February 11, 2021

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

Zonta Partnership
7075 Campus Drive
Colorado Springs, CO 80920

Attn: Doug Barber

Re: Soil, Geology, and Geologic Hazard Study
Terra Benedetta Subdivision
Portions of Parcel No. 62000-00-461
13580 Bridle Bit Road
El Paso County, Colorado

Dear Mr. Barber:

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the NE¼ of Section 10 and the NW¼ of Section 11 Township 11 South, Range 66 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located on the west side of Bridle Bit Road, northeast of Highway 83 and Shoup Road in El Paso County, Colorado. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is gradually to moderately sloping to the west, with the moderate slopes along a ridge in the northern and southern portions of the site. Drainages were not observed on the site; however, minor drainage swales are located along the ridge in the northern portion of the site. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included undeveloped and agricultural. The site contains field grasses, weeds, kinnikinic, scrub oak, and ponderosa pines. An existing water well is located on Lot 2. Site mapping was completed on January 14, 2021. Test Borings were drilled on December 18, 2020.

Total acreage involved in the proposed subdivision is 26.42-acres. Three rural residential lots are proposed as part of the replat. The proposed lot sizes range from 5.28-acres to 11.06-acres. The new lots will be serviced by individual wells and on-site wastewater treatment systems. The Site Plan with the proposed replat is presented in Figure 3.

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 shallow bedrock and minor drainage swales. Based on the proposed development plan, it appears that these areas will have some minor impacts 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.

SCOPE OF THE REPORT

The scope of the report will include the following:

- 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.

FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey 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 January 14, 2021.

Three test borings were drilled on the site to determine general suitability of the soil characteristics for residential construction. The locations of the test borings are indicated on the Site Plan/Test Pit Location Map, Figure 3. The Test Boring Logs are presented in Appendix B. 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. Results of the laboratory testing are included in Appendix C.

SOIL AND GEOLOGIC CONDITIONS

Soil Survey

The Natural Resource Conservation Service (NRCS) (Reference 1, Figure 4), previously the Soil Conservation Service (Reference 2) has mapped two soil types on the site. Complete descriptions of the soil types are presented in Appendix D. In general, the soils consist of sandy loam to gravelly loamy sand. The soils are described as follows:

Type	Description
41	Kettle gravelly, loamy sand, 8 – 40% Slopes
71	Pring coarse sandy loam, 3 – 8% Slopes

The soils have been described to have moderate to rapid permeabilities. The soils are described as well suited for use as homesites. Possible hazards with soils erosion are present on the site. The erosion potential can be controlled with vegetation. The soils have been described to have moderate erosion hazards (Reference 2).

Soils

The soils encountered in the test borings and test borings consisted of an upper layer of silty to very clayey sand overlying silty to silty and clayey sandstone. Bedrock was encountered at depths ranging from 1 foot to 13 feet. The upper sands were encountered at medium dense to dense states and dry to moist conditions. The sandstone was encountered at very dense states and moderate moisture conditions. The samples of sand tested had 21 to 46 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing on a sample of the very clayey sand resulted in a liquid limit of 38 and a plastic index of 20, and non-plastic results for the silty sand. FHA Swell Testing on a sample of the very clayey sand resulted in an expansion pressure of 330 psf, indicating a low expansion potential. The sample of sandstone tested had 27 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing on a sample of clayey sandstone resulted in a liquid limit of 34 and a plastic index of 16. Highly expansive claystone and siltstone lenses are commonly interbedded in the Dawson Formation in the area.

Groundwater

Groundwater was not encountered in the test borings which were drilled to depths of 10 to 20 feet. Groundwater is not anticipated to affect shallow foundations on the majority of the site. Fluctuations in groundwater conditions may occur due to variations in rainfall or other factors not readily apparent at this time. Isolated sand layers within the soil profile can carry water in the subsurface. Contractors should be cognizant of the potential for the occurrence of subsurface water features during construction.

Geology

Approximately 8 miles west of the site 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 a large structural feature known as the Denver Basin. Bedrock in the area is typically gently dipping in a northeasterly direction (Reference 3). The bedrock underlying the site consists of the Dawson Formation of Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers claystone or siltstone.

The geology of the site was evaluated using the *Geologic Map of the Monument Quadrangle,* by Thorson in 2003, (Reference 4, Figure 5). The Geology Map for the site is presented in Figure 6. Two mappable units were identified on this site which is described as follows:

Qas_1 **Younger Alluvial-Slope Deposits of Holocene to Late Pleistocene Age:** These are sheetwash and fluvial deposited sands that exists in the northern portions of the site. These materials typically consist of silty to clayey sands.

