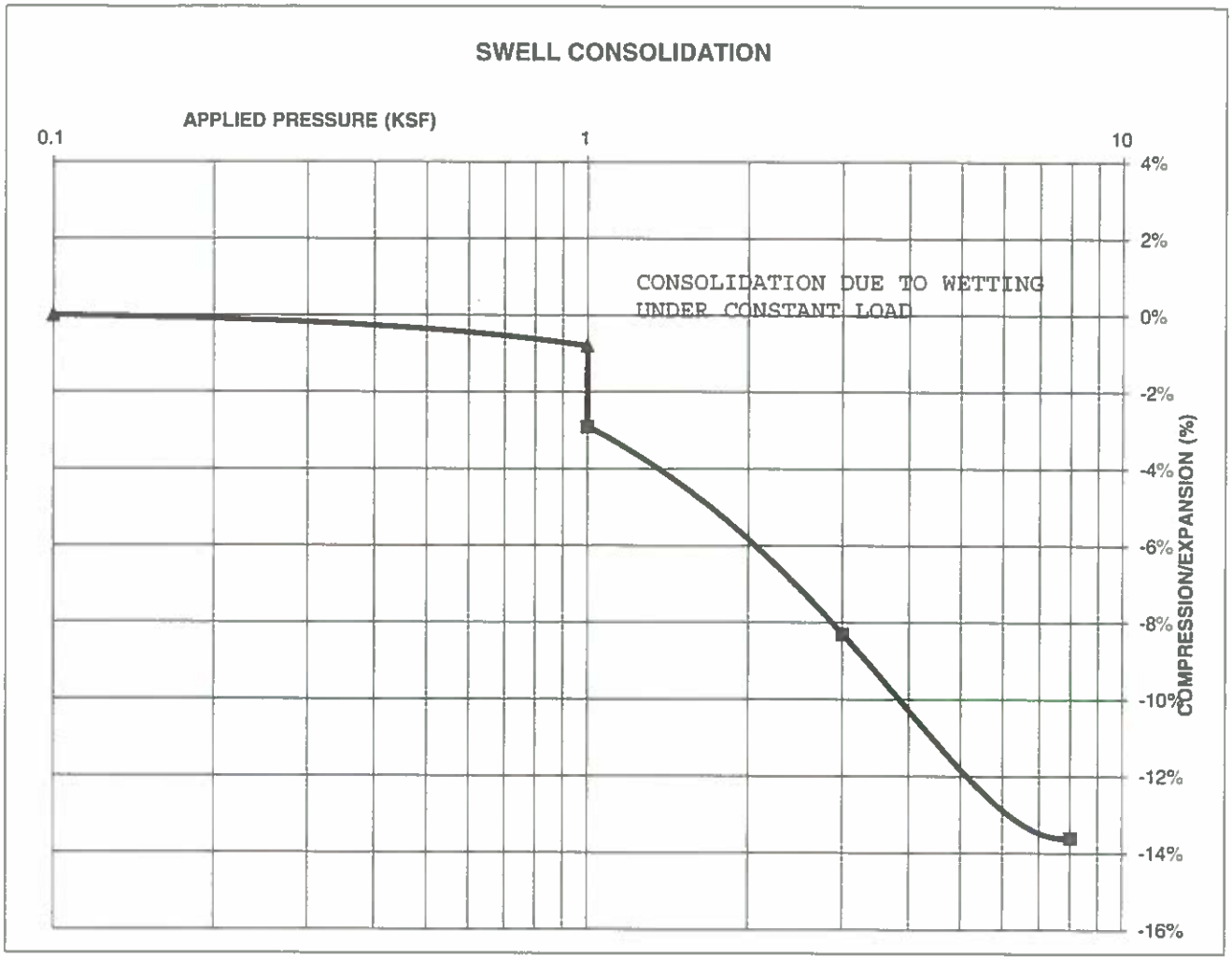
JOB NO.: 211100

FIG NO.: B-20

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 17 | DEPTH(ft) | 2-3 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 99 |
| NATURAL MOISTURE CONTENT | | | 9.0% |
| SWELL/CONSOLIDATION (%) | | | -2.1% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

