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**WASTEWATER STUDY  
SADDLEHORN RANCH – FILING NO. 4  
CURTIS ROAD & JUDGE ORR ROAD  
EL PASO COUNTY, COLORADO**

Prepared for

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Attn: William Guman

December 5, 2022

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.  
Geologist



Reviewed by:

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

LLL

Encl.

Entech Job No. 222006  
AAprojects/2022/222006 wws

PCD Fil No.

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## 1.0 SUMMARY

### ***Project Location***

The project site lies in portions northeast ¼ and southeast ¼ the of Section 3, Township 13 South, Range 64 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 3 miles east of Falcon, Colorado, southeast of the intersection of Curtis Road and Judge Orr Road.

### ***Project Description***

Total acreage involved in the project is approximately 162 acres. The proposed site development consists of forty-two (42) single-family rural residential lots. The development will be serviced by Saddlehorn Ranch Metropolitan water and individual on-site wastewater treatment systems.

### ***Scope of Report***

This report presents the results of our geologic evaluation, treatment of engineering geologic hazard study and wastewater study for individual on-site wastewater treatment systems.

### ***Land Use and Engineering Geology***

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of potentially expansive soils, hydrocompaction, loose/collapsible soils, shallow bedrock, floodplain, potentially seasonal shallow groundwater, seasonal shallow groundwater and areas of ponded water. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

## 2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the northeast ¼ and southeast ¼ the of Section 3, Township 13 South, Range 64 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 3 miles east of Falcon, Colorado, southeast of Curtis Road and Judge Orr Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site varies from very gradually to moderately sloping generally to the south to southeast. Three drainages that are tributaries to Black Squirrel Creek bisect the overall Saddlehorn Ranch site, with the middle drainage located along the southern side of Filing 4, and the northern drainage is located within the northeastern portion of Filing No. 4. Steeper slopes are located along portions of some of the drainages on the site. The drainages in Filing No. 4 flow in a southeasterly direction through Filing No. 4 and are primarily located within drainage easements and open space tracts being avoided by the proposed lots. Water was not observed in the in Filing No. 4 at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses and weeds. Site photographs, taken September 28, 2022, are included in Appendix A.

Total acreage involved in the proposed development is approximately 162 acres with forty-two (42) single-family rural residential lots, with designated open space and drainage easements. The proposed residential lots range from approximately 2.5 to 3.9 acres. The majority of the lots are approximately 2.5 acres in size. The area will be serviced by Saddlehorn Ranch Metropolitan water and individual on-site wastewater treatment systems. The proposed Site Plan/Testing Location Map is presented in Figure 3.

The site was previously investigated as part of a Preliminary Soils, Geology, Geologic Hazard and Wastewater Study, Entech Job No. 181823 (Reference 1). Four (4) test borings, and forty-five (45) tactile test pits were performed on the site to determine general suitability of the site for construction and the use of on-site wastewater treatment systems. The previous report/investigation was used as part of this investigation. More specifically one (1) test boring (TB-3), and nine (9) of the previous test pits were used as part of the Saddlehorn Ranch – Filing No. 4 investigation. Eight (8) additional test borings and one (1) test pit were completed for Saddlehorn Ranch – Filing No. 4. The Test Pit Logs are included in Appendix B, the Laboratory

Testing Results are included in Appendix C, and a Summary of the Laboratory Testing Results is presented in Table 1.

### **3.0 SCOPE OF THE REPORT**

The scope of the report includes a general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property. The scope of the report includes the evaluation of the site for individual on-site wastewater treatment systems in accordance with El Paso Land Development Code.

### **4.0 FIELD INVESTIGATION**

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS) (previously the Soil Conservation Service (SCS)) survey data was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and aerial photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on September 28, 2022.

Four (4) test borings, and forty-five (45) tactile test pits were previously performed on the site to verify general soil conditions and the suitability of the site for the use of on-site wastewater treatment systems (Reference 1). One Test Boring (TB-3), and nine (9) of the previous Test Pits (TP-22, TP-23, TP-28, TP-29, TP-30, TP-37, TP-38, TP-39, & TP-40) were used as part of the Saddlehorn Ranch – Filing No. 4 investigation. Eight (8) additional test borings and one (1) test pit were completed for Saddlehorn Ranch – Filing No. 4. The locations of the test pits are indicated on the Site Plan/Testing Location Map, Figure 3. The Test Pit Logs are included in Appendix B, the Laboratory Testing Results are included in Appendix C, and a Summary of the Laboratory Testing Results is presented in Table 1. Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis, ASTM D-422, and

Atterberg Limits, ASTM D-4318 for classification purposes. Volume change testing was performed on selected samples using the FHA Swell Test and Swell/Consolidation Test, ASTM D-4546, in order to evaluate the expansion/consolidation potential of the soils. Soluble sulfate testing was performed on selected samples to determine the corrosive characteristics of the soils on concrete placed below ground. Results of the laboratory testing are included in Appendix C. The Laboratory Test Results are summarized in Tables 1 and 2.

## **5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY**

### **5.1 General Geology**

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 18 miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northwesterly direction (Reference 2). The rocks in the area of the site are sedimentary in nature and typically Tertiary to Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of man-made fill deposits, residual soils, eolian soils, and alluvial soils of the Quaternary Age. The residual soils are produced by the in-situ action of weathering of the bedrock on site. The alluvial soils were deposited by water in the major drainages on the site and as stream terrace deposits. The eolian soils were deposited by prevailing winds from the west and northwest. The site's stratigraphy will be discussed in more detail in Section 5.3.

### **5.2 Soil Conservation Survey**

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped three soil types on the site (Figure 4). In general, they vary from loam, loamy sands, and sandy loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
8	Blakeland Loamy Sand, 1-9% slopes
19	Columbine Gravelly Sandy Loam, 0 to 3% slopes
29	Fluvaquentic Haplaquolls, nearly level

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to typically have moderate to very rapid permeabilities. The majority of the soils have rapid permeabilities. Limitations described for the soils include the hazard of flooding on Soil Type Nos. 19 and 29. Soil Type No. 29 is mapped in the floodplain zone that is designated as open space. Roads may need to be designed to minimize frost-heave potential. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards.

### **5.3 Site Stratigraphy**

The Falcon Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 5). The Geology Map prepared for the site is presented in Figure 6. Five mappable units were identified on the overall site which are described as follows:

**Qal Recent Alluvium – Post Piney Creek (Alluvium One) of Late Holocene Age:**

These materials consist of water deposited sands located along some of the minor drainages across the site. The materials consist of silty to clayey sand and sandy clays.

**Qp Piney Creek Alluvium (Alluvium Two) of Early Holocene Age:**

These materials consist of low stream-terrace deposits above the current stream channels. The materials typically consist of silty to well graded sand.

**Qb Broadway Alluvium (Alluvium Three) of Late Pleistocene Age:**

These materials consist of middle steam terrace deposits. The materials typically consist of silty to clayey gravelly sands.

**Qes Eolian Sand of Quaternary Age:**

These deposits are fine to medium grained soil deposited on the site by the action of prevailing winds from the west and northwest. They typically occur as large dune deposits or narrow ridges. These soils are typically tan to brown in color and tend to have very uniform or well-sorted gradation. These materials tend to have a relatively high permeability and low density.

**Qes/Tkd Eolian Sand Deposits of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:**

The Dawson Formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone.

Overlying this formation is a variable layer of eolian sand and residual soil, undifferentiated. The eolian sands were deposited by the action of the prevailing winds. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands, sandy clays and sandy silts.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon Quadrangle* distributed by the Colorado Geological Survey in 2012 (Reference 5), and the *Geologic Map of the Pueblo 1<sup>0</sup> x 2<sup>0</sup> Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 6). The Test Pits were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

#### **5.4 Soil Conditions**

The soils encountered in the Test Borings and Test Pits can be grouped into four general soil and rock types. The soils were classified using the Unified Soil Classification System (USCS). The test pit soils were also classified using the USDA Textural Soil Classification.

Soil Type 1 is a well-graded sand, slightly silty to silty sand and clayey to very clayey sand (SW, SM-SW, SM, SC). This material was encountered in all of the test pits and eight of the test borings. The sand was encountered at depths ranging from the existing surface to 4 feet, and extending to depths of 4 to 11 feet bgs. These soils were encountered at loose to medium dense states and at dry to moist conditions. Samples tested had 3 to 37 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in liquid limits of 19 to 21 and plastic indexes of 3 to 4, and non-plastic results. FHA Swell Testing on select samples resulted in expansion pressures of 30 to 430 psf, indicating low expansion potentials.

Soil Type 2 is a sandy clay and very sandy silt (CL, ML). This material was encountered in Test Boring Nos. 7 and Test Pit 1A. The clays were encountered at depths ranging from the existing surface and extended to depths of 8 to 9 feet. The clay was encountered at firm consistencies and moist conditions. The samples tested had 61 to 88 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in liquid limits of 32 to 41 and plastic indexes of 10 to 18. Swell/Consolidation Testing resulted in a volume change of 0.8 percent, indicating a low expansion potential. Sulfate testing resulted in less than 0.01 percent soluble sulfate by

weight, indicating the sandstone exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 is a silty to very silty sandstone and clayey to very clayey sandstone (SM, SM-SW, SC). This material was encountered in eight of the test borings and three of the test pits. The sandstone was encountered at depths ranging from 2.5 to 11 feet bgs and extended to termination of the test borings and pits (5 to 20 feet). The sandstone was encountered at dense to very dense states and moist conditions. Samples tested had 9 to 28 percent of the soil sized particles passing the No. 200 sieve. Atterberg Limits Testing resulted in non-plastic results. Highly expansive clayey sandstone and claystone are commonly interbedded in the sandstone in the area. Sulfate testing resulted in 0.01 percent soluble sulfate by weight, indicating the sandstone exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 4 is a very sandy claystone and very sandy siltstone (CL, ML). This material was encountered one of the test borings and test pits at 5 to 19 feet bgs and extended to the termination of the test borings and test pits (8 to 20 feet). The claystone and siltstone were encountered at hard consistencies and moist conditions. Samples tested had 57 to 59 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in a liquid limit of 41 and plastic index of 5. Swell/Consolidation Testing on a samples resulted in volume changes of 1.4, indicating a low to moderate expansion potential. FHA Swell Testing on a sample of the claystone resulted in an expansion pressure of 3160 psf, indicating a moderate to high expansion potential.

The Test Borings and Test Pit Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. The Laboratory Test Results are summarized on Table 1.

### **5.5 Groundwater**

Groundwater or signs of seasonal groundwater were encountered in all of the test borings and in three of the test pits within Filing No. 4 at depths ranging from 3.5 to 16 feet. Areas of seasonal and potentially seasonal shallow groundwater have been mapped in low-lying areas and in the drainages on the site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Isolated sand layers within the variable soil profile, sometimes only a few feet in thickness and width, can carry water in the subsurface. Additionally, perched water

conditions can occur on this site where water can flow through permeable sands overlying less permeable bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

#### Floodplain and Drainage Areas – Constraint

Portions of the site associated with tributaries of the Black Squirrel Creek drainage are mapped within a floodplain zone according to the FEMA Map No. 08041C0558G, dated December 7, 2018 (Figure 7, Reference 7). Areas of ponded water were observed in the central portion of the site near the windmill. The floodplain areas have been designated as open space and/or can be avoided by construction. Additionally, areas of seasonal and potentially seasonal shallow groundwater were observed across the site. In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and frost heave potential. These are low-lying areas along the drainage in the southern and northeastern portions of Filing 4 and in the low-lying areas and minor drainages across the site. These areas can likely be avoided or properly mitigated by development. Perched water conditions could be encountered across the entire site where water can flow within permeable sand layers overlying impermeable bedrock. These areas should be identified on an individual basis at the time of construction. Where perched water conditions are encountered, the mitigation recommendations for seasonal and potentially seasonal shallow groundwater should be followed. Foundations should maintain a minimum separation of 3 feet between the foundation grade and the maximum anticipated groundwater level. The floodplain should be avoided by construction unless site-specific floodplain determination and drainage studies are performed. These areas are discussed below.

## **6.0 ON-SITE WASTEWATER TREATMENT**

The site was evaluated for individual and commercial on-site wastewater treatment systems in accordance with El Paso Land Development Code. Forty-five (45) tactile test pits were performed on the property, ten (10) test pits were located within Filing No. 4. The test pits were placed in potential locations of future systems. The approximate locations of the test pits are indicated on Figure 3, on the Geology/Engineering Geology Map, Figure 6, and on the Septic Suitability Map, Figure 8. A table showing the results of the Tactile Test Pits is presented in Table 3. Test Pit Logs are included in Appendix B and D.

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped the site with three soil descriptions. The Soil Survey Map (Reference 3) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having moderate to very rapid percolation rates. The majority of the soils have been described with rapid permeabilities. The Natural Resource Conservation Service (NRCS) has rated the soil suitability with respect to septic tank absorption fields. The soils in the area have been described as very limited due to seepage, bottom layer, and filtering capacity. These areas are typically associated with shallow groundwater, shallow bedrock, and unsuitable soils which require designed systems. Flooding and depth to saturation zone are limitations on Soil Type 29. The majority of the areas mapped with Soil Type 29 lie within the drainage areas and will be avoided by development. The map and descriptions for the NRCS Septic Tank Absorption Field Soil Rating are included in Appendix E.