Qc/Tkd **Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age:** The materials consist of colluvial or residual soils overlying the bedrock materials on-site. The colluvial soils were deposited by the action of sheetwash and gravity. The residual soils were derived from the in-situ weathering of the bedrock on site. These materials typically consist of silty to clayey sand with potential areas of sandy clays. The bedrock consists of the Dawson Formation. The Dawson Formation typically consists of coarse-grained, arkosic sandstone with interbedded lenses of fine-grained sandstone, siltstone and claystone.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Monument Quadrangle* distributed by the Colorado Geologic Survey in 2003 (Reference 4, Figure 5), The *Geologic Map of the Colorado Springs-Castle Rock Area,* distributed by the US Geological Survey in 1979 (Reference 5), and the *Geologic Map of the Denver 1° x 2° Quadrangle,* distributed by the US Geological Survey in 1981 (Reference 6). The test pits were used in evaluating the site and are included in Appendix A. The Geology Map prepared for the site is presented in Figure 6.

ENGINEERING GEOLOGIC HAZARDS

Mapping has been performed on this site to identify areas where various geologic conditions exist of which developers should be cognizant during the planning, design and construction stages where new construction is proposed. The engineering geologic hazards identified on this site include potentially seasonal shallow groundwater areas. These hazards and recommended mitigation techniques are discussed as follows:

Expansive Soils

Expansive soils were not encountered on the site. However, highly expansive claystone and siltstone are commonly interbedded in the sandstone of the Dawson Formation. Expansive soils or bedrock, if encountered beneath foundations, can cause differential movement in the structure foundation.

Mitigation: Should expansive soils be encountered beneath the foundation; mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements.

Floodplain Drainage Areas

Several minor drainage swales exist on the site along the ridges in the northern and southern portions of the site. No water was observed flowing in the drainage swales at the time of the investigation, however, these areas have the potential for seasonal shallow groundwater. Due to the size of the proposed lots these areas can either be avoided or redirected around proposed structures or proposed soil treatment areas. The site does not lie within any floodplain zones

according to the FEMA Map No. 08041CO295G dated December 7, 2018 (Figure 7, Reference 7). Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

RELEVANCE OF GEOLOGIC CONDITIONS TO LAND USE PLANNING

The proposed development will be rural-residential utilizing individual on-site wastewater treatment systems and water wells. Total acreage involved in the proposed subdivision is 26.42-acres. Three rural residential lots are proposed as part of the replat. The proposed lot sizes range from 5.28-acres to 11.06-acres. The existing geologic and engineering geologic conditions will impose minor constraints on development and construction. The geologic conditions on the site include shallow bedrock, which can be satisfactorily mitigated proper engineering design and construction practices.

The upper granular soils encountered in the test borings on the site were encountered at medium dense to dense states, and the sandstone was encountered at very dense states. Shallow bedrock was encountered in some of the test borings drilled on site. Difficult excavation should be expected in areas of shallow bedrock. Areas containing arkosic sandstone will have high allowable bearing conditions. Highly expansive claystone and siltstone are commonly interbedded in the sandstone of the Dawson Formation in the area. Mitigation of expansive soils, if encountered, will be required. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. These soils will not prohibit development.

In summary, the granular soils will likely provide suitable support for shallow foundations. The geologic conditions encountered on site can be mitigated with avoidance or proper engineering and construction practices.

ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 8), of the area of the site is not mapped with any potential aggregate resources. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 9), the site is not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 10), the area of the site has been mapped as "little or no potential" for industrial minerals.

According to *the Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 10), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "Poor" for coal resources. No active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site (Reference 10).

The site has been mapped as "Fair" for oil and gas resources (Reference 10). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

EROSION CONTROL

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils and weathered bedrock materials become increasingly less susceptible to water erosion. For the typical soils observed on site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

Zonta Partnership
Soils, Geology, and Geologic Hazard Study
Terra Benedetta Subdivision
Portions of Parcel No. 62000-00-461
13580 Bridle Bit Road
El Paso County, Colorado

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 are 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 new 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 Zonta Partnership, 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.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Reviewed by:

COLORADO LICENSED
JOSEPH COLLIN GOODE JR.
23725
2.11.21
PROFESSIONAL ENGINEER

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

Kristen A. Andrew-Hoeser, P.G.
Senior Geologist

LLL

Encl.