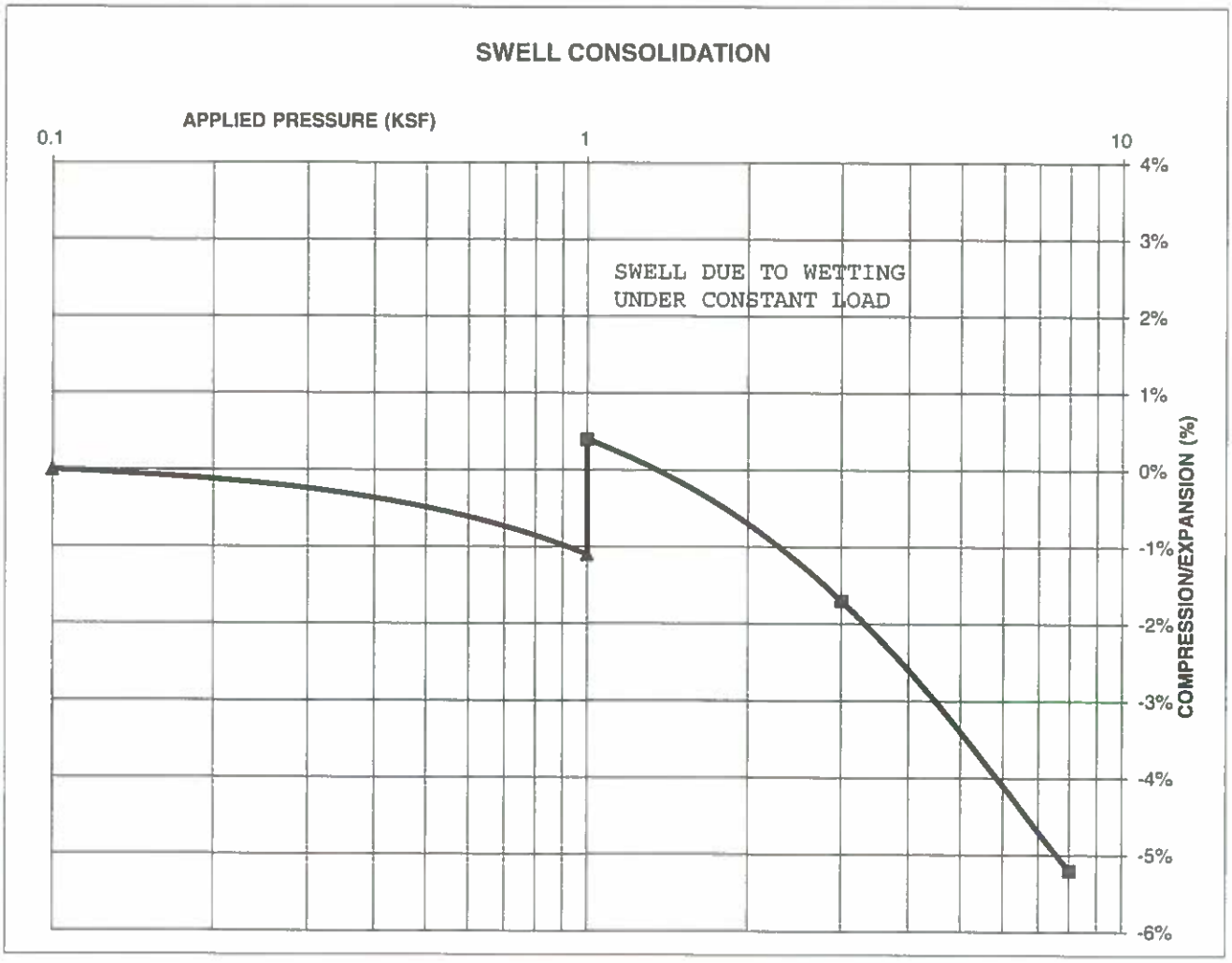
| DRAWN: | DATE: | CHECKED: | DATE |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: B-21

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 10 | DEPTH(ft) | 2-3 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 110 |
| NATURAL MOISTURE CONTENT | | | 10.1% |
| SWELL/CONSOLIDATION (%) | | | 1.5% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

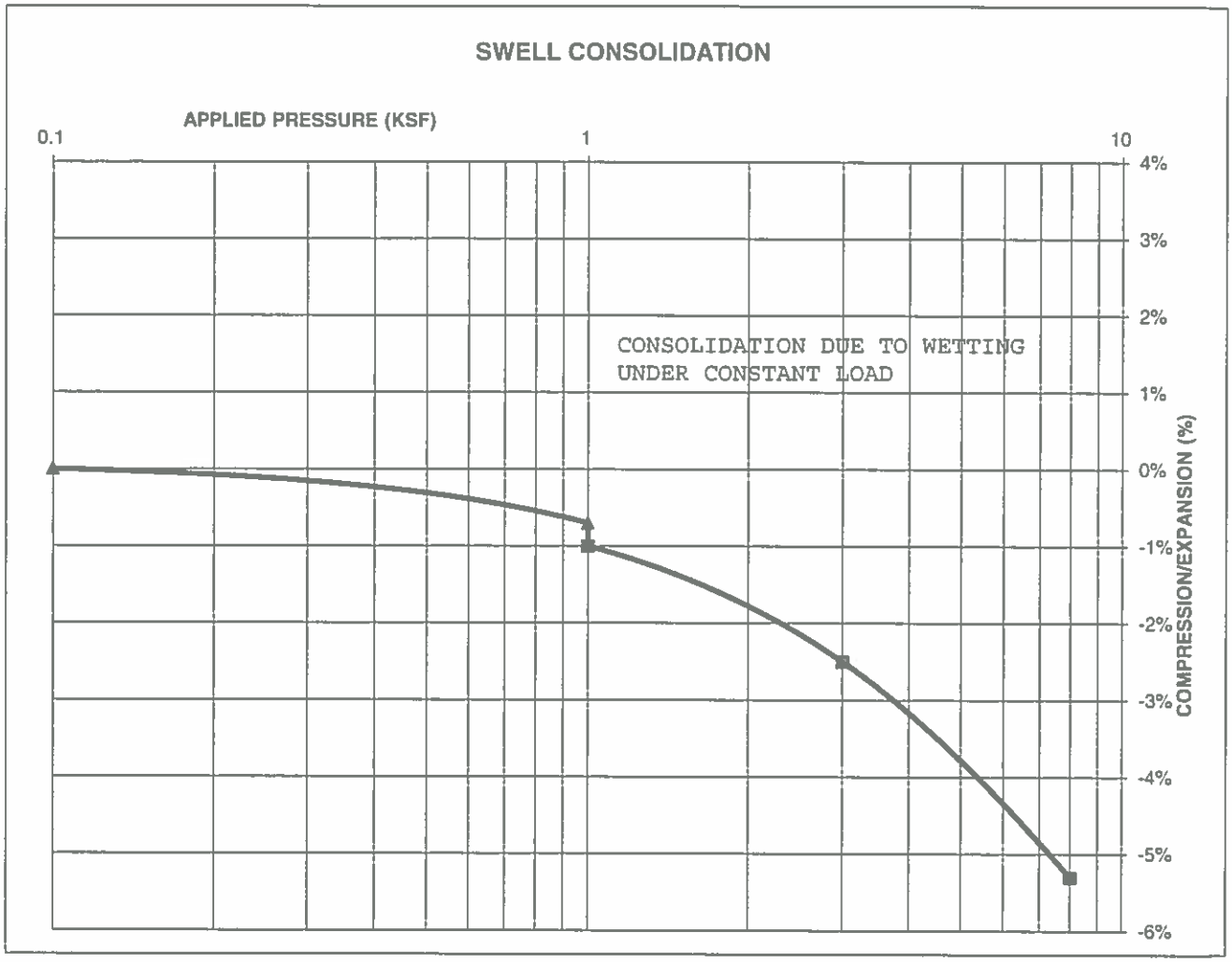
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/12 |