Soils encountered in the tactile test pits consisted of loamy sand, sandy clay loam and sandy clay. Bedrock was encountered in three of the test pits at 2 to 4 feet bgs, which were excavated to 6.5 to 8 feet. Groundwater or signs of seasonally occurring groundwater were encountered at depths of 3.5 to 6.5 feet in four of the test pits. The limiting layers encountered in the test pits are the sandy loam (Soil Type 2), sandy clay loam (Soil Type 3A), and sandy clay, sandy claystone, and sandstone (Soil Type 4A) which corresponds to LTAR values ranging from 0.80 to 0.15 gallons per day per square foot. Designed systems will be required where bedrock or groundwater are encountered at 6 feet bgs or shallower. Some of the areas tested for Filing No. 3 will be suitable for conventional on-site wastewater treatment systems. Designed systems due to restrictive clay soils, shallow bedrock or shallow groundwater may be required along the drainage in Filing No. 3. Additional investigation of individual lots may identify areas where suitable for conventional systems could be used.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County and State Guidelines and properly maintained. Based on the testing performed as part of this investigation designed systems will likely be required for the majority of the lots. A Septic Suitability Map is presented in Figure 8. Areas where OWTS sites are not recommended are also indicated on Figure 8. Individual soil testing is required on each lot prior to construction. Absorption fields must be located a minimum of 100 feet from any well, including those on

adjacent properties. Absorption fields must also be located a minimum of 50 feet from any drainages, floodplains or ponded areas and 25 feet from dry gulches.

## **7.0 CLOSURE**

It is our opinion that the existing geologic engineering and geologic conditions will impose some minor constraints on development and construction of the site. The majority of these conditions can be avoided by construction. Others can be mitigated through proper engineering design and construction practices. The proposed development and use is consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites and septic systems will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for William Guman and Associates, Ltd for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

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## **TABLES**

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: GUMAN AND ASSOC.  
 PROJECT: JUDGE ORR AND CURTIS ROAD  
 JOB NO.: 222006

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	1	5			37.3	21	4	0.04			SM	SAND, SILTY
1	5	5			20.0				30		SM	SAND, SILTY
1	6	2-3			12.5						SM	SAND, SILTY
2	7	5			60.9				170		ML	SILT, VERY SANDY
3	2	15			9.1	NV	NP	0.02			SM-SW	SANDSTONE, SLIGHTLY SILTY
3	3	15			28.1						SM	SANDSTONE, SILTY
3	8	10			8.4						SM-SW	SANDSTONE, SLIGHTLY SILTY
4	4	20	31.1	77.4	58.9	41	5			1.4	ML	SILTSTONE, VERY SANDY

**Table 2: Summary Test Boring Results**

<b>Test Boring No.</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Groundwater or Seasonally Occurring Groundwater (ft.)</b>
1	9	12
2	9	8.5
3	4	7
4	9	16
5	7	7.5
6	11	6
7	9	7
8	9	9
3*	9	12

\*- Test Boring from EEI Job No. 181823

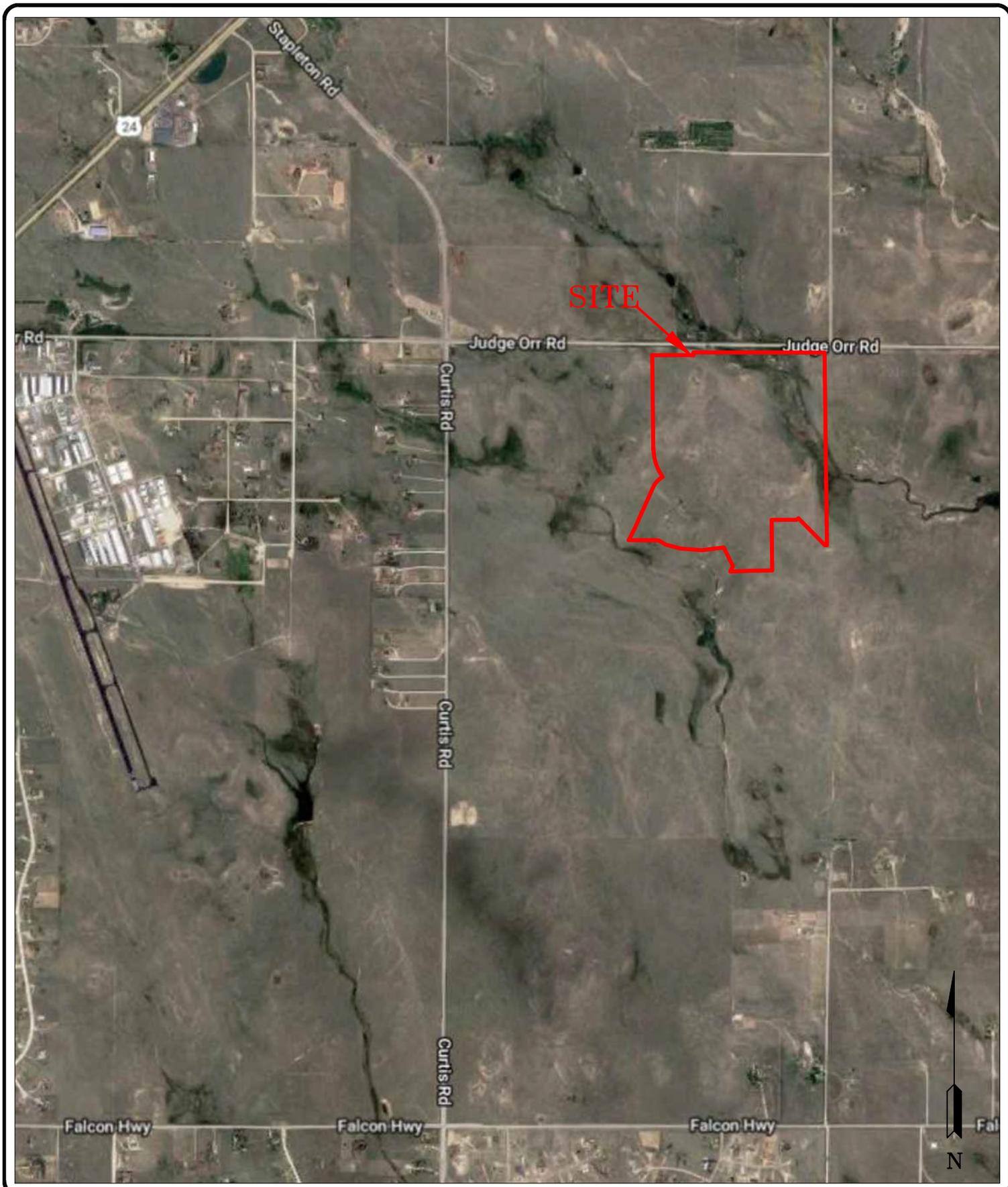
**Table 3: Summary Tactile Test Pit Results**

<b>Test Pit No.</b>	<b>USDA Soil Type</b>	<b>LTAR Value</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Groundwater or Seasonally Occurring Groundwater (ft.)</b>
1A	4A*	0.15	>8	5*
22**	2A	0.5	>8	>8
23**	4A*	0.15	2*	>8
28**	2A	0.5	>8	6.5
29**	2A	0.5	>8	>8
30**	4A*	0.15	4*	6.5
37**	3A*	0.3	>8	>8
38**	2A	0.5	>8	>8
39**	2A	0.5	>8	>8
40**	4A*	0.15	2.5*	3.5

\*- Conditions that will require an engineered OWTS

\*\* - Test Pits from EEI Job No. 181823

## FIGURES



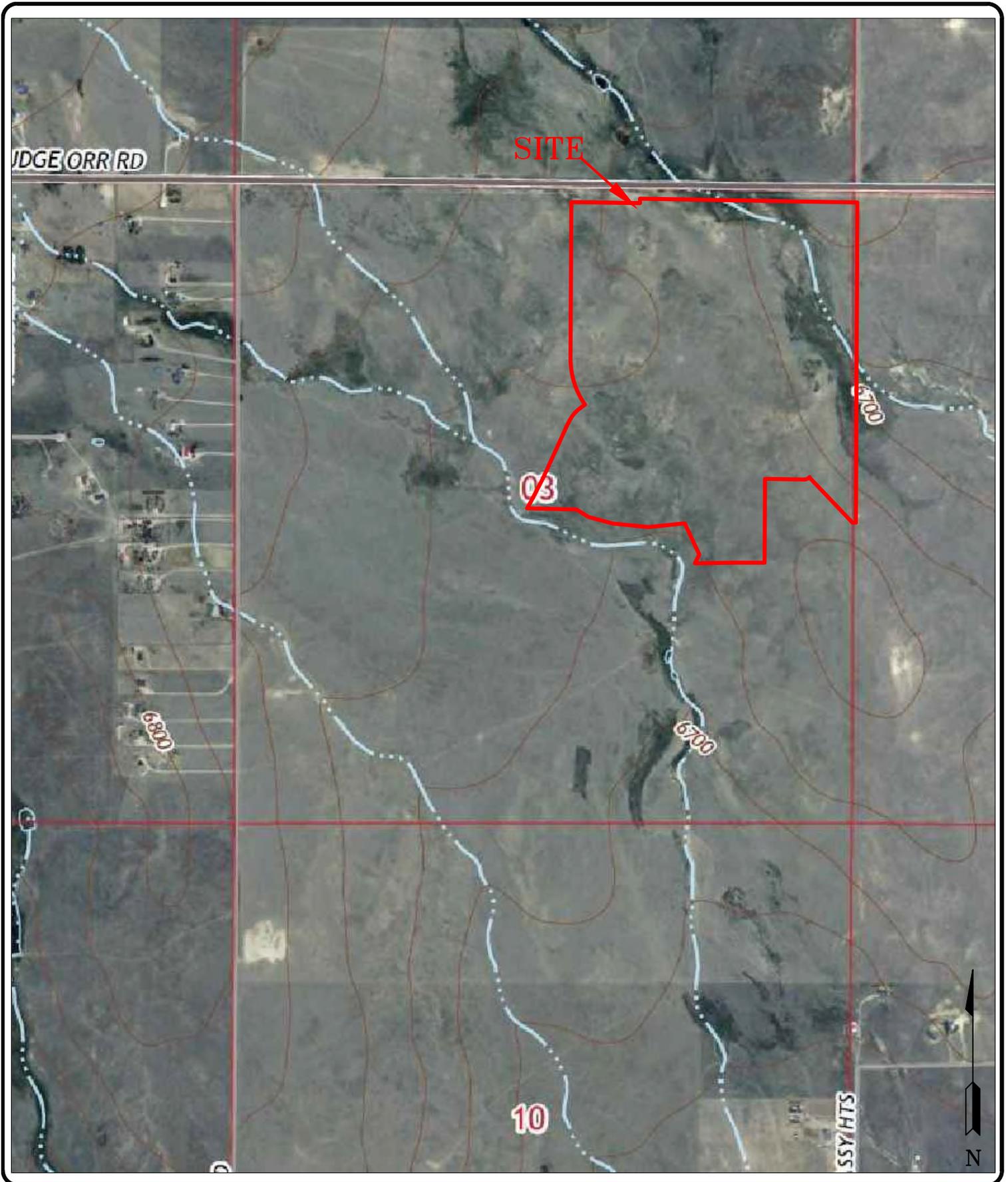

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VICINITY MAP  
SADDLEHORN RANCH FILING NO. 4  
CURTIS ROAD AND JUDGE ORR ROAD  
EL PASO COUNTY, CO.  
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DRAWN: LLL	DATE: 11/8/22	CHECKED:	DATE:
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JOB NO.:  
**222006**

FIG NO.:  
**1**




**ENTECH**  
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COLORADO SPRINGS, CO. 80907 (719) 531-5599

USGS MAP  
SADDLEHORN RANCH FILING NO. 4  
CURTIS ROAD AND JUDGE ORR ROAD  
EL PASO COUNTY, CO.  
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DRAWN: LLL	DATE: 11/8/22	CHECKED:	DATE:
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JOB NO.:  
**222006**