Entech Job No. 202824
AAprojects/2020/202824 sg&ghs

BIBLIOGRAPHY

1. Natural Resource Conservation *Service,* September 13, 2019. *Web Soil Survey.* United States Department Agriculture, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

2. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*

3. Bryant, Bruce; McGrew, Laura W; and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado.* Sheet 2. U.S. Geologic Survey. Map I-1163, Sheet 2.

4. Thorson, Jon P. and Madole, Richard F., 2003. *Geologic Map of the Monument Quadrangle, El Paso County, Colorado.* Colorado Geological Survey. Open-File Report 02-40.

5. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado.* USGS, Map I-857-F.

6. Bryant, Bruce; McGrew, Laura W; and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, North-Central Colorado.* Sheet 1. U.S. Geologic Survey. Map I-1163.

7. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado.* Map Number 08041CO295G

8. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps.*

9. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties.* Colorado Geological Survey. Special Publication 5-B.

10. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board.* Colorado Geological Survey. Open-File Report 03-07.

TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

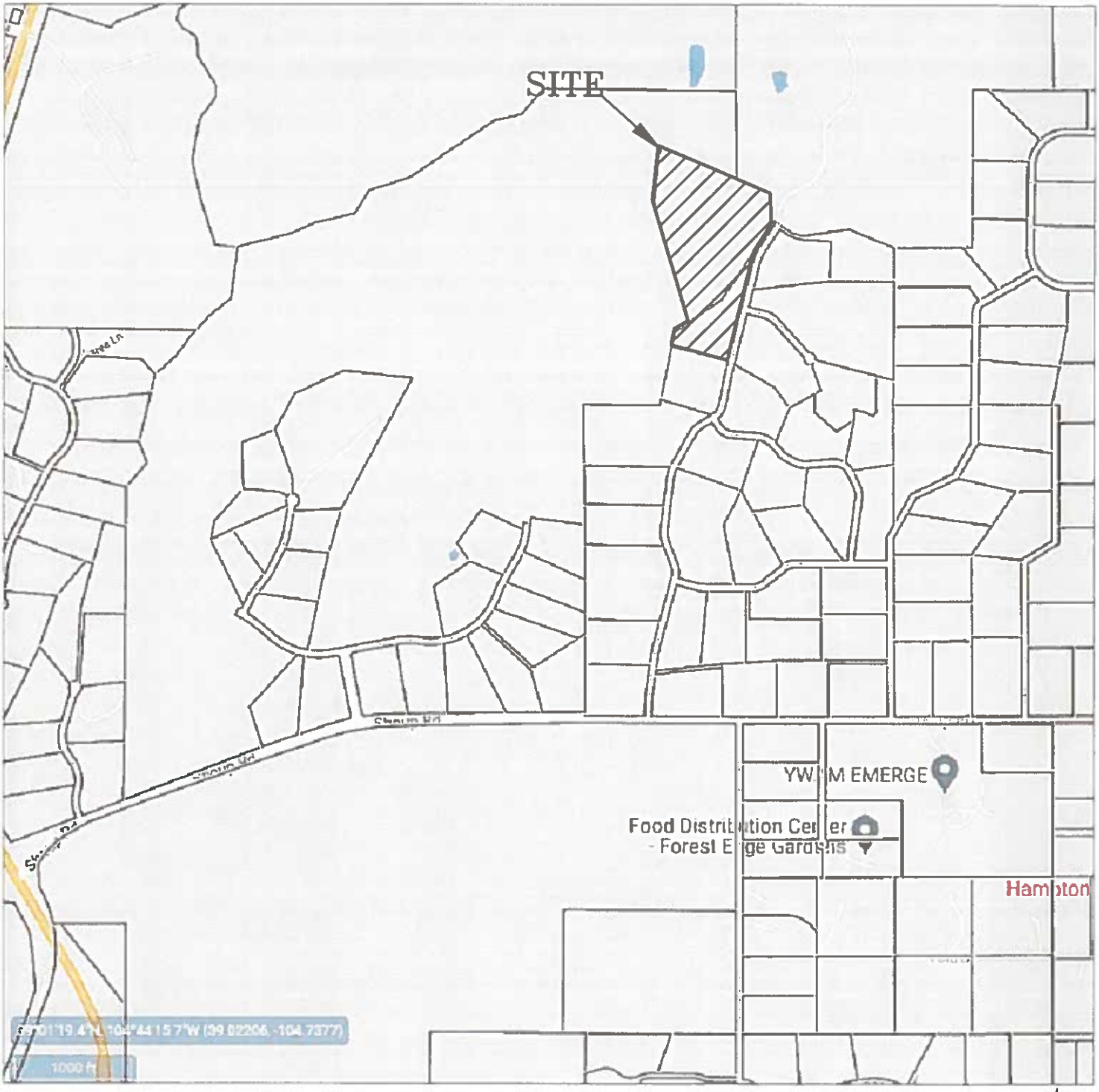
CLIENT ZONTA PARTNERSHIP
PROJECT 13580 BRIDLE BIT ROAD
JOB NO. 202824