JOB NO. 211100
FIG NO. B-22

## *CONSOLIDATION TEST RESULTS*

| | | | |
|---|---|---|---|
| TEST BORING # | 16 | DEPTH(ft) | 2-3 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 105 |
| NATURAL MOISTURE CONTENT | | | 8.3% |
| SWELL/CONSOLIDATION (%) | | | -0.3% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

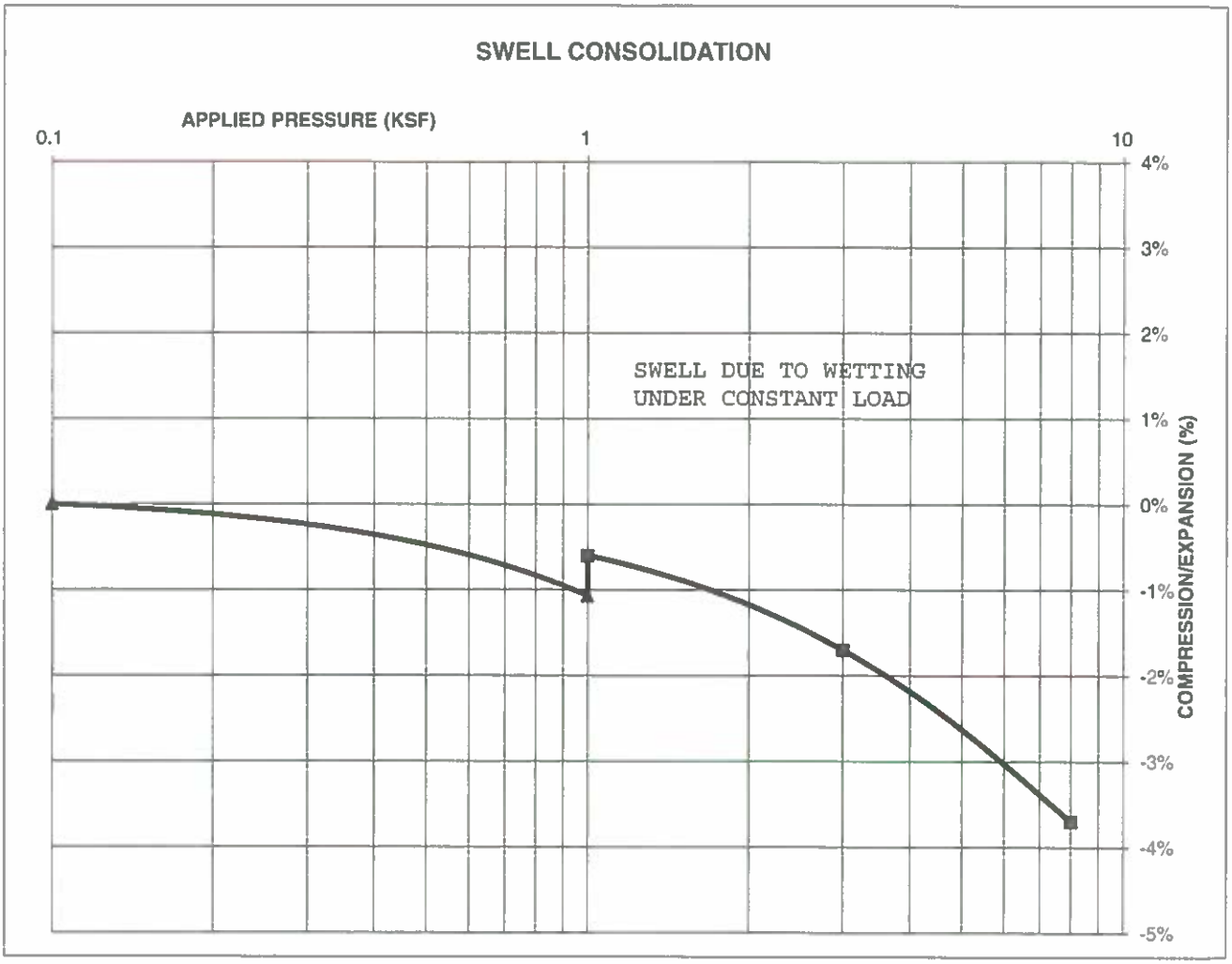
| DRAWN: | DATE | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO. 211100
FIG NO. B-23

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 19 | DEPTH(ft) | 10 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 105 |
| NATURAL MOISTURE CONTENT | | | 20.5% |
| SWELL/CONSOLIDATION (%) | | | 0.5% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