FIG NO.:  
**2**

REVISION	BY

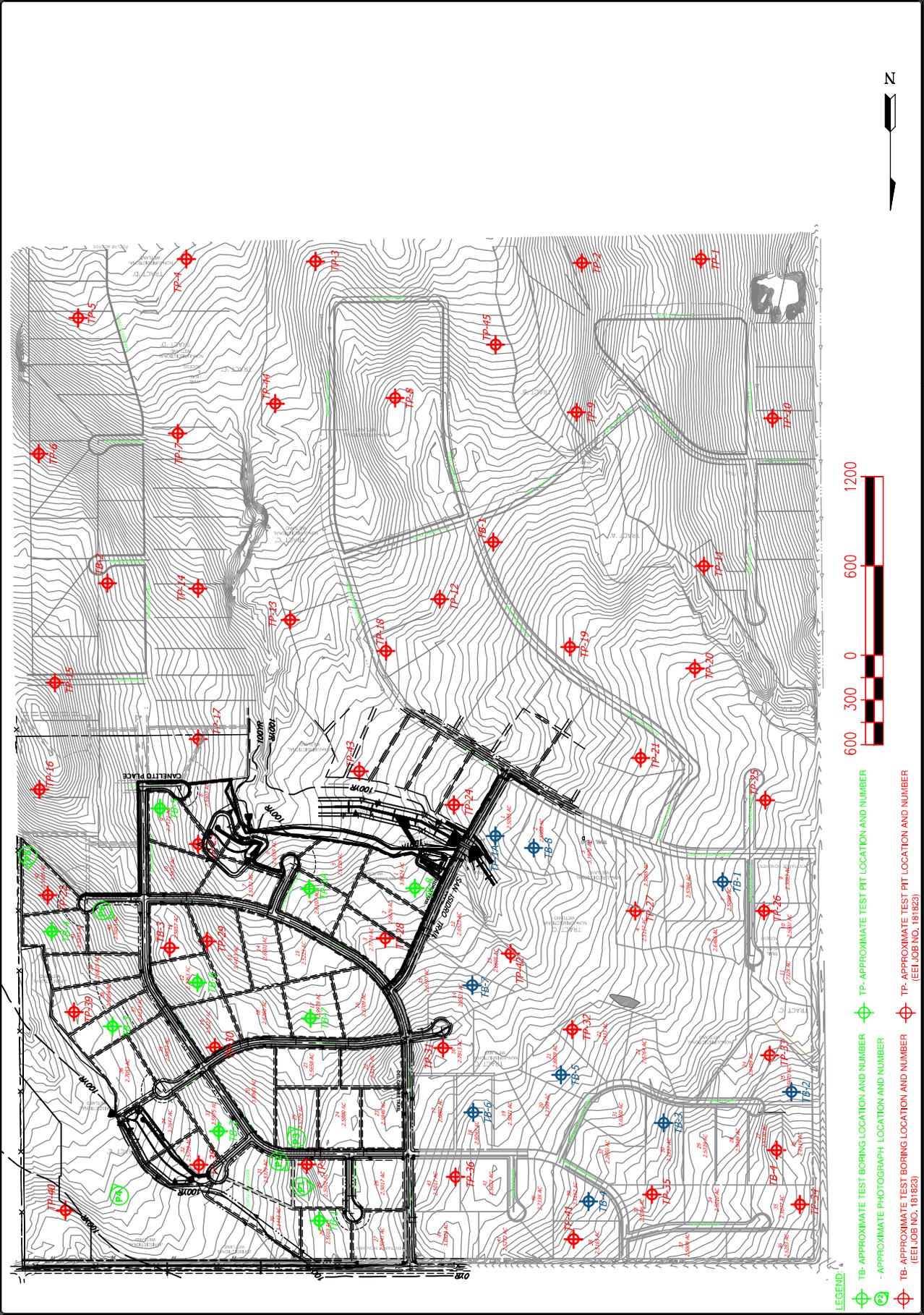
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505 ELKTON DRIVE  
CLONDA SPRINGS, GA 30027  
(770) 531-5599

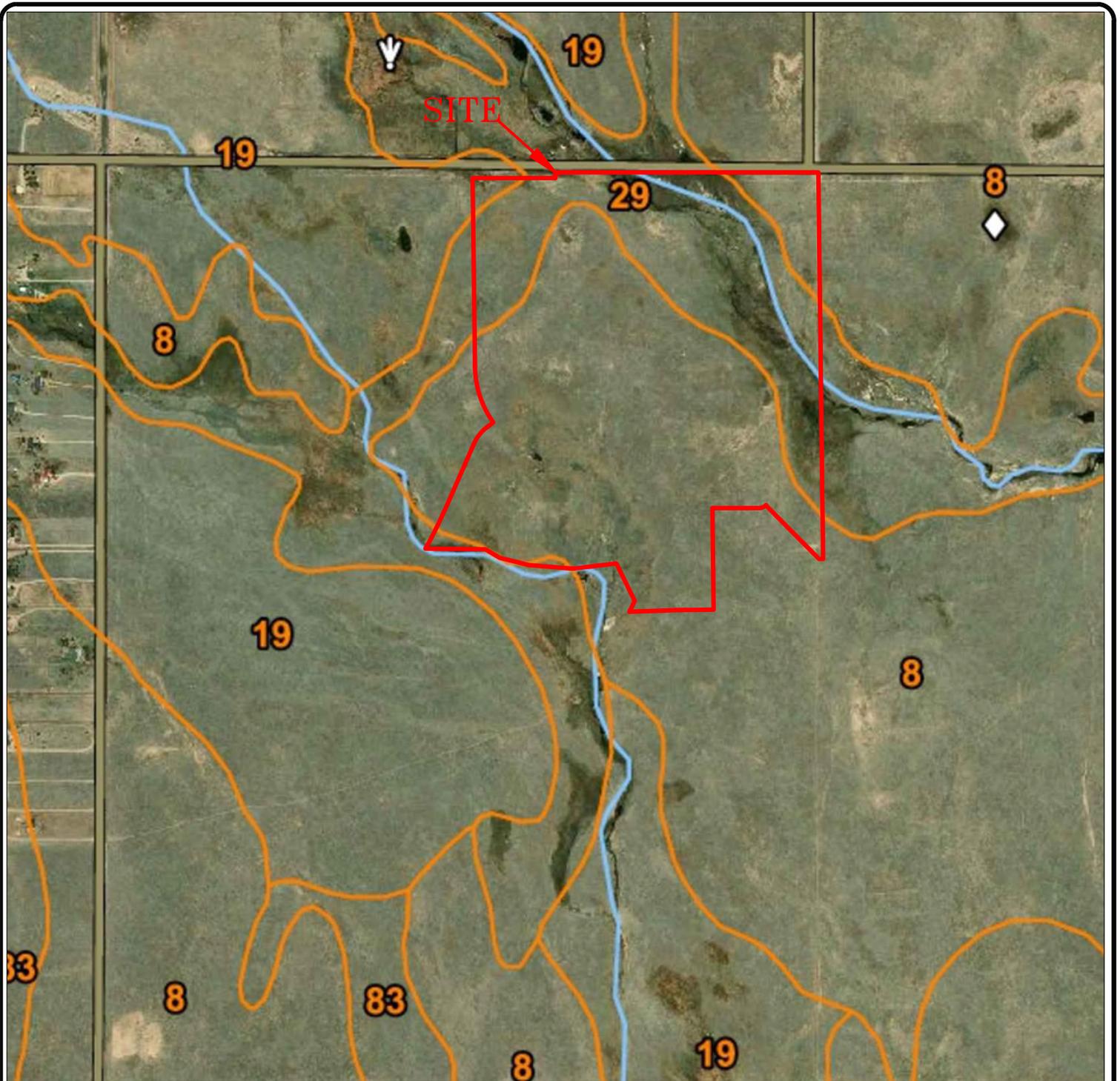


SITE PLAN/TEST BORING LOCATION MAP  
SADLEHORN RANCH FILING NO. 4  
CURTIS ROAD AND JUDGE ORR ROAD  
EL PASO COUNTY, CO.  
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DATE	11/16/22
BY	AS SHOWN
SCALE	AS SHOWN
PROJECT	181823
CLIENT	WILLIAM GUMAN AND ASSOCIATES, LTD



N



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SOIL SURVEY MAP  
 SADDLEHORN RANCH FILING NO. 4  
 CURTIS ROAD AND JUDGE ORR ROAD  
 EL PASO COUNTY, CO.  
 FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DRAWN:  
 LLL

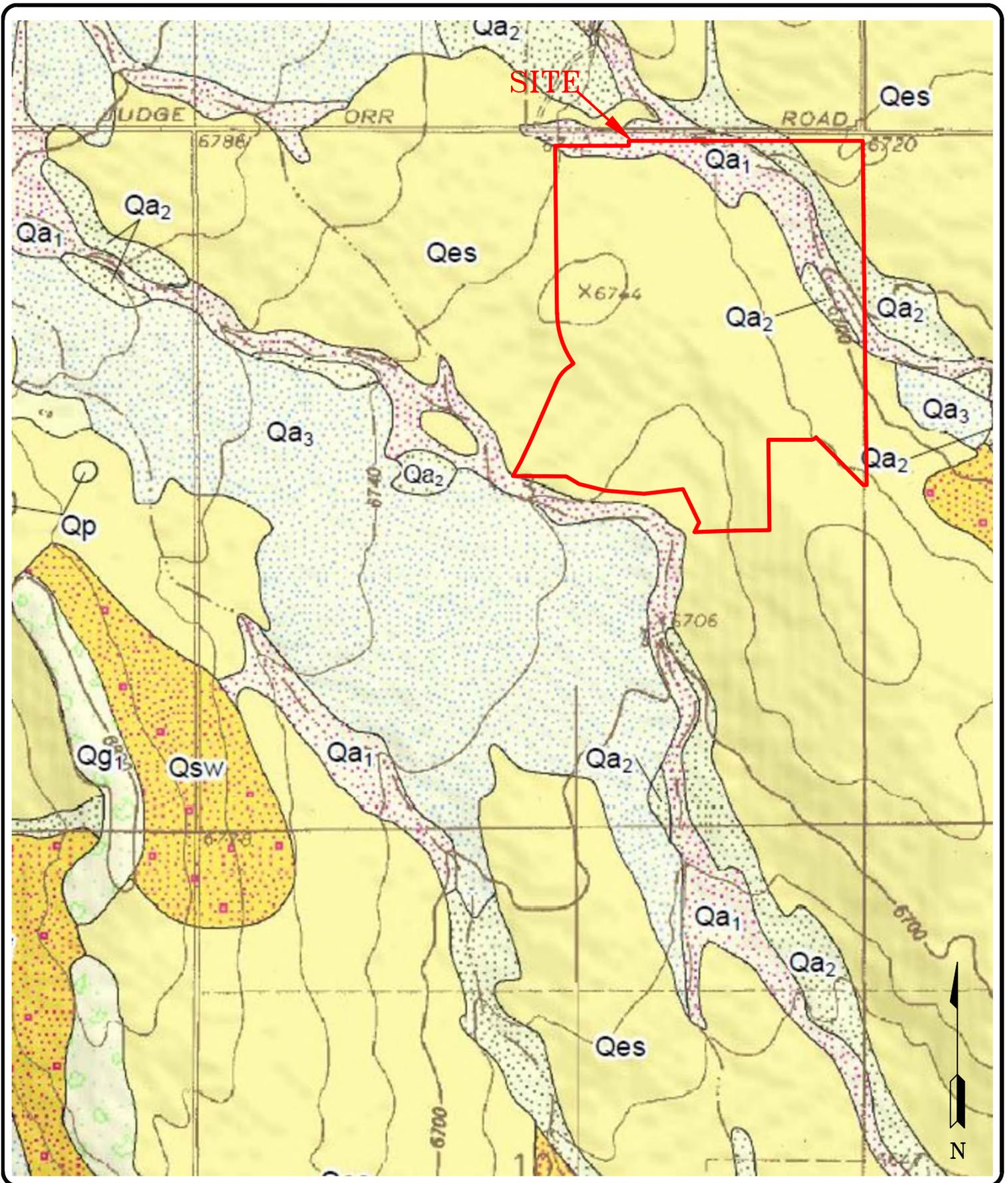
DATE:  
 11/8/22

CHECKED:

DATE:

JOB NO.:  
 222006

FIG NO.:  
 4



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

FALCON QUADRANGLE GEOLOGIC MAP  
SADDLEHORN RANCH FILING NO. 4  
CURTIS ROAD AND JUDGE ORR ROAD  
EL PASO COUNTY, CO.  
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DRAWN: LLL	DATE: 11/8/22	CHECKED:	DATE:
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JOB NO.:  
222006