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	10			45.6	38	20		330		SC	SAND, VERY CLAYEY
1	2	2-3			20.8	NV	NP				SM	SAND, SILTY
2	3	5			26.7	34	16				SC	SANDSTONE, CLAYEY

Table 2: Summary of Test Boring Results

Test Boring No.	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	13	>20
2	4	>15
3	1	>10

FIGURES



N

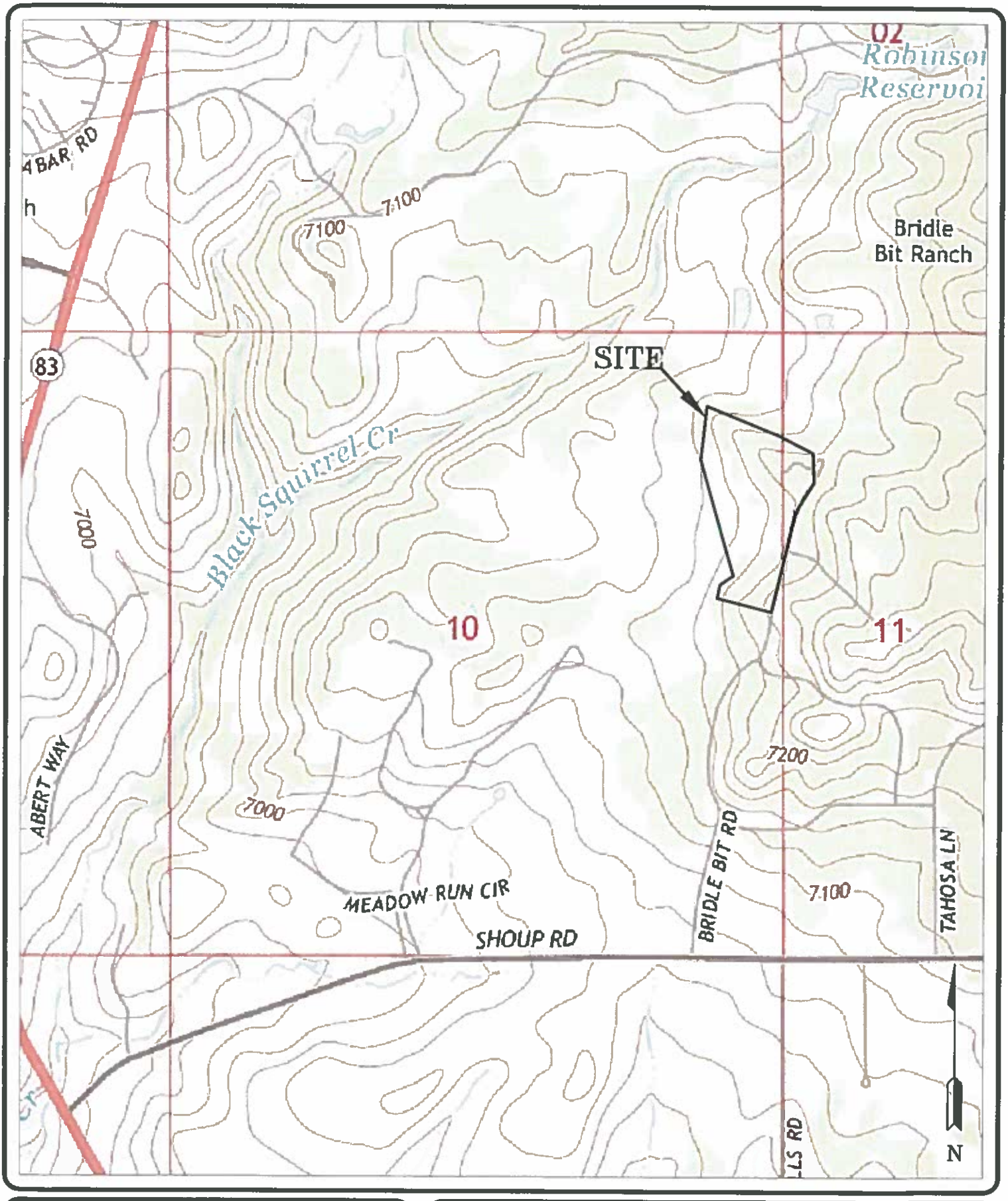
ENTECH ENGINEERING, INC.
595 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 1