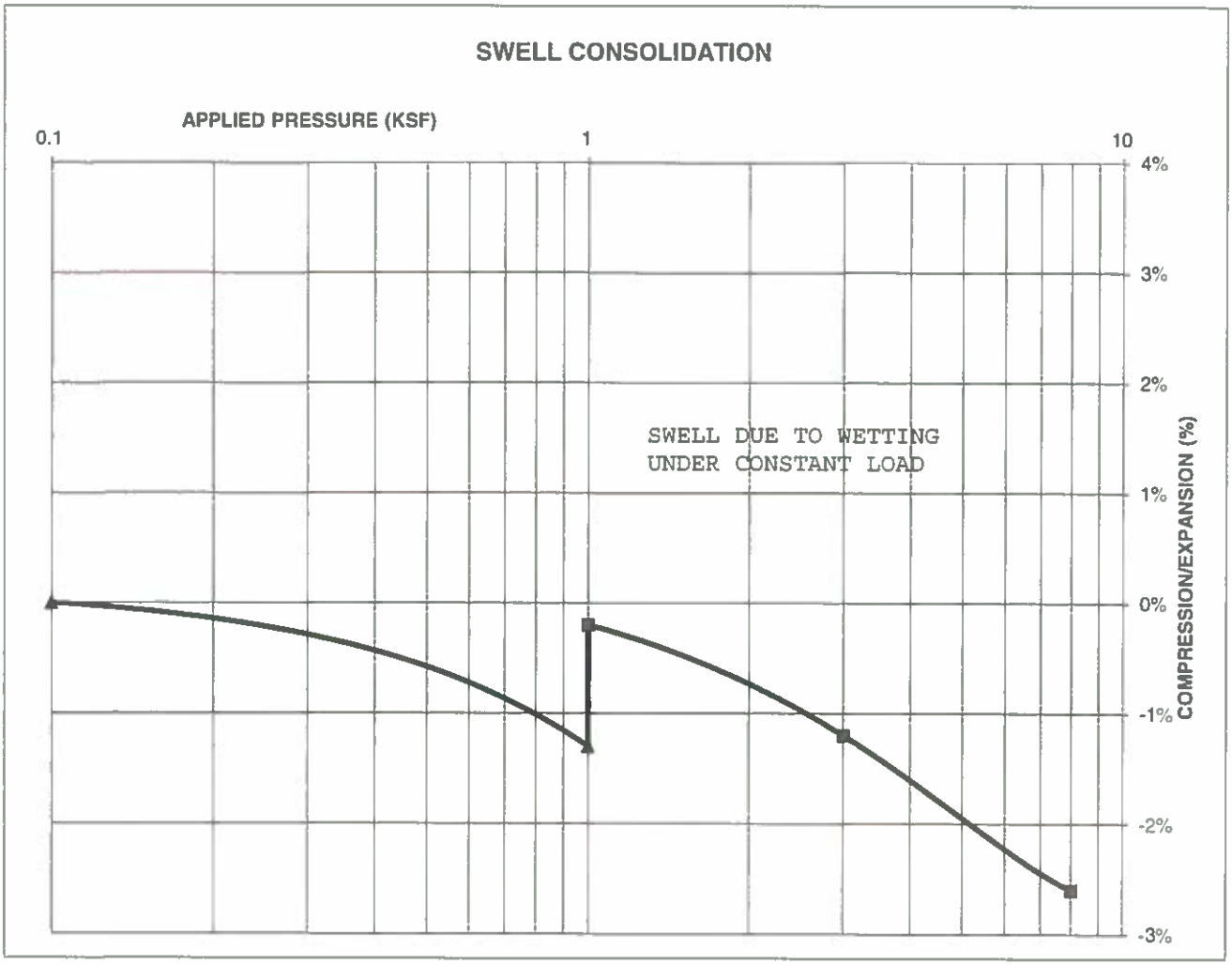
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100
FIG NO.: B-24

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 1 | DEPTH(ft) | 2-3 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 120 |
| NATURAL MOISTURE CONTENT | | | 13.4% |
| SWELL/CONSOLIDATION (%) | | | 1.1% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

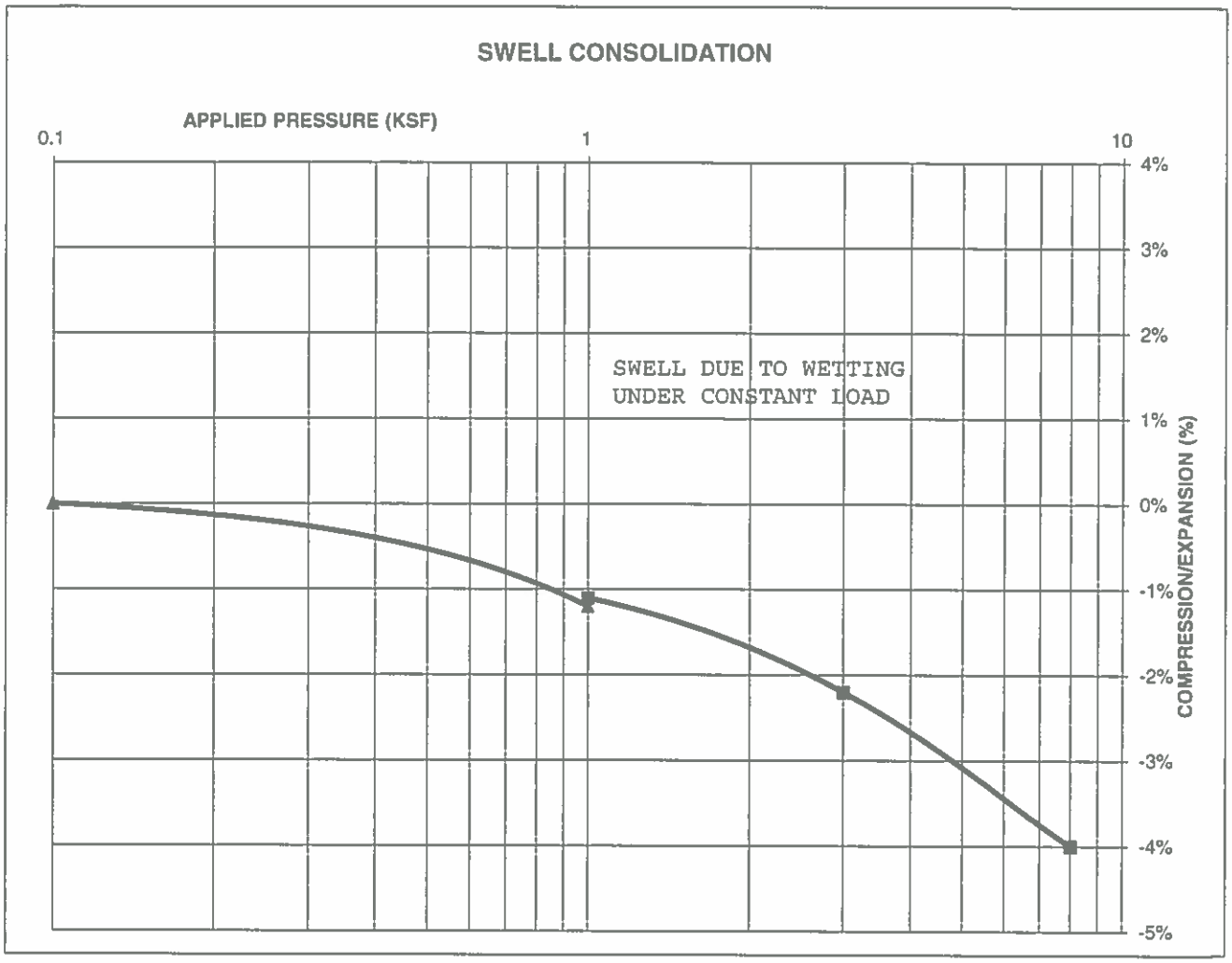
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100
FIG NO.: B-25