FIG NO.:  
5

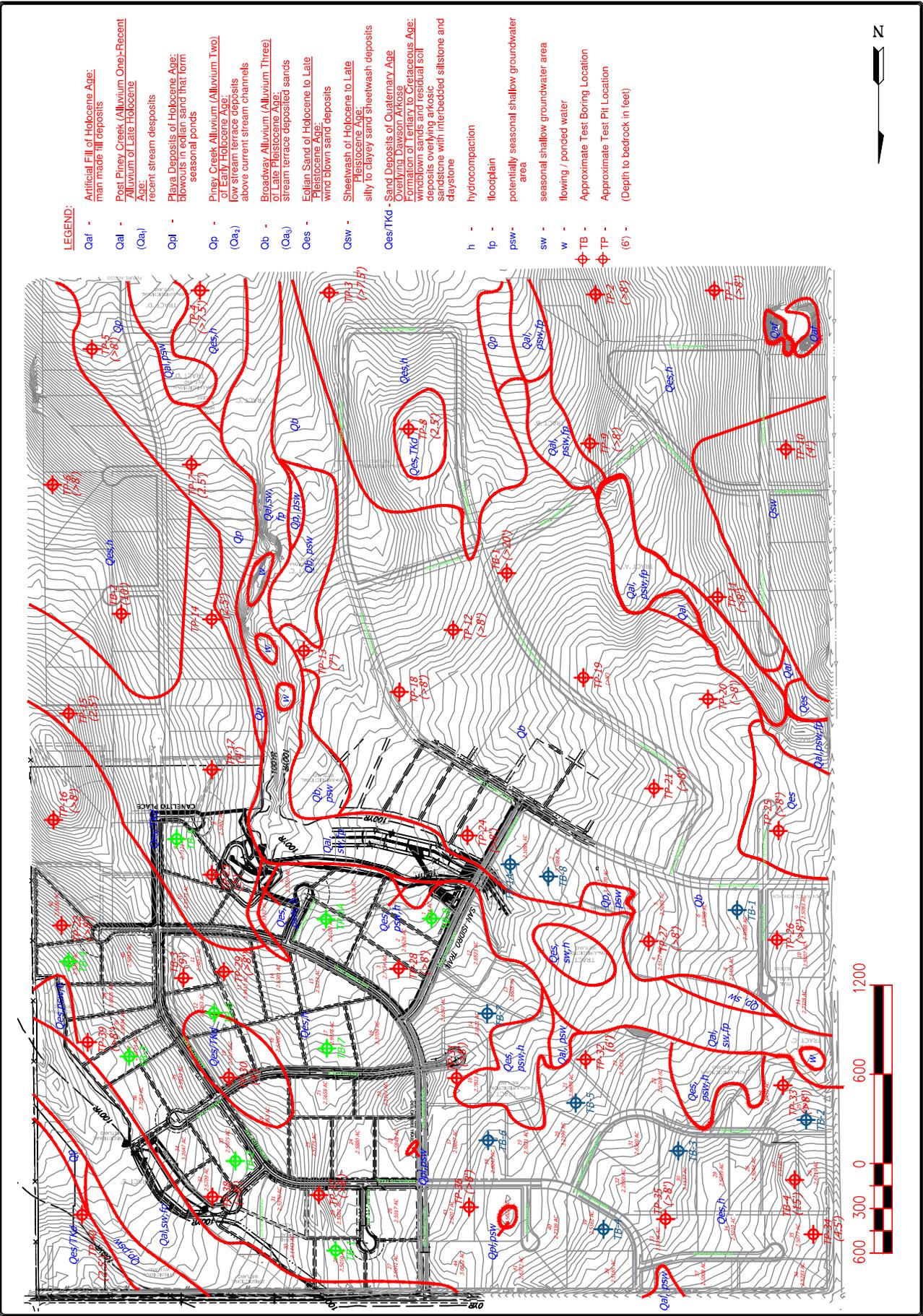
REVISION BY	

**ENTTECH**  
ENGINEERING, INC.

  
 505 ELKTON DRIVE  
 COLLEGE SPRINGS, GA 30607  
 (770) 531-5599

**GEOLGY/ENGINEERING GEOLOGY MAP**  
**SADLIEHORN RANCH FILING NO. 4**  
**CURTIS ROAD AND JUDE ORR ROAD**  
**EL PASO COUNTY, CO.**  
**FOR: WILLIAM GUMAN AND ASSOCIATES, LTD.**

DATE	11/26/22
BY	AS SHOWN
SCALE	AS SHOWN
PROJECT NO.	209 WJ
DATE	11/26/22
BY	AS SHOWN
SCALE	AS SHOWN
PROJECT NO.	209 WJ
DATE	11/26/22
BY	AS SHOWN
SCALE	AS SHOWN
PROJECT NO.	209 WJ



- LEGEND:**
- Qaf - Artificial Fill of Holocene Age;
  - Qal - Post Piney Creek (Alluvium One)-Recent Alluvium of Late Holocene Age;
  - (Qa) - recent stream deposits
  - Qp - Playa Deposits of Holocene Age; blowouts in eolian sand that form seasonal ponds
  - Qp - Piney Creek Alluvium (Alluvium Two) of Early Holocene Age;
  - (Qa) - low stream terrace deposits above current stream channels
  - Qb - Breakaway Alluvium (Alluvium Three) of Late Pleistocene Age;
  - (Qa) - stream terrace deposited sands
  - Qes - Eolian Sand of Holocene to Late Pleistocene Age;
  - Qsw - wind blown sand deposits
  - Qsw - Sheetwash of Holocene to Late Pleistocene Age;
  - Qes/Tkd - silty to clayey sand sheetwash deposits
  - Qes/Tkd - Sand Deposits of Quaternary Age Overlying Dawson Arkosid Formation of Tertiary to Cretaceous Age;
  - h - winblown sands and residual soil deposits overlying arkosid sandstone with interbedded siltstone and claystone
  - fp - hydrocompaction
  - psw - floodplain
  - sw - potentially seasonal shallow groundwater area
  - sw - seasonal shallow groundwater area
  - w - flowing / ponded water
  - TP - Approximate Test Boring Location
  - (6') - Approximate Test Pit Location (Depth to bedrock in feet)





REVISION BY:	

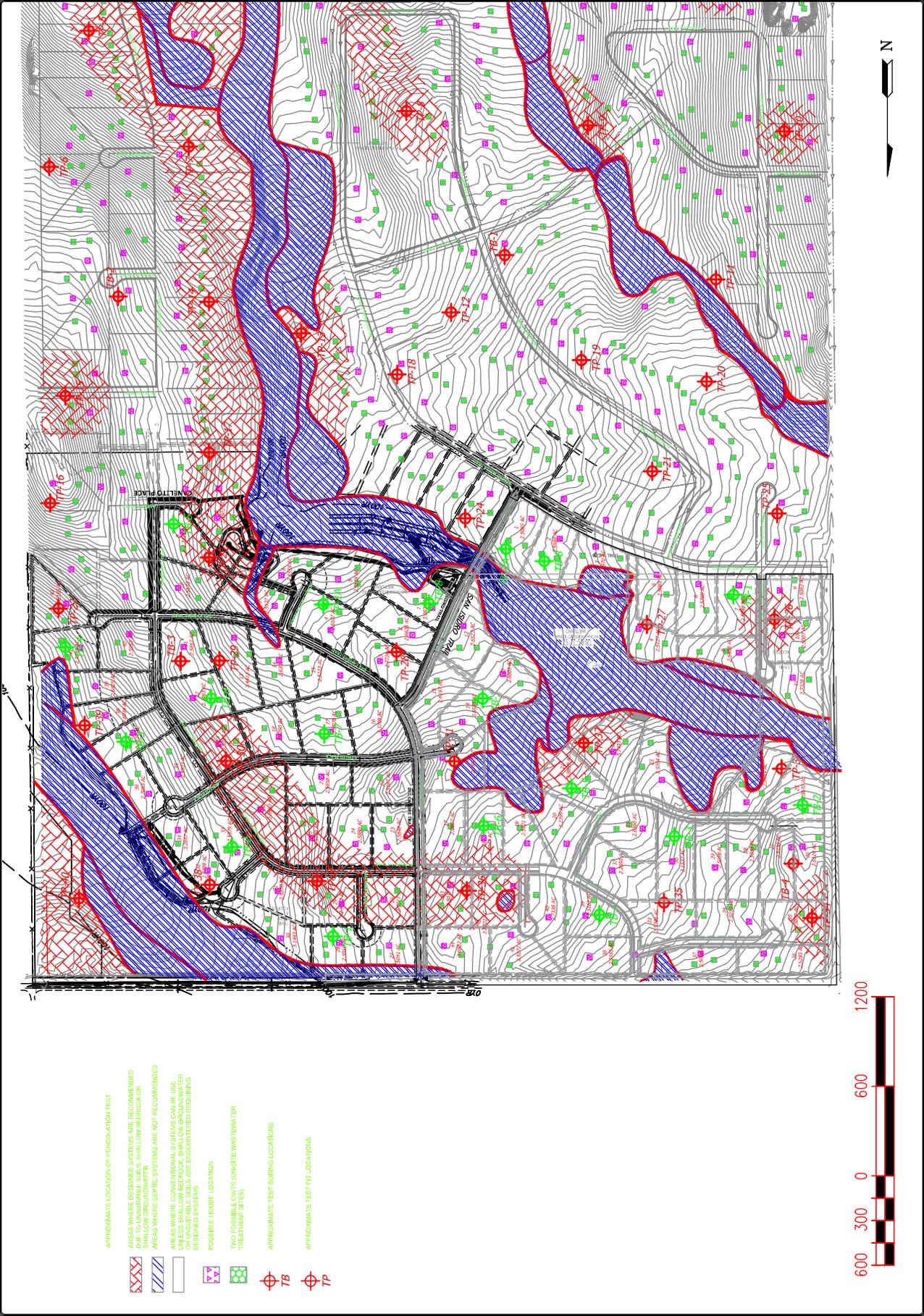
**ENTTECH ENGINEERING, INC.**

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



**SEPTIC SUITABILITY MAP**  
SADDLEHORN RANCH FILING NO. 4  
CURTIS ROAD AND JUDGE ORR ROAD  
EL PASO COUNTY, CO.  
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD.

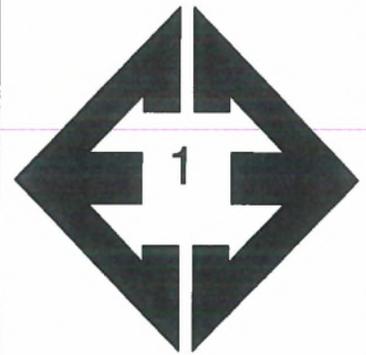
DATE 11/26/22	<b>8</b>
AS SHOWN JOB NO. 75528784	
DATE 11/26/22	
BY L.L.L. OREGON	



- APPROXIMATE LOCATION OF PERCOLATION TEST
- AREAS WHERE DESIGNED SYSTEMS ARE RECOMMENDED FOR SHALLOW GROUNDWATER
- AREAS WHERE SEPTIC SYSTEMS ARE NOT RECOMMENDED
- AREAS WHERE CONVENTIONAL SYSTEMS CAN BE USED UNLESS SHALLOW BEERACK, SHALLOW GROUNDWATER OR UNSUITABLE SOILS ARE ENCOUNTERED REQUIRING DESIGNED SYSTEMS
- POSSIBLE HOUSE LOCATION
- TWO POSSIBLE LOTS (ON-SITE WASTEWATER TREATMENT SITE)
- APPROXIMATE TEST BORING LOCATIONS
- APPROXIMATE TEST PIT LOCATIONS



## **APPENDIX A: Site Photographs**



**Looking west from the  
northern portion of  
Filing No. 4.**

September 28, 2022



**Looking southeast  
from the northern  
portion of Filing No. 4.**

September 28, 2022



**Looking east from the  
northern portion of  
Filing No. 4.**

September 28, 2022



**Looking southeast  
from the northeastern  
portion of Filing No. 4.**

September 28, 2022



**Looking north from the southeastern portion of Filing No. 4.**

September 28, 2022



**Looking northwest from the southeastern portion of Filing No. 4.**

September 28, 2022

## **APPENDIX B: Test Boring & Test Pit Logs**

TEST BORING NO. 1  
 DATE DRILLED 10/10/2022  
 Job # 222006

TEST BORING NO. 2  
 DATE DRILLED 10/10/2022  
 CLIENT GUMAN AND ASSOC.  
 LOCATION JUDGE ORR AND CURTIS ROAD

REMARKS

REMARKS

WATER @ 12', 10/11/22

SAND, SILTY, FINE TO COARSE  
 GRAINED, TAN, MEDIUM DENSE,  
 MOIST

SANDSTONE, SILTY, FINE TO  
 COARSE GRAINED, GRAY BROWN,  
 VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			11	6.1	1
5			10	7.3	1
10			50 8"	13.3	3
15			50 11"	14.5	3
20			50 6"	16.0	3

WATER @ 8.5', 10/11/22

SAND, SILTY, FINE TO COARSE  
 GRAINED, TAN, LOOSE TO  
 MEDIUM DENSE, DRY TO MOIST

SANDSTONE, SLIGHTLY SILTY,  
 FINE TO COARSE GRAINED,  
 GRAY BROWN, VERY DENSE,  
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			8	2.0	1
5			16	4.9	1
10			50 8"	11.9	3
15			50 11"	13.2	3
20			50 6"	14.3	3



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 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 11/8/22

JOB NO.:  
 222006

FIG NO.:  
 B-1

TEST BORING NO. 3  
 DATE DRILLED 10/10/2022  
 Job # 222006

TEST BORING NO. 4  
 DATE DRILLED 10/10/2022  
 CLIENT GUMAN AND ASSOC.  
 LOCATION JUDGE ORR AND CURTIS ROAD

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 7', 10/11/22							WATER @ 16', 10/11/22						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY				17	1.6	1	SAND, SILTY, FINE TO COARSE GRAINED, TAN, LOOSE, DRY				9	1.4	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN TO GRAY BROWN, VERY DENSE TO DENSE, MOIST	5			50 10"	6.6	3		5		*		1.4	1
	10			50 7"	8.4	3	SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	10			50 11"	7.3	3
	15			50	13.0	3		15			50 11"	13.4	3
WEATHERED ZONE	20			45	12.9	3	SILTSTONE, VERY SANDY, GRAY BROWN, STIFF, MOIST	20			28	28.2	4