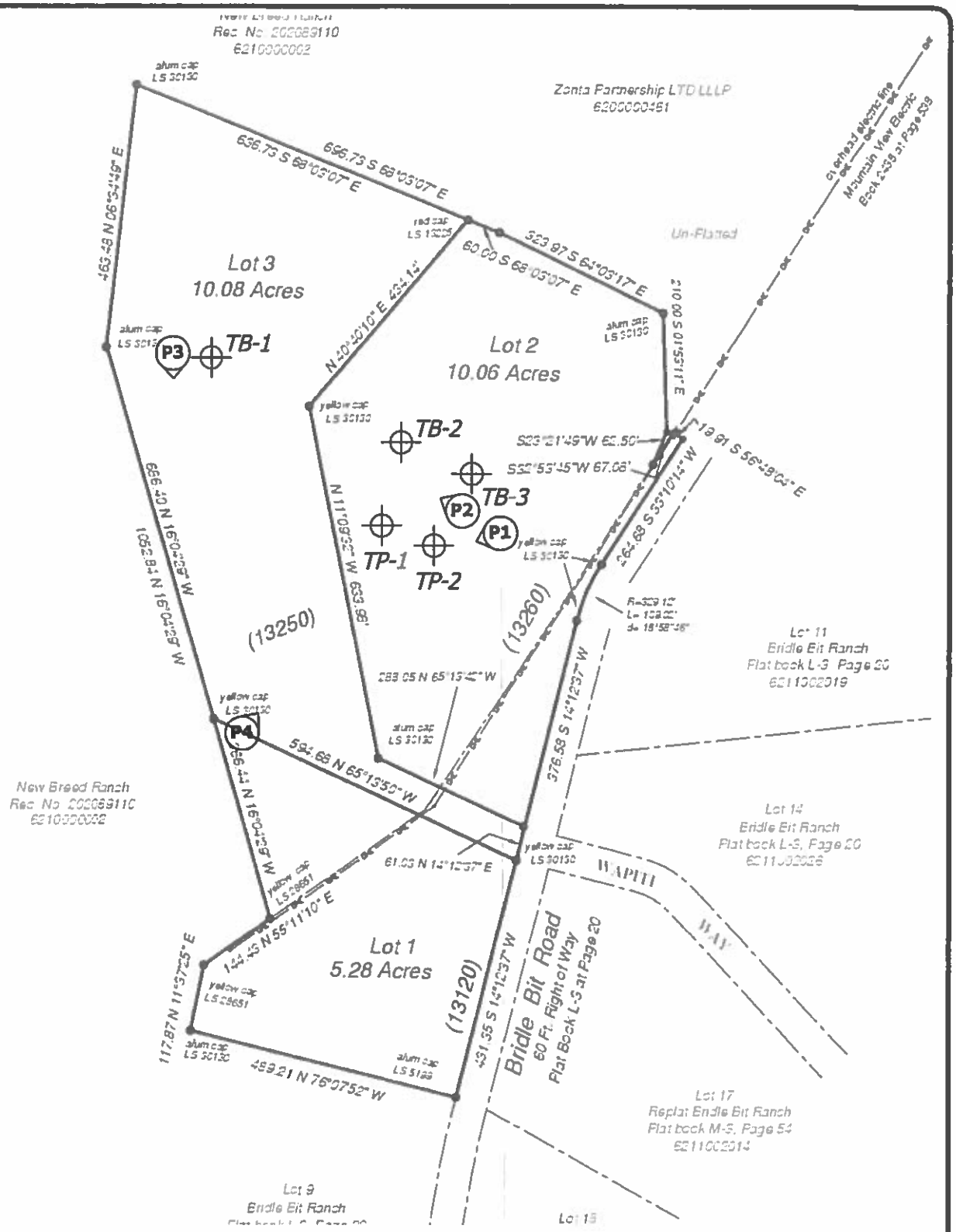
ENTECH
ENGINEERING, INC.
525 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