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 3 | DEPTH(ft) | 10 |
| DESCRIPTION | SC | SOIL TYPE | 3 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 114 |
| NATURAL MOISTURE CONTENT | | | 12.4% |
| SWELL/CONSOLIDATION (%) | | | 0.1% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

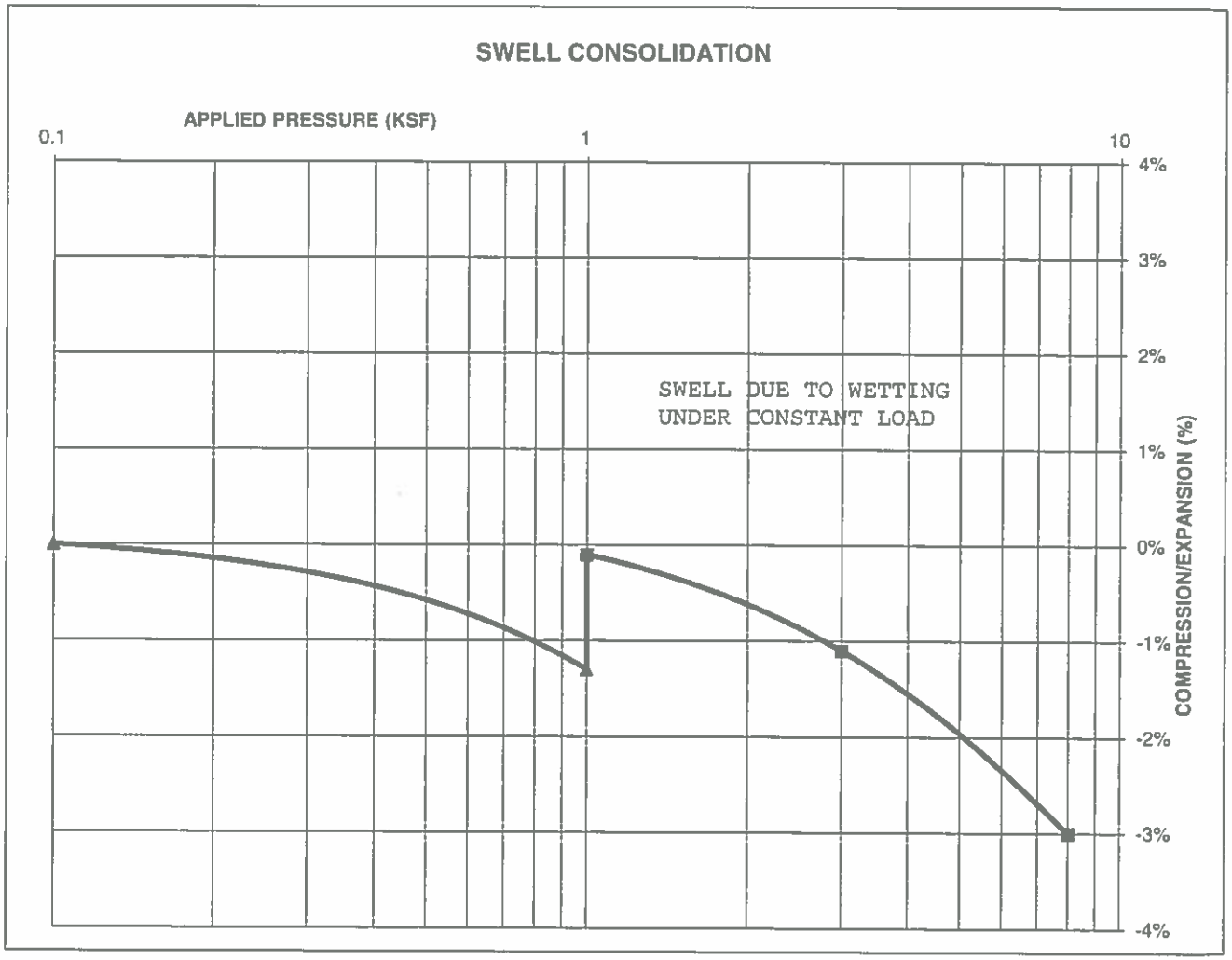
| DRAWN: | DATE | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: B-26

## *CONSOLIDATION TEST RESULTS*

| | | | |
|---|---|---|---|
| TEST BORING # | 2 | DEPTH(ft) | 15 |
| DESCRIPTION | CL | SOIL TYPE | 4 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 117 |
| NATURAL MOISTURE CONTENT | | | 13.3% |
| SWELL/CONSOLIDATION (%) | | | 1.2% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