\* - BULK SAMPLE TAKEN



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 COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

DRAWN: DATE: CHECKED: LLL DATE: 11/8/22

JOB NO.: 222006

FIG NO.: B-2

TEST BORING NO. 5  
 DATE DRILLED 10/10/2022  
 Job # 222006

TEST BORING NO. 6  
 DATE DRILLED 10/10/2022  
 CLIENT GUMAN AND ASSOC.  
 LOCATION JUDGE ORR AND CURTIS ROAD

REMARKS

REMARKS

WATER @ 7.5', 10/11/22

SAND, SILTY, FINE TO COARSE  
 GRAINED, TAN, MEDIUM DENSE,  
 DRY TO MOIST

SANDSTONE, SILTY, FINE  
 TO COARSE GRAINED, TAN  
 TO GRAY BROWN, VERY DENSE,  
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			22	2.9	1
5			24	12.5	1
10			50 9"	11.9	3
15			50 10"	13.8	3
20			50 7"	18.4	3

WATER @ 6', 10/11/22

SAND, SILTY, FINE TO COARSE  
 GRAINED, TAN, MEDIUM DENSE  
 TO DENSE, DRY TO VERY MOIST

SANDSTONE, SILTY, FINE TO  
 COARSE GRAINED, GRAY  
 BROWN, VERY DENSE, MOIST

\* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			25	1.2	1
5			*	1.0	1
10			42	11.2	1
15			50 7"	12.8	3
20			50 6"	22.4	3



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 11/8/22

JOB NO.:  
 222006

FIG NO.:

B-3

TEST BORING NO. 7  
 DATE DRILLED 10/10/2022  
 Job # 222006

TEST BORING NO. 8  
 DATE DRILLED 10/10/2022  
 CLIENT GUMAN AND ASSOC.  
 LOCATION JUDGE ORR AND CURTIS ROAD

REMARKS

REMARKS

WATER @ 7', 10/10/22

SILT, VERY SANDY, TAN, STIFF, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

\* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			20	11.5	2
5			*	25.9	2
10			50 10"	10.2	3
15			*	13.5	3
20			*	21.5	3



WATER @ 9', 10/10/22

SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE, DRY TO MOIST

SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST

\* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			31	2.8	1
5			30	13.3	1
10			50 9"	17.4	3
15			50 7"	16.0	3
20			*	18.2	3



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TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

11/8/22

JOB NO.:  
 222006

FIG NO.:

B-4

TEST PIT NO. 1A  
 DATE EXCAVATED 10/13/2022  
 Job # 222006

CLIENT LOCATION GUMAN and ASSOCIATES  
 SADDLEHORN, FILING 4

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
redoximorphic features encountered at 5'-0"													
topsoil, sandy clay loam, brown, moist	1							1					
	2							2					
sandy clay loam, fine to coarse grained, brown, moist	3			gr	w	3A		3					
sandy clay, fine to medium grained, grayish brown, moist	4			ma		4A		4					
	5							5					
sandy clay loam, fine to coarse grained, brownish grey, moist	6			gr	w	2A		6					
	7							7					
	8							8					
	9							9					
	10							10					

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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**TEST PIT LOG**

DRAWN:  
jhr

DATE:  
10/19/22

CHECKED:

DATE:

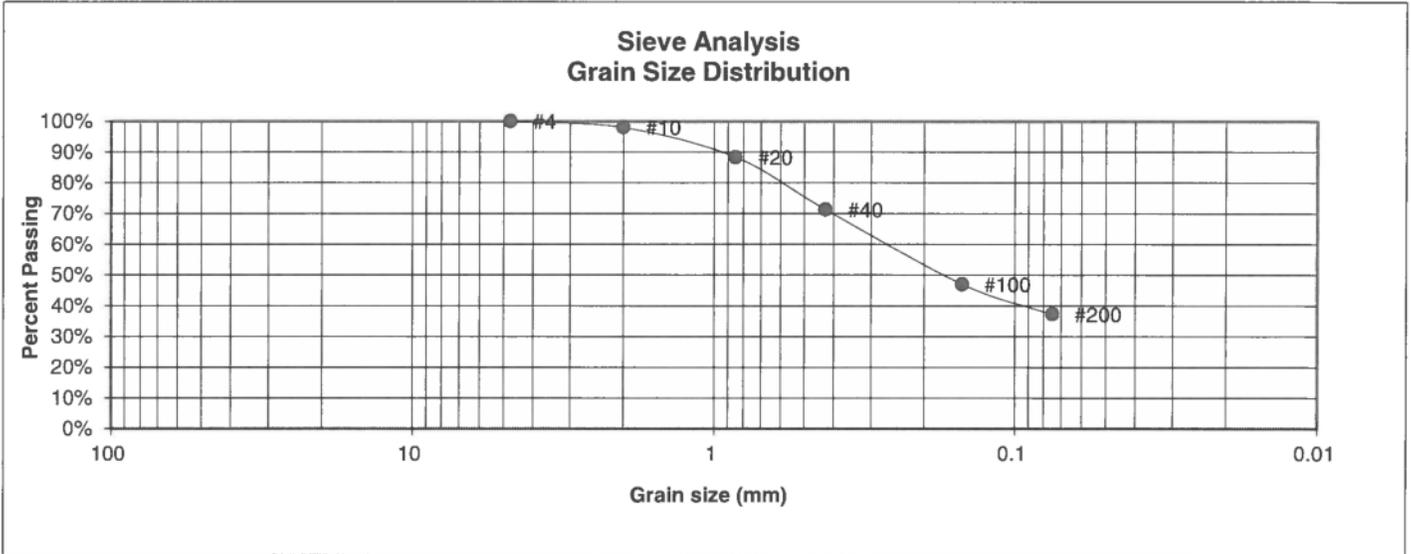
JOB NO.:  
222006

FIG NO.:

B-5

## **APPENDIX C: Laboratory Test Results**

UNIFIED CLASSIFICATION	SM	CLIENT	GUMAN AND ASSOC.
SOIL TYPE #	1	PROJECT	JUDGE ORR AND CURTIS ROAD
TEST BORING #	1	JOB NO.	222006
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.0%
20	88.3%
40	71.3%
100	47.0%
200	37.3%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	21
Plastic Index	4

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**

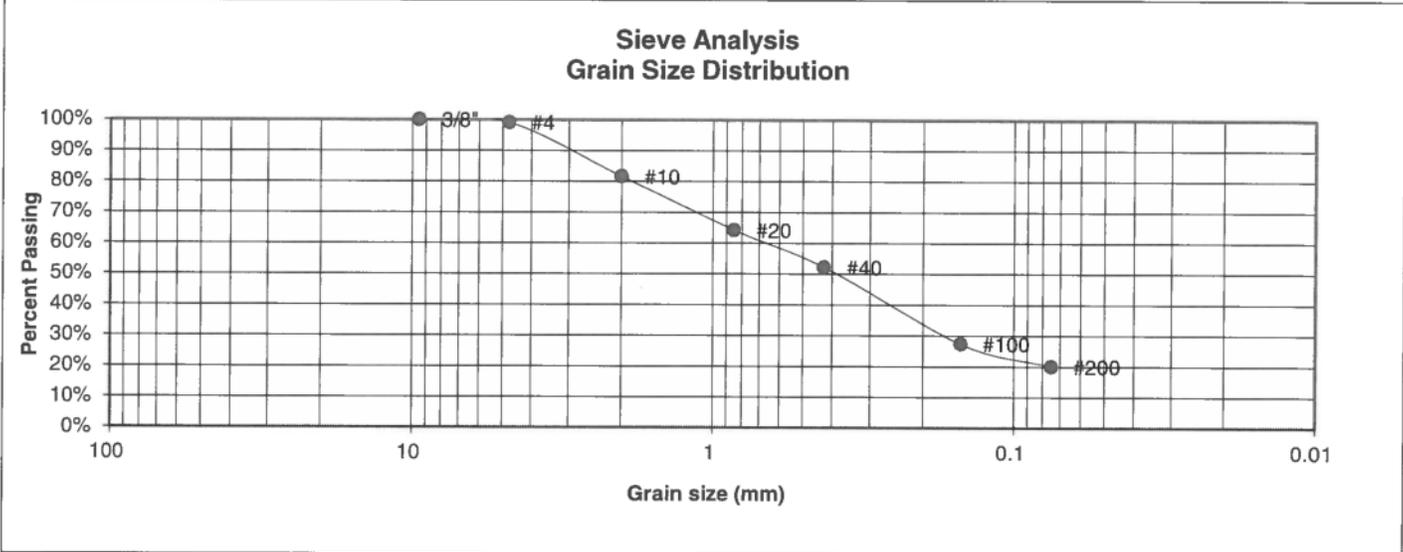
DRAWN:	DATE:	CHECKED:	DATE:
		LLL	11/8/22

JOB NO.:  
222006

FIG NO.:

C-1

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	GUMAN AND ASSOC.
<u>SOIL TYPE #</u>	1	<u>PROJECT</u>	JUDGE ORR AND CURTIS ROAD
<u>TEST BORING #</u>	5	<u>JOB NO.</u>	222006
<u>DEPTH (FT)</u>	5	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.1%
10	81.6%
20	64.2%
40	52.2%
100	27.3%
200	20.0%

Atterberg Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

Swell

Moisture at start	18.1%
Moisture at finish	20.2%
Moisture increase	2.1%
Initial dry density (pcf)	87
Swell (psf)	30



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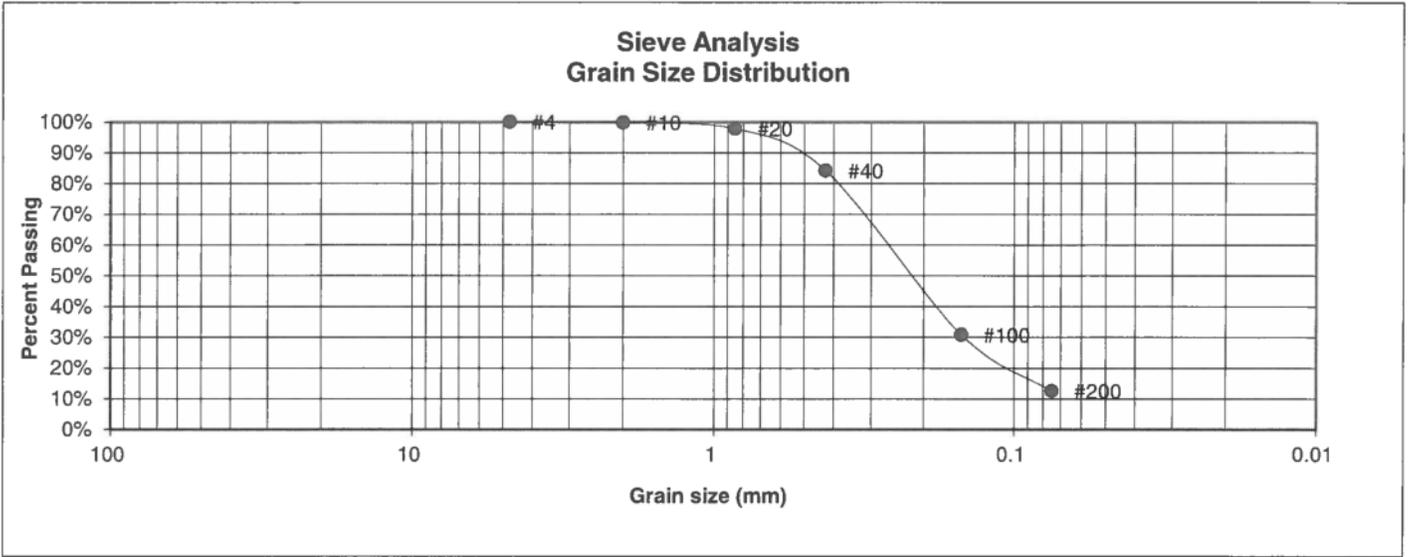
**LABORATORY TEST  
RESULTS**

<u>DRAWN:</u>	<u>DATE:</u>	<u>CHECKED:</u> LLL	<u>DATE:</u> 11/8/22
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JOB NO.:  
222006

FIG NO.:  
C-2

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	GUMAN AND ASSOC.
<u>SOIL TYPE #</u>	1	<u>PROJECT</u>	JUDGE ORR AND CURTIS ROAD
<u>TEST BORING #</u>	6	<u>JOB NO.</u>	222006
<u>DEPTH (FT)</u>	2-3	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.8%
20	97.8%
40	84.2%
100	30.8%
200	12.5%

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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**LABORATORY TEST  
RESULTS**