USGS MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 2



TP- APPROXIMATE TEST PIT LOCATION AND NUMBER

(P2) - APPROXIMATE TEST PIT LOCATION AND NUMBER

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

PROPOSED REPLAT/TESTING LOCATION MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 3

N

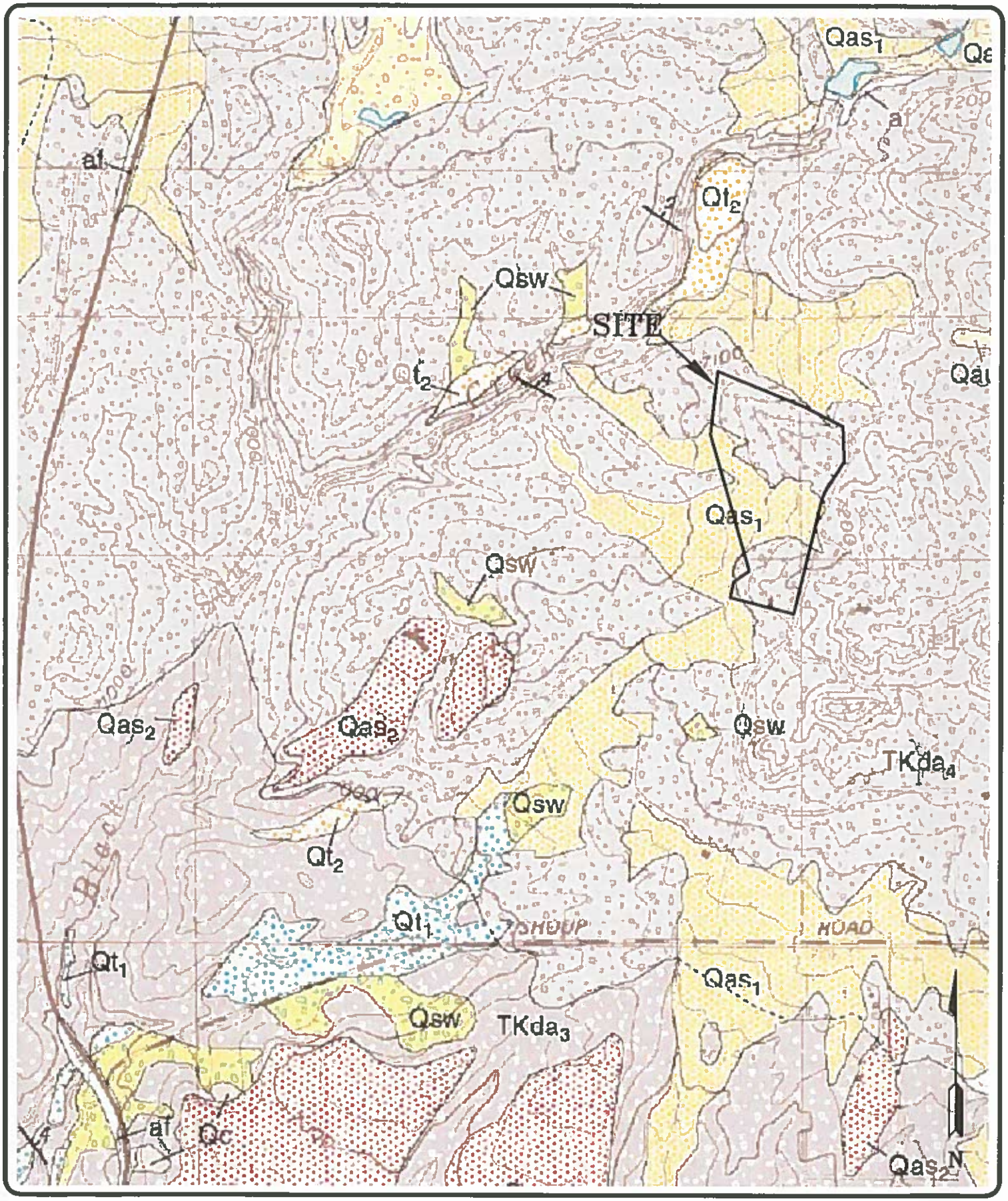
ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 4



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

MONUMENT QUADRANGLE GEOLOGIC MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 5