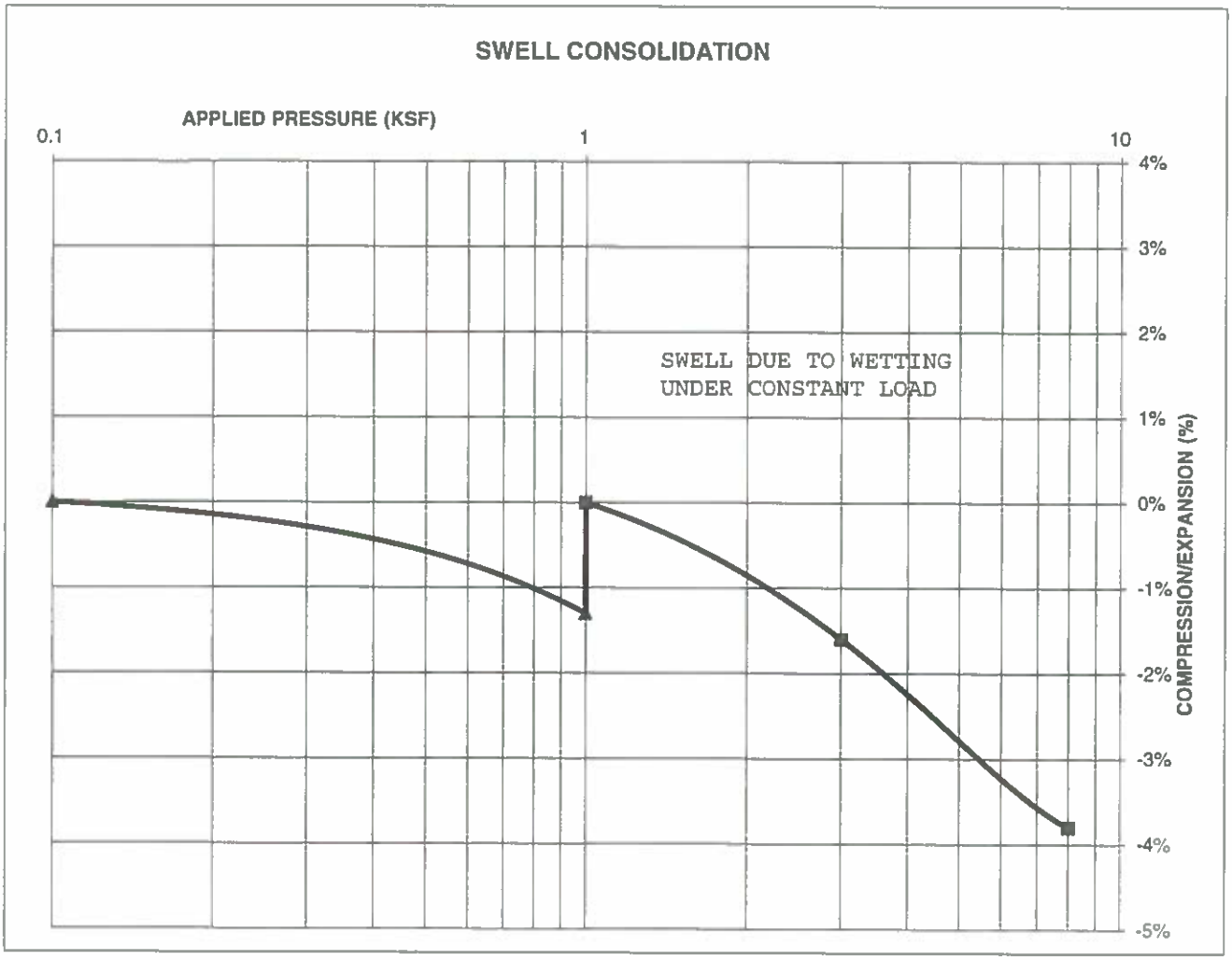
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100
FIG NO.: B-27

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 7 | DEPTH(ft) | 5 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 114 |
| NATURAL MOISTURE CONTENT | | | 12.4% |
| SWELL/CONSOLIDATION (%) | | | 1.3% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

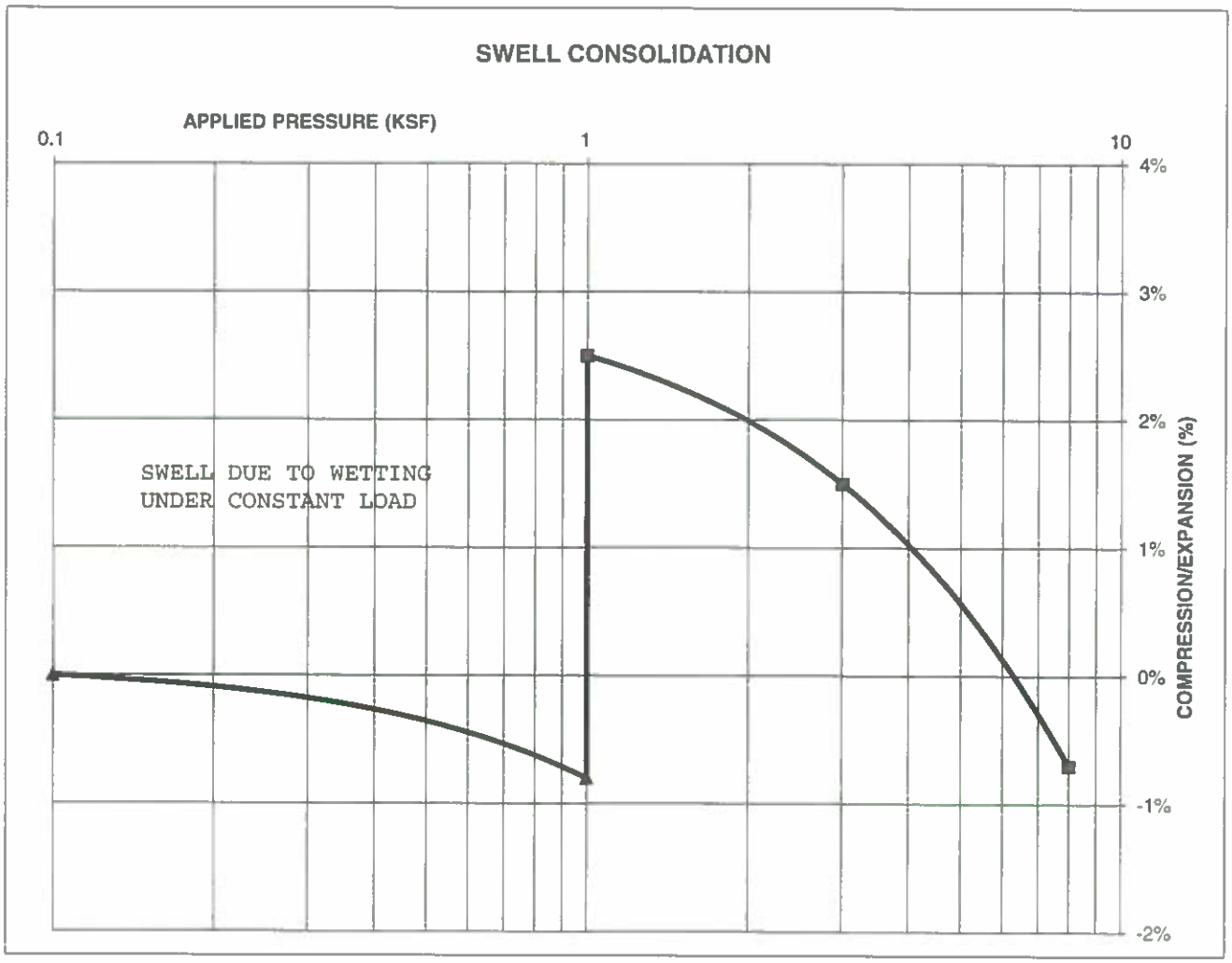
| DRAWN: | DATE: | CHECKED: | DATE: 7/19/21 |
|---|---|---|---|