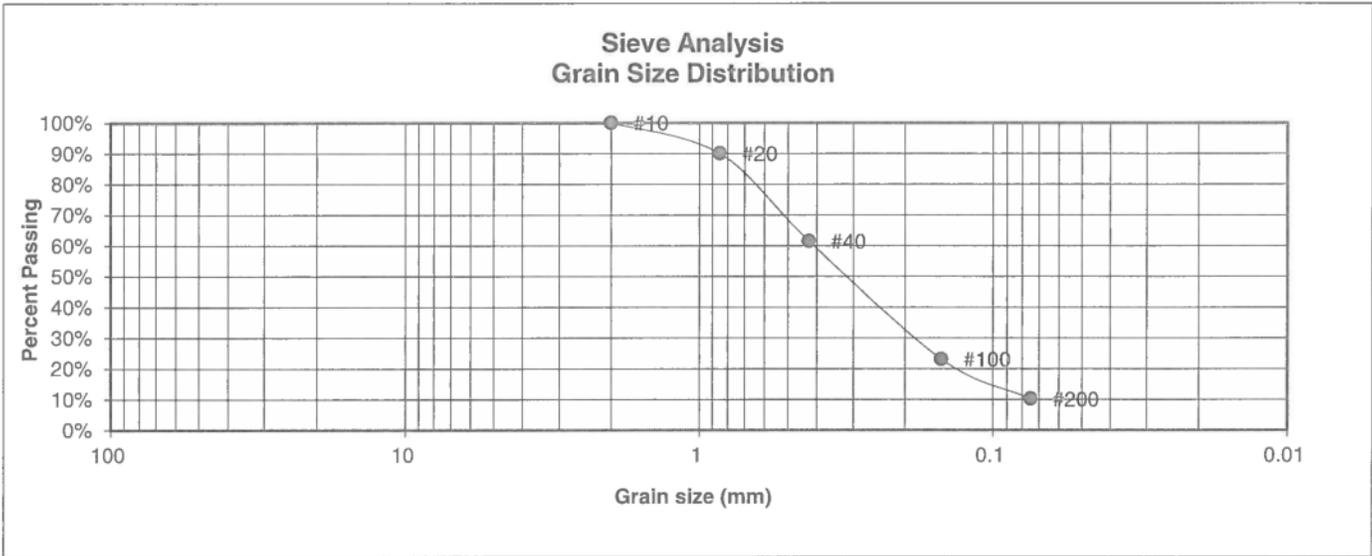
<u>DRAWN:</u>	<u>DATE:</u>	<u>CHECKED:</u>	<u>DATE:</u>
		LLL	11/8/22

JOB NO.:  
222006

FIG NO.:

C-3

BORING NO.	TP-1	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	3	AASHTO CLASSIFICATION		JOB NO.	222006
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	SADDLEHORN, FILING 4				



<u>U.S. Sieve #</u>	<u>Percent Finer</u>	<u>Atterberg Limits</u>
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4		<u>Swell</u>
10	100.0%	Moisture at start
20	90.0%	Moisture at finish
40	61.5%	Moisture increase
100	23.1%	Initial dry density (pcf)
200	10.2%	Swell (psf)



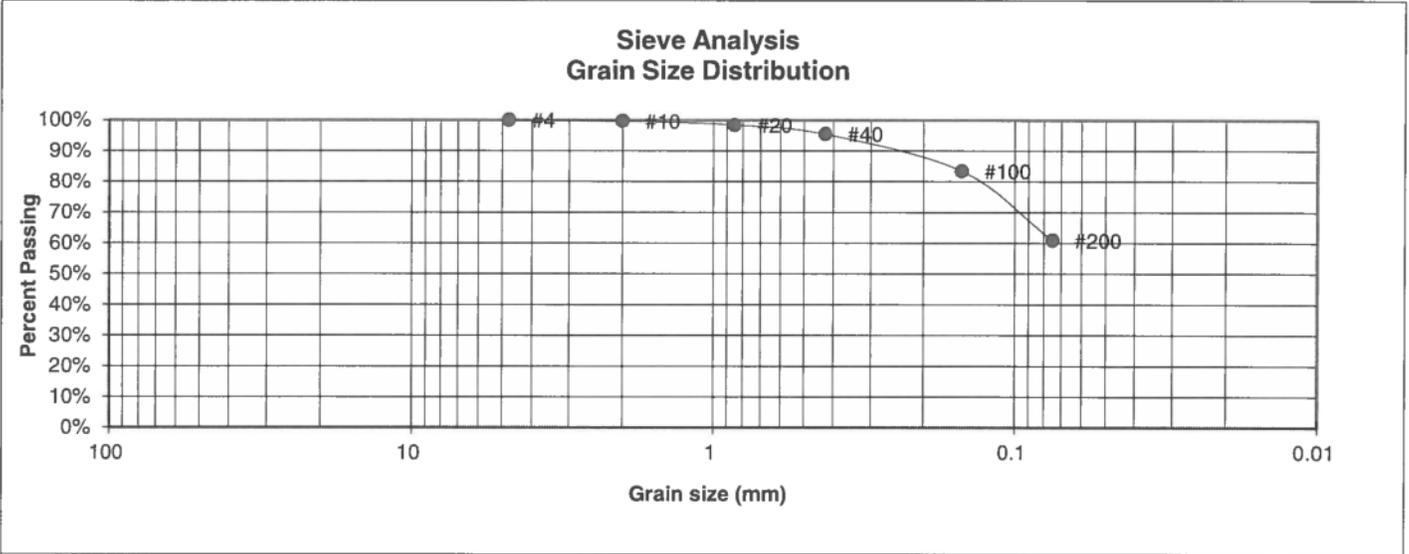
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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: <i>LLL</i>	DATE: <i>11/8/22</i>
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JOB NO.:  
222006  
FIG NO.:  
*C-4*

UNIFIED CLASSIFICATION	ML	CLIENT	GUMAN AND ASSOC.
SOIL TYPE #	2	PROJECT	JUDGE ORR AND CURTIS ROAD
TEST BORING #	7	JOB NO.	222006
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.7%
20	98.4%
40	95.4%
100	83.4%
200	60.9%

**Atterberg Limits**  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

<u>Swell</u>	
Moisture at start	17.6%
Moisture at finish	21.9%
Moisture increase	4.3%
Initial dry density (pcf)	95
Swell (psf)	170



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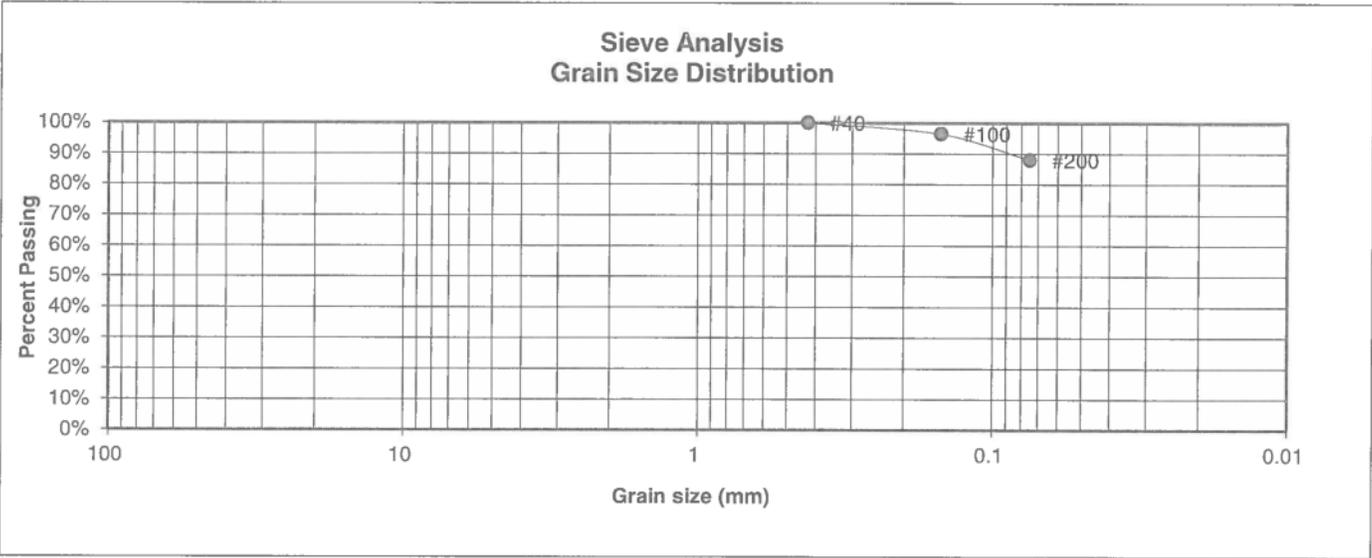
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	11/8/22

JOB NO.:  
222006

FIG NO.:  
C-5

BORING NO.	TP-1	UNIFIED CLASSIFICATION	CL	TEST BY	BL
DEPTH(ft)	4	AASHTO CLASSIFICATION		JOB NO.	222006
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	SADDLEHORN, FILING 4				



U.S. Sieve #	Percent Finer	Atterberg Limits
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4		<u>Swell</u>
10		Moisture at start
20		Moisture at finish
40	100.0%	Moisture increase
100	96.5%	Initial dry density (pcf)
200	88.0%	Swell (psf)



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN:

DATE:

CHECKED:

DATE:

LLL

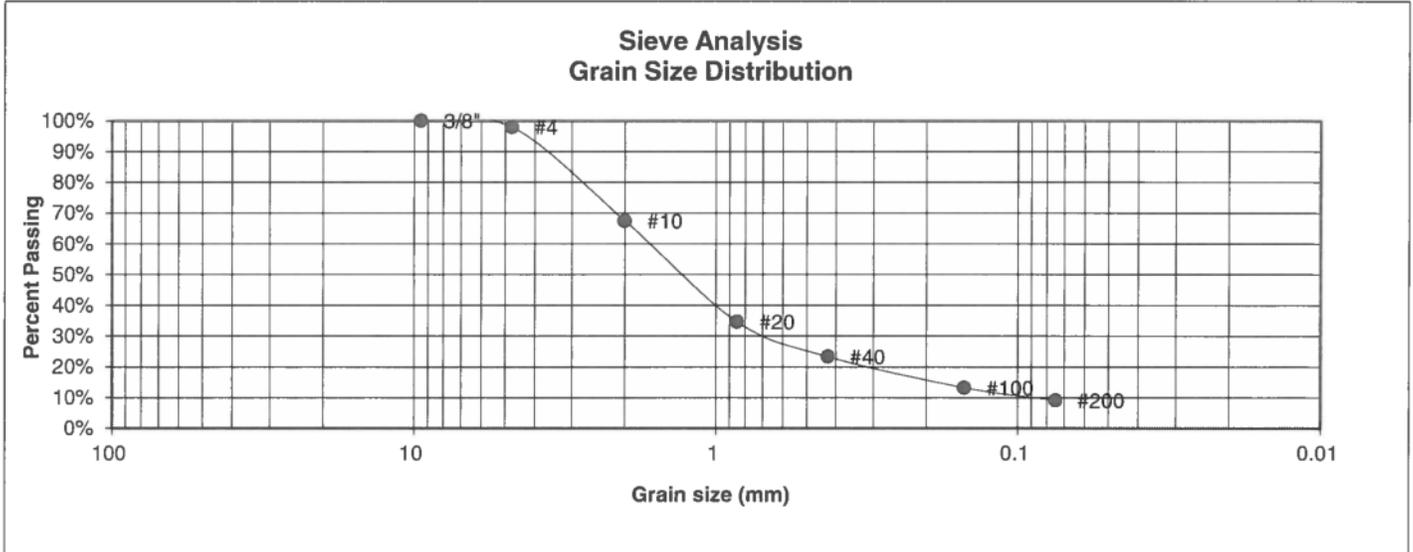
11/8/22

JOB NO.:  
222006

FIG NO.:

C-6

<u>UNIFIED CLASSIFICATION</u>	SM-SW	<u>CLIENT</u>	GUMAN AND ASSOC.
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	JUDGE ORR AND CURTIS ROAD
<u>TEST BORING #</u>	2	<u>JOB NO.</u>	222006
<u>DEPTH (FT)</u>	15	<u>TEST BY</u>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.9%
10	67.5%
20	34.6%
40	23.3%
100	13.2%
200	9.1%

Atterberg Limits	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

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



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COLORADO SPRINGS, COLORADO 80907

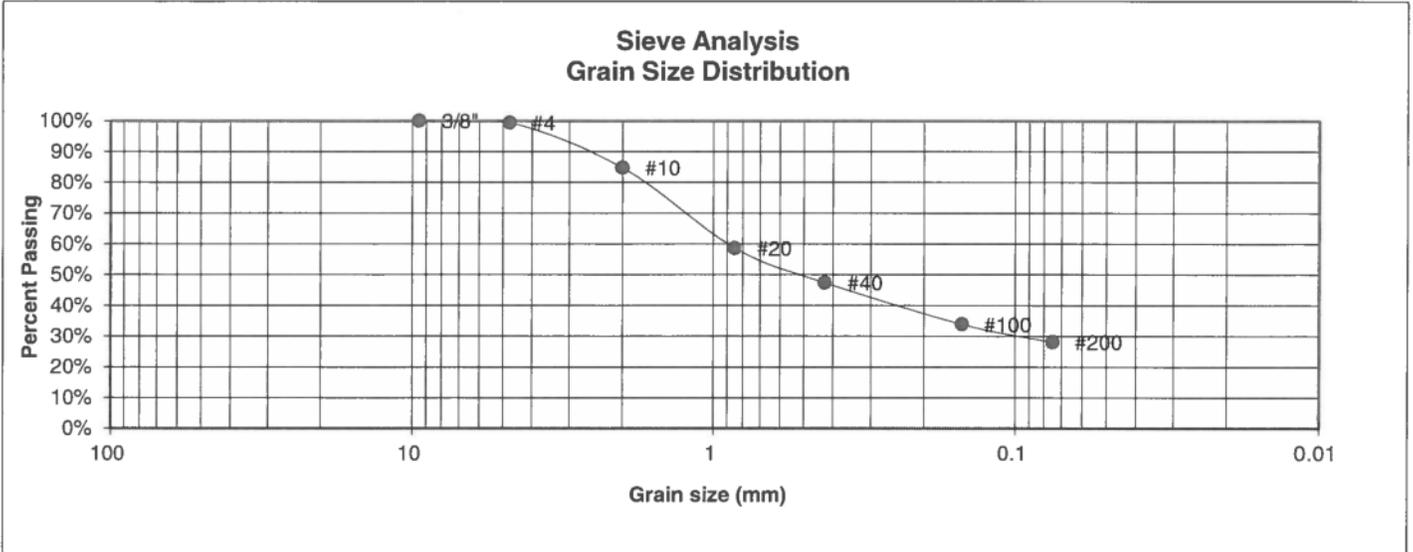
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED: <i>LLL</i>	DATE: <i>11/8/22</i>
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JOB NO.:  
222006

FIG NO.:  
*6-7*

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	GUMAN AND ASSOC.
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	JUDGE ORR AND CURTIS ROAD
<u>TEST BORING #</u>	3	<u>JOB NO.</u>	222006
<u>DEPTH (FT)</u>	15	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.4%
10	84.8%
20	58.6%
40	47.4%
100	33.9%
200	28.1%

Atterberg Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



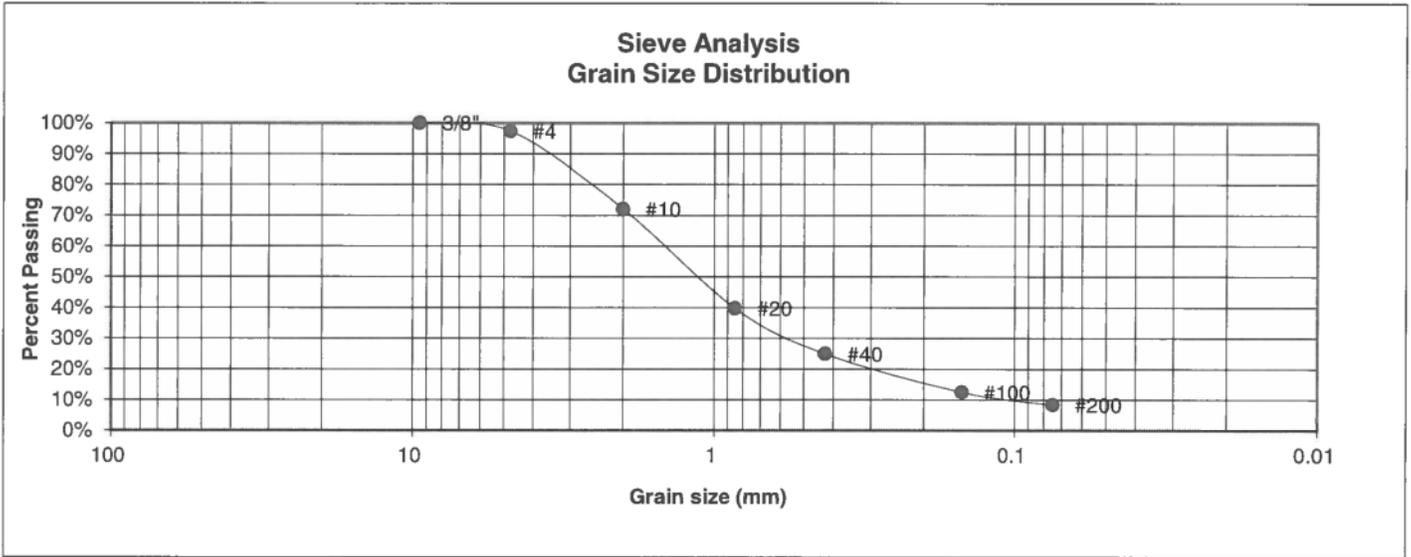
**ENTECH  
ENGINEERING, INC.**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

<u>DRAWN:</u>	<u>DATE:</u>	<u>CHECKED:</u> LL	<u>DATE:</u> 11/8/22
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JOB NO.:  
222006  
  
 FIG NO.:  
C-8

<b>UNIFIED CLASSIFICATION</b>	SM-SW	<b>CLIENT</b>	GUMAN AND ASSOC.
<b>SOIL TYPE #</b>	3	<b>PROJECT</b>	JUDGE ORR AND CURTIS ROAD
<b>TEST BORING #</b>	8	<b>JOB NO.</b>	222006
<b>DEPTH (FT)</b>	10	<b>TEST BY</b>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.4%
10	72.0%
20	39.7%
40	24.9%
100	12.5%
200	8.4%

**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

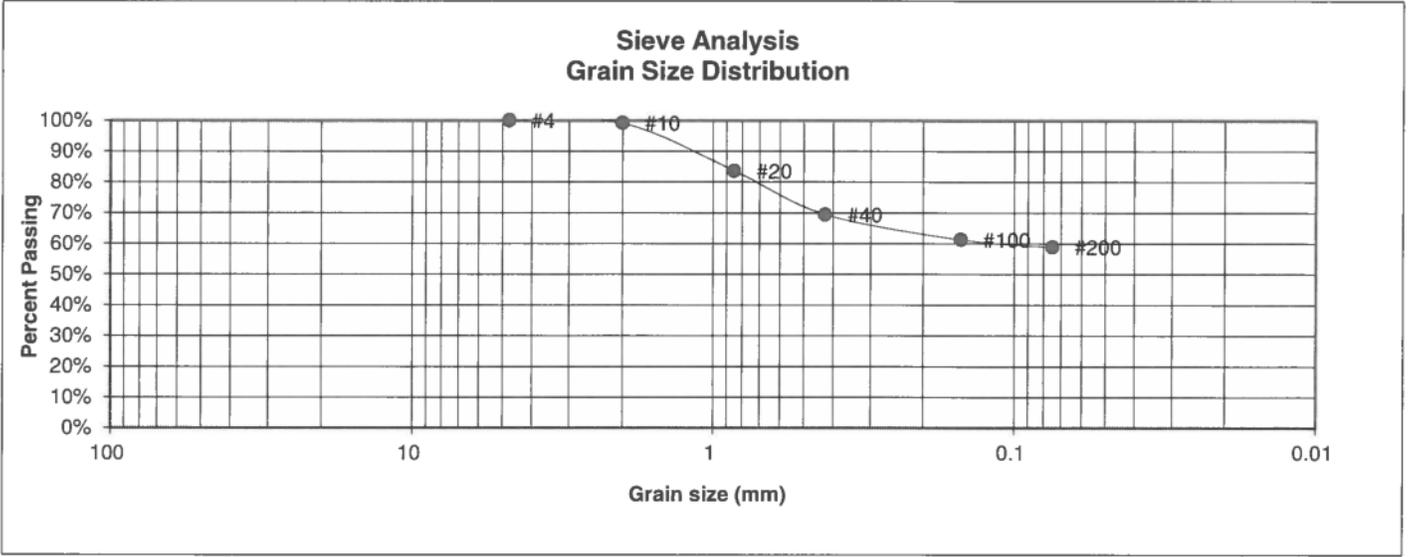
**LABORATORY TEST  
RESULTS**

<b>DRAWN:</b>	<b>DATE:</b>	<b>CHECKED:</b> LLL	<b>DATE:</b> 11/8/22
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JOB NO.:  
222006

FIG NO.:  
C-9

UNIFIED CLASSIFICATION	ML	CLIENT	GUMAN AND ASSOC.
SOIL TYPE #	4	PROJECT	JUDGE ORR AND CURTIS ROAD
TEST BORING #	4	JOB NO.	222006
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	83.7%
40	69.4%
100	61.3%
200	58.9%

Atterberg Limits	
Plastic Limit	36
Liquid Limit	41
Plastic Index	5

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



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**LABORATORY TEST  
RESULTS**

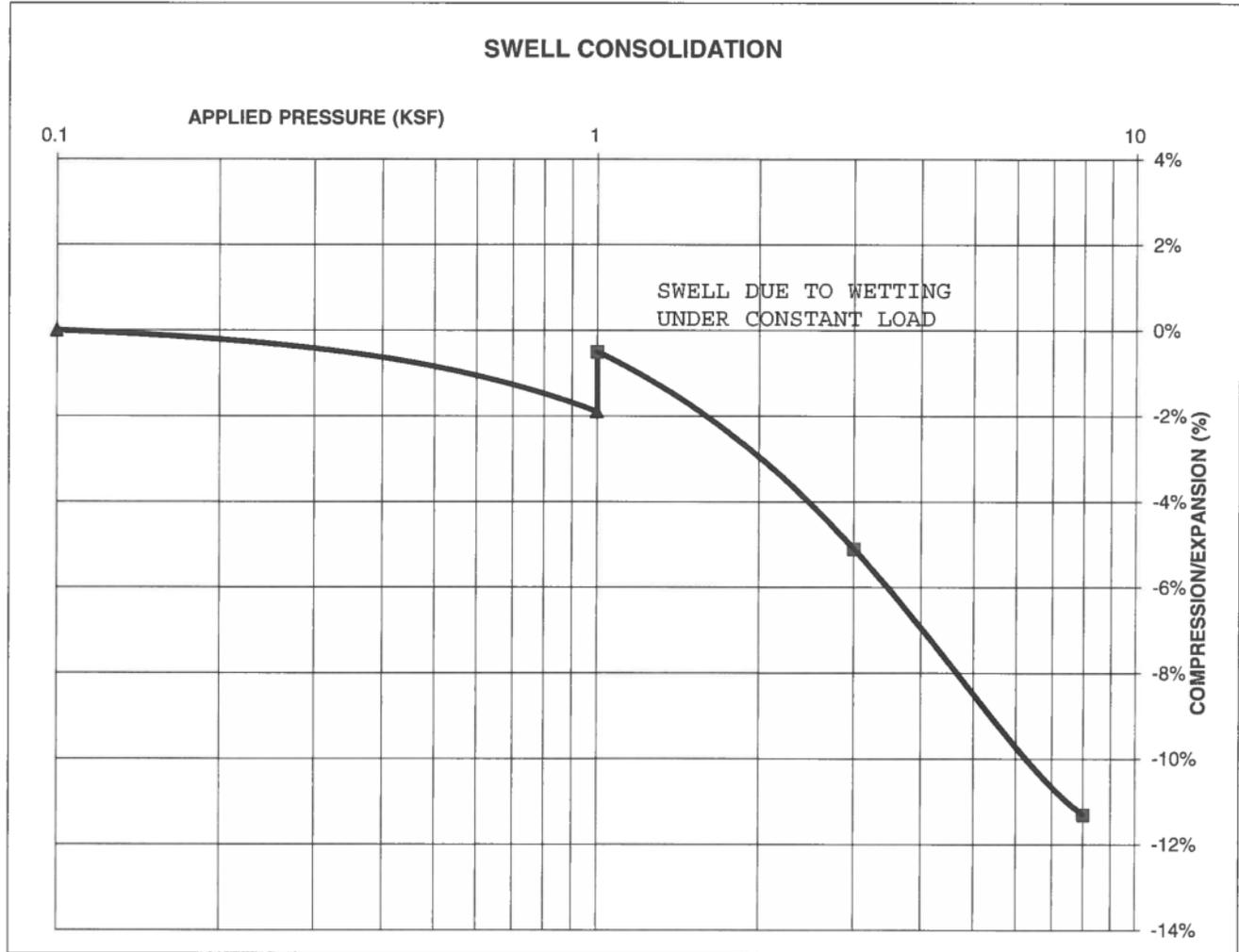
DRAWN:	DATE:	CHECKED: <i>LLL</i>	DATE: <i>11/8/22</i>
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JOB NO.:  
222006  
FIG NO.:  
*C-10*

**CONSOLIDATION TEST RESULTS**

TEST BORING #	4	DEPTH(ft)	20
DESCRIPTION	ML	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			77
NATURAL MOISTURE CONTENT			31.1%
SWELL/CONSOLIDATION (%)			1.4%

JOB NO. 222006  
 CLIENT GUMAN AND ASSOC.  
 PROJECT JUDGE ORR AND CURTIS ROAD



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 COLORADO SPRINGS, COLORADO 80907