JOB NO.: 211100
FIG NO.: B-28

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 11 | DEPTH(ft) | 5 |
| DESCRIPTION | CL | SOIL TYPE | 2 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 127 |
| NATURAL MOISTURE CONTENT | | | 8.5% |
| SWELL/CONSOLIDATION (%) | | | 3.3% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

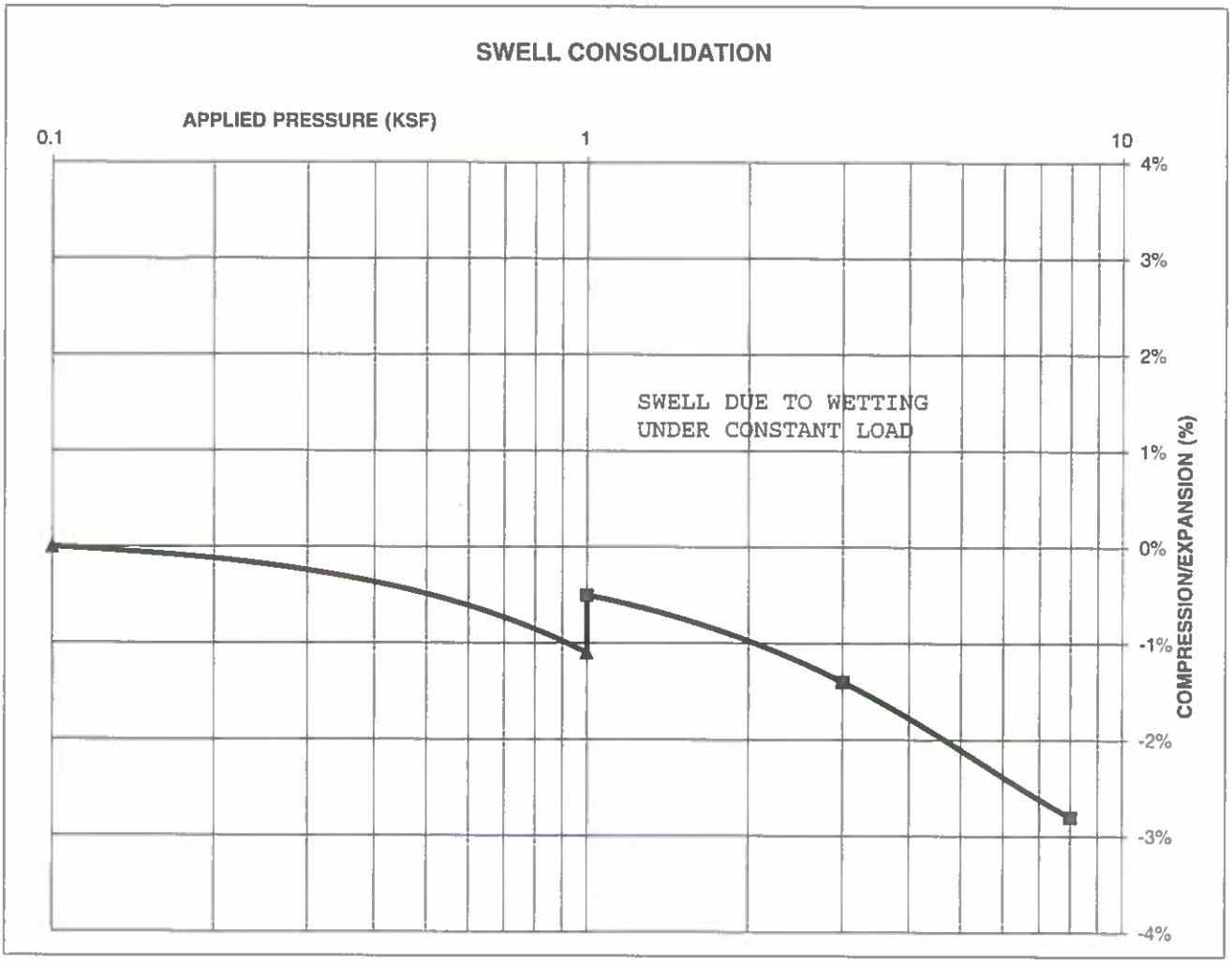
| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 2/19/21 |

JOB NO.: 211100
FIG NO.: B-29

***CONSOLIDATION TEST RESULTS***

| | | | |
|---|---|---|---|
| TEST BORING # | 12 | DEPTH(ft) | 20 |
| DESCRIPTION | CL | SOIL TYPE | 4 |
| NATURAL UNIT DRY WEIGHT (PCF) | | | 117 |
| NATURAL MOISTURE CONTENT | | | 15.1% |
| SWELL/CONSOLIDATION (%) | | | 0.6% |