**SWELL CONSOLIDATION  
 TEST RESULTS**

DRAWN:

DATE:

CHECKED:  
*LLL*

DATE:

*11/8/22*

JOB NO.:  
 222006

FIG NO.:

*C-11*



**APPENDIX D: Saddlehorn Ranch Subdivision, Test Boring & Test Pit  
Logs, Laboratory Testing Summary, Entech Job No. 181823**

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS FROM TEST BORINGS**

CLIENT WILLIAM GUMAN  
 PROJECT CURTIS AND JUDGE ORR  
 JOB NO. 181823

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	1	2-3			12.0	NV	NP	<0.01			SM	SAND, SILTY
1	2	5			13.8						SM	SAND, SILTY
1	4	2-3			3.2						SW	SAND
3	3	10			12.9	NV	NP	<0.01			SM	SANDSTONE, SILTY
4	4	20	21.4	104.2	52.5	NV	NP	<0.01		0.0	ML	SILTSTONE, VERY SANDY

**TABLE 2**

**SUMMARY OF LABORATORY TEST RESULTS FROM TEST PITS**

CLIENT GUMAN AND ASSOCIATES  
 PROJECT CURTIS RD AND JUGRE ORR RD  
 JOB NO. 181823

SOIL TYPE	TEST PIT 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	2	2-3			7.6						SM-SW	SAND, SLIGHTLY SILTY
1	3	5-6			9.8						SM-SW	SAND, SLIGHTLY SILTY
1	6	4-6			5.5						SM-SW	SAND, SLIGHTLY SILTY
1	9	2-3			26.5	24	9				SC	SAND, CLAYEY
1	11	5-6			10.4						SM-SW	SAND, SLIGHTLY SILTY
1	12	2-3			6.6						SM-SW	SAND, SLIGHTLY SILTY
1	13	5-6			30.3	25	11				SC	SAND, CLAYEY
1	15	2-3			27.5			820			SC	SAND, CLAYEY
1	18	5-6			1.6						SW	SAND
1	21	5-6			23.4						SC	SAND, CLAYEY
1	37	6-7			30.1	19	3	430			SM	SAND, SILTY
1	31	2-3			16.6						SM	SAND, SILTY
1	32	4-5			44.3						SC	SAND, VERY CLAYEY
1	33	2-3			4.3						SW	SAND
1	35	5-6			2.2						SW	SAND
1	36	2-3			8.2						SM-SW	SAND, SLIGHTLY SILTY
1	38	2-3			3.1						SW	SAND
1	39	5-6			12.4						SM	SAND, SILTY
2	1	7-8			70.3	49	31	1360			CL	CLAY, SANDY
2	4	2-3			56.4	26	12				CL	CLAY, VERY SANDY
2	5	7-8			69.6	32	19	880			CL	CLAY, SANDY
2	16	7-8			92.9			4420			CL	CLAY, SANDY
3	8	4-5			44.8	29	13				SC	SANDSTONE, VERY CLAYEY
3	10	5-6			16.6						SM	SANDSTONE, SILTY
3	17	5-6			12.6						SM	SANDSTONE, SILTY
3	34	5-6			16.9						SM	SANDSTONE, SILTY
3	40	5-6			13.9						SM	SANDSTONE, SILTY
4	7	6-7			91.8			2300			CL	CLAYSTONE, SANDY
4	14	4-5			76.1	47	23	3160			CL	CLAYSTONE, SANDY
4	23	5-6			57.0			450			CL	CLAYSTONE, VERY SANDY

TEST BORING NO. 3  
 DATE DRILLED 4/2/2019  
 Job # 181823

TEST BORING NO. 4  
 DATE DRILLED 4/2/2019  
 CLIENT WILLIAM GUMAN  
 LOCATION CURTIS AND JUDGE ORR

REMARKS

WATER @ 12', 4/3/19

6" TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, DENSE TO MEDIUM DENSE, MOIST TO WET

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, WET



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	*		44	7.3	1
5-10	*		41	8.6	1
10-15	*		50 9"	11.8	3
15-20	*		50 8"	11.7	3
20-25	*		50 6"	14.8	3

REMARKS

WATER @ 14', 4/3/19

6" TOPSOIL, SAND, CLEAN TO SILTY, FINE TO COARSE GRAINED, TAN, LOOSE TO DENSE, MOIST

SILTSTONE, VERY SANDY, DARK GRAY, HARD, WET



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	*		7	2.6	1
5-10	*		10	2.3	1
10-15	*		30	4.0	1
15-20	*		32	9.6	1
20-25	*		50 4"	21.3	4



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

4/12/19

JOB NO.:  
 181823

FIG NO.:

B-2

TEST PIT NO. 21  
 DATE EXCAVATED 1/23/2019  
 Job # 181823

TEST PIT NO. 22  
 DATE EXCAVATED 1/4/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1						topsoil sandy loam, brown	1					
sandy loam, fine to medium grained, tan	2			gr	m	2	loamy sand, fine to coarse grained, tan	2			sg		1
loamy sand to sand, fine to coarse grained, tan	3			sg		1		3					
	4							4					
	5							5					
	6						sandy loam, fine to coarse grained, tan	6			gr	w	2A
	7							7					
	8							8					
	9							9					
	10							10					

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:

DATE:

LLL

2/16/14

JOB NO.:

181823

FIG NO.:

B-13

TEST PIT NO. 23  
 DATE EXCAVATED 1/4/2019  
 Job # 181823

TEST PIT NO. 24  
 DATE EXCAVATED 1/23/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy clay loam, brown	1	[Symbol]		gr	w	3A	topsoil sandy loam, brown	1	[Symbol]		gr	w	2A
sandy clay loam, light brown	2	[Symbol]		ma		3A	sandy loam, fine to coarse grained, tan	2	[Symbol]		gr	w	2A
weathered silty sandstone, fine to coarse grained, grayish tan	3	[Symbol]		ma		3A	loamy sand to sand, fine to coarse grained, tan	3	[Symbol]		sg		1
	4	[Symbol]						4	[Symbol]				
weathered sandy claystone, gray brown	5	[Symbol]		ma		4A		5	[Symbol]				
	6	[Symbol]						6	[Symbol]				
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 2/16/19

JOB NO.:  
 181823

FIG NO.:  
 B-14

TEST PIT NO. 27  
 DATE EXCAVATED 1/23/2019  
 Job # 181823

TEST PIT NO. 28  
 DATE EXCAVATED 1/23/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1	[Symbol]		gr	w	2A	topsoil sandy loam, brown	1	[Symbol]		gr	w	2A
sandy loam, fine to coarse grained, light brown	2	[Symbol]					sandy loam, fine to coarse grained, light brown	2	[Symbol]				
loamy sand to sand, fine to coarse grained, tan	3	[Symbol]		sg		1	sand, fine to coarse grained, tan	3	[Symbol]		sg		1
	4	[Symbol]						4	[Symbol]				
	5	[Symbol]					*-groundwater at 6.5'	5	[Symbol]				
	6	[Symbol]						6	[Symbol]				
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 2/16/19

JOB NO.:  
 181823

FIG NO.:  
 B-16

TEST PIT NO. 29  
 DATE EXCAVATED 1/23/2019  
 Job # 181823

TEST PIT NO. 30  
 DATE EXCAVATED 1/23/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1	[Symbol]					topsoil sandy loam, brown	1	[Symbol]				
sandy loam, fine to coarse grained, light brown	2	[Symbol]		gr	w	2A	sandy loam, fine to coarse grained, light brown	2	[Symbol]		gr	w	2A
loamy sand, fine to coarse grained, tan	3	[Symbol]		sg		1	loamy sand, fine to coarse grained, tan	3	[Symbol]		sg		1
	4	[Symbol]					weathered clayey sandstone fine to coarse grained, grayish tan	4	[Symbol]		ma		4A
	5	[Symbol]						5	[Symbol]				
	6	[Symbol]						6	[Symbol]				
	7	[Symbol]					*-signs of seasonally occurring groundwater at 6.5'	7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 2/16/19

JOB NO.:  
 181823

FIG NO.:  
 B-17

TEST PIT NO. 37  
 DATE EXCAVATED 1/4/2019  
 Job # 181823

TEST PIT NO. 38  
 DATE EXCAVATED 1/4/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1	[Symbol]					topsoil sandy loam, brown	1	[Symbol]				
loamy sand, fine to coarse grained, tan	2	[Symbol]		sg		1	sandy loam, fine to coarse grained, tan	2	[Symbol]		gr	w	2A
	3	[Symbol]					loamy sand, fine to coarse grained, tan	3	[Symbol]		sg		1
	4	[Symbol]						4	[Symbol]				
	5	[Symbol]						5	[Symbol]				
sandy clay loam, gray	6	[Symbol]		gr	w	3A	sandy loam, fine to coarse grained, orangish tan	6	[Symbol]		gr	w	2A
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]					*signs of seasonal occuring groundwater at 6.5'	8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 2/16/19

JOB NO.:

181823

FIG NO.:

13-21

TEST PIT NO. 39  
 DATE EXCAVATED 1/4/2019  
 Job # 181823

TEST PIT NO. 40  
 DATE EXCAVATED 1/4/2019  
 CLIENT GUMAN AND ASSOCIATES, LTD  
 LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1						topsoil sandy loam, brown	1					
loamy sand, fine to coarse grained, tan	2			sg		1	sandy loam, fine to coarse grained, tan	2			gr	w	2A
	3						weathered to formational clayey sandstone, tan to orangish tan	3			ma		4A
sandy loam, fine to coarse grained, tan	5			gr	w	2A	*-signs of seasonal occuring groundwater at 3.5'	5					
	6							6					
	7							7					
	8							8					
	9							9					
	10							10					

Soil Structure Shape  
 granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade  
 weak - w  
 moderate - m  
 strong - s  
 loose - l



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**TEST PIT LOG**

DRAWN:

DATE:

CHECKED:  
 LLL

DATE:  
 2/16/19

JOB NO.:  
 181823  
 FIG NO.:  
 B-22

## **APPENDIX E: Soil Survey Descriptions**

## El Paso County Area, Colorado

### 8—Blakeland loamy sand, 1 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369v  
*Elevation:* 4,600 to 5,800 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 46 to 48 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Blakeland and similar soils:* 98 percent  
*Minor components:* 2 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Blakeland

##### Setting

*Landform:* Flats, hills  
*Landform position (three-dimensional):* Side slope, talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

##### Typical profile

*A - 0 to 11 inches:* loamy sand  
*AC - 11 to 27 inches:* loamy sand  
*C - 27 to 60 inches:* sand

##### Properties and qualities

*Slope:* 1 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Somewhat excessively drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 5 percent  
*Available water supply, 0 to 60 inches:* Low (about 4.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R049XB210CO - Sandy Foothill  
*Hydric soil rating:* No

### **Minor Components**

#### **Other soils**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

#### **Pleasant**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

## **Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 20, Sep 2, 2022

## El Paso County Area, Colorado

### 19—Columbine gravelly sandy loam, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 367p  
*Elevation:* 6,500 to 7,300 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 46 to 50 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Columbine and similar soils:* 97 percent  
*Minor components:* 3 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Columbine

##### Setting

*Landform:* Fans, fan terraces, flood plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

##### Typical profile

*A - 0 to 14 inches:* gravelly sandy loam  
*C - 14 to 60 inches:* very gravelly loamy sand

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Runoff class:* Very low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water supply, 0 to 60 inches:* Very low (about 2.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R049XY214CO - Gravelly Foothill  
*Hydric soil rating:* No

#### Minor Components

##### Fluvaquentic haplaquolls

*Percent of map unit:* 1 percent

*Landform: Swales*  
*Hydric soil rating: Yes*

**Other soils**

*Percent of map unit: 1 percent*  
*Hydric soil rating: No*

**Pleasant**

*Percent of map unit: 1 percent*  
*Landform: Depressions*  
*Hydric soil rating: Yes*

## Data Source Information

Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 20, Sep 2, 2022

## El Paso County Area, Colorado

### 29—Fluvaquentic Haplaquolls, nearly level

#### Map Unit Setting

*National map unit symbol:* 3681  
*Elevation:* 5,000 to 7,800 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 46 to 52 degrees F  
*Frost-free period:* 110 to 165 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Fluvaquentic haplaquolls and similar soils:* 98 percent  
*Minor components:* 2 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Fluvaquentic Haplaquolls

##### Setting

*Landform:* Marshes, flood plains, swales  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

##### Typical profile

*A - 0 to 12 inches:* variable  
*C - 12 to 60 inches:* stratified very gravelly sand to loam

##### Properties and qualities

*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Poorly drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 6.00 in/hr)  
*Depth to water table:* About 0 to 24 inches  
*Frequency of flooding:* Frequent  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Moderate (about 6.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 5w  
*Hydrologic Soil Group:* D  
*Ecological site:* R067BY029CO - Sandy Meadow  
*Hydric soil rating:* Yes

### **Minor Components**

#### **Haplaquolls**

*Percent of map unit:* 1 percent

*Landform:* Domes

*Hydric soil rating:* Yes

#### **Other soils**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 20, Sep 2, 2022