JOB NO. 211100
CLIENT GOODWIN KNIGHT
PROJECT MESA RIDGE

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SWELL CONSOLIDATION
TEST RESULTS

| DRAWN: | DATE: | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100
FIG NO.: B-30

| | | | |
|---|---|---|---|
| CLIENT | GOODWIN KNIGHT | JOB NO. | 211100 |
| PROJECT | MESA RIDGE | DATE | 7/8/2021 |
| LOCATION | MESA RIDGE | TEST BY | BL |

| BORING NUMBER | DEPTH, (ft) | SOIL TYPE NUMBER | UNIFIED CLASSIFICATION | WATER SOLUBLE SULFATE, (wt%) |
|---|---|---|---|---|
| TB-1 | 2-3 | 2 | CL | <0.01 |
| TB-2 | 15 | 4 | CL | 0.02 |
| TB-3 | 10 | 3 | SC | 0.01 |
| TB-4 | 5 | 1 | SC | <0.01 |
| | | | | |
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QC BLANK PASS

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**LABORATORY TEST SULFATE RESULTS**

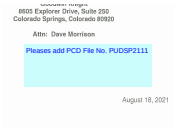
| DRAWN: | DATE | CHECKED: | DATE: |
|---|---|---|---|
| | | | 7/19/21 |

JOB NO.: 211100

FIG NO.: B-31

# Soils & Geology Report_V1 Redlines.pdf Markup Summary 10-21-2021

## Daniel Torres (6)




**Subject:** Text Box
**Page Label:** 1
**Author:** Daniel Torres
**Date:** 10/21/2021 11:30:54 AM
**Status:**
**Color:**
**Layer:**
**Space:**

Pleases add PCD File No. PUDSP2111

---


**Subject:** Cloud+
**Page Label:** 3
**Author:** Daniel Torres
**Date:** 10/21/2021 11:30:33 AM
**Status:**
**Color:**
**Layer:**
**Space:**

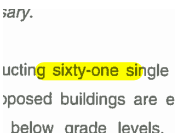
Update accordingly

---


**Subject:** Text Box
**Page Label:** 3
**Author:** Daniel Torres
**Date:** 10/21/2021 11:49:06 AM
**Status:**
**Color:**
**Layer:**
**Space:**

Per ECM Appendix C.2.2.E, provide description of Geological Hazards and Constraints. If there are none, then please state it in the report.

---




**Subject:** Highlight
**Page Label:** 7
**Author:** Daniel Torres
**Date:** 10/21/2021 11:33:15 AM
**Status:**
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**Space:**

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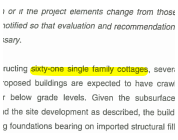


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**Date:** 10/21/2021 11:33:19 AM
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**Subject:** Highlight
**Page Label:** 11
**Author:** Daniel Torres
**Date:** 10/21/2021 11:40:09 AM
**Status:**
**Color:**
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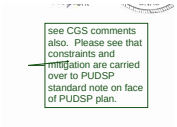
**Space:**

## dsdparsons (13)

**Subject:** Callout
**Page Label:** 1
**Author:** dsdparsons
**Date:** 10/21/2021 1:02:16 PM
**Status:**
**Color:**
**Layer:**
**Space:**

see checklist and add missing items. Include the mineral deposit paragraph....You may want to reference the Sterling Ranch Fil 2 Report for sample completed

---




**Subject:** Callout
**Page Label:** 1
**Author:** dsdparsons
**Date:** 10/21/2021 1:00:29 PM
**Status:**
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**Layer:**
**Space:**

see CGS comments also. Please see that constraints and mitigation are carried over to PUDSP standard note on face of PUDSP plan.

---


**Subject:** Image
**Page Label:** 1
**Author:** dsdparsons
**Date:** 10/21/2021 1:02:25 PM
**Status:**
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**Subject:** Callout
**Page Label:** 2
**Author:** dsdparsons
**Date:** 10/21/2021 12:53:01 PM
**Status:**
**Color:**
**Layer:**
**Space:**

map of site with the constraints/hazards overlayed- make sure units are labeled, so specific units can be identified if a crawlspace is proposed where groundwater may impact.

---

**Subject:** Image
**Page Label:** 2
**Author:** dsdparsons
**Date:** 10/21/2021 12:54:59 PM
**Status:**
**Color:**
**Layer:**
**Space:**

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**Subject:** Callout
**Page Label:** 2
**Author:** dsdparsons
**Date:** 10/21/2021 12:55:33 PM
**Status:**
**Color:**
**Layer:**
**Space:**

add missing relative figures

**Subject:** Image
**Page Label:** 2
**Author:** dsdparsons
**Date:** 10/21/2021 12:57:20 PM
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**Subject:** Callout
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**Author:** dsdparsons
**Date:** 10/21/2021 11:01:04 AM
**Status:**
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122 units

---


**Subject:** Callout
**Page Label:** 4
**Author:** dsdparsons
**Date:** 10/21/2021 11:27:17 AM
**Status:**
**Color:**
**Layer:**
**Space:**

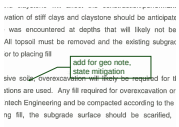
122 units

---


**Subject:** Callout
**Page Label:** 8
**Author:** dsdparsons
**Date:** 10/21/2021 12:44:58 PM
**Status:**
**Color:**
**Layer:**
**Space:**

shallow bedrock add to geo note constraint

---




**Subject:** Callout
**Page Label:** 8
**Author:** dsdparsons
**Date:** 10/21/2021 12:45:39 PM
**Status:**
**Color:**
**Layer:**
**Space:**

add for geo note, state mitigation

---


**Subject:** Callout
**Page Label:** 8
**Author:** dsdparsons
**Date:** 10/21/2021 12:46:00 PM
**Status:**
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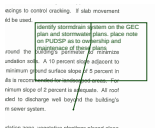
**Layer:**
**Space:**

add for geo note, state mitigation




**Subject:** Callout
**Page Label:** 11
**Author:** dsdparsons
**Date:** 10/21/2021 12:47:08 PM
**Status:**
**Color:**
**Layer:**
**Space:**

identify stormdrain system on the GEC plan and stormwater plans. place note on PUDSP as to ownership and maintenace of these plans

---

**Subject:** Re: Callout
**Page Label:** 11
**Author:** Daniel Torres
**Date:** 10/21/2021 12:54:16 PM
**Status:**
**Color:**
**Layer:**
**Space:**

Thank you Kari for adding a comment on this, I had put a yellow dot on the paragraph so that i wouldn't forget to add a comment