Legend:

Qas_1 - Younger Alluvial-Slope deposits of Holocene and late Pleistocene Age: sheetwash and stream deposited alluvium

TKd - Dawson Formation of Tertiary to Cretaceous Age: colluvial and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone

N

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

GEOLOGY/ENGINEERING GEOLOGY MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 6

N

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

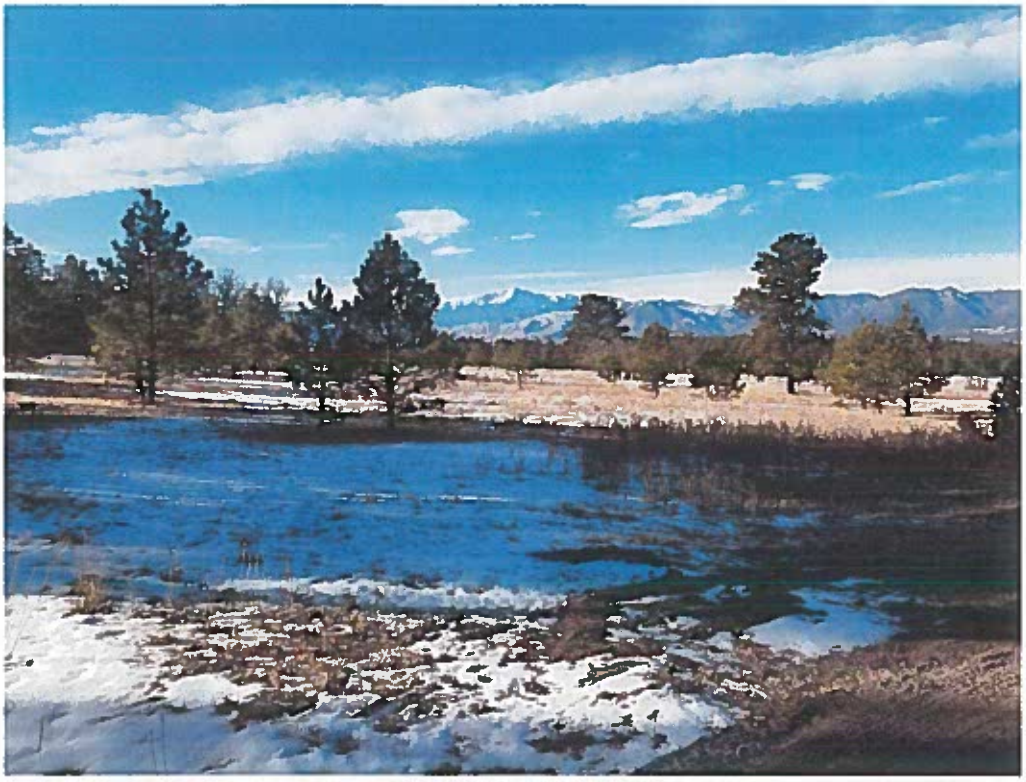
FEMA FLOODPLAIN MAP
TERRA BENEDETTA SUBDIVISION
13580 BRIDLE BIT ROAD
EL PASO COUNTY, CO.
FOR: ZONTA PARTNERSHIP, LTD

DRAWN:	DATE:	CHECKED:	DATE:
LLL	2/2/21		

JOB NO.: 202824

FIG NO.: 7

APPENDIX A: Photographs



1

Looking west from the central portion of the site.

January 14, 2021

2

Looking northwest from the central portion of lot 2.

January 14, 2021

Job No. 202824

3

Looking south from the northwestern portion of the site.

January 14, 2021

4

Looking northeast from the southwestern portion of site.

January 14, 2021

Job No. 202824

APPENDIX B: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 12/18/2020
Job # 202824

REMARKS

GPS COORDINATES:
39.023930° N, -104.758461° W

DRY TO 19', 1/4/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		■	50	2.5	1
5		■	32	7.1	1
10		■	12	21.9	1
15		■	50 / 7"	9.0	2
20		■	50 / 3"	10.5	2

1' TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE TO DENSE, DRY TO MOIST

SAND, VERY CLAYEY, FINE GRAINED, BROWN, MEDIUM DENSE, MOIST

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

TEST BORING NO. 2
DATE DRILLED 12/18/2020
CLIENT ZONTA PARTNERSHIP
LOCATION 13580 BRIDLE BIT ROAD

REMARKS

GPS COORDINATES:
39.023933° N, -104.756973° W

DRY TO 14', 1/4/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		■	*	7.9	1
5		■	50 / 3"	7.8	2
10		■	50 / 6"	7.6	2
15		■	50 / 4"	10.6	2
20					

1' TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, MOIST

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

* - BULK SAMPLE TAKEN

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED: CA	DATE: 1/5/21

JOB NO.: 202824
FIG NO.: B-1

TEST BORING NO. 3
DATE DRILLED 12/18/2020
Job # 202824

REMARKS

GPS COORDINATES:
39.023842° N, -104.757156° W

DRY TO 10', 1/4/21

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50 / 10"	4.5	2
5			50 / 3"	8.9	2
10			50 / 5"	8.0	2
15					
20					

1' TOPSOIL, SAND, SILTY, BROWN
SANDSTONE, SILTY TO CLAYEY,
FINE TO COARSE GRAINED,
BROWN, VERY DENSE, MOIST

TEST BORING NO. 4
DATE DRILLED 12/18/2020
CLIENT ZONTA PARTNERSHIP
LOCATION 13580 BRIDLE BIT ROAD

REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5					
10					
15					
20					

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

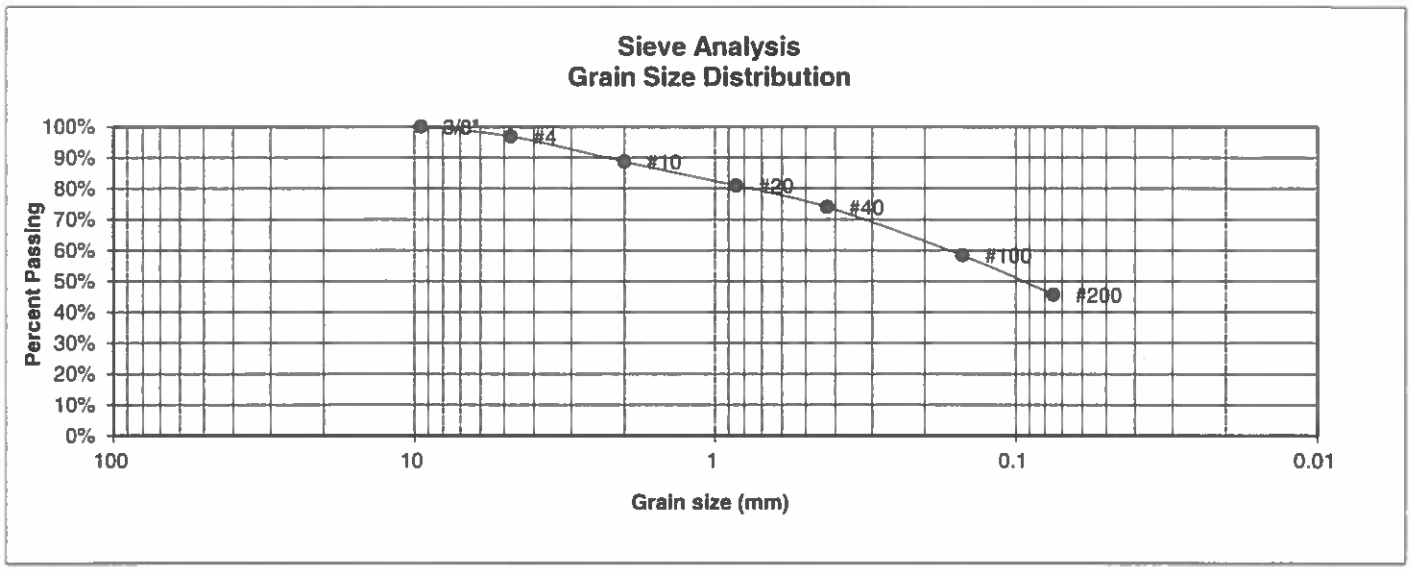
TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			1/5/21

JOB NO.: 202824
FIG NO.: B-2

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION	SC	CLIENT	ZONTA PARTNERSHIP
SOIL TYPE #	1	PROJECT	13580 BRIDLE BIT ROAD
TEST BORING #	1	JOB NO.	202824
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.9%
10	88.7%
20	80.9%
40	74.0%
100	58.4%
200	45.6%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	38
Plastic Index	20

Swell	
Moisture at start	10.4%
Moisture at finish	19.7%
Moisture increase	9.3%
Initial dry density (pcf)	106
Swell (psf)	330

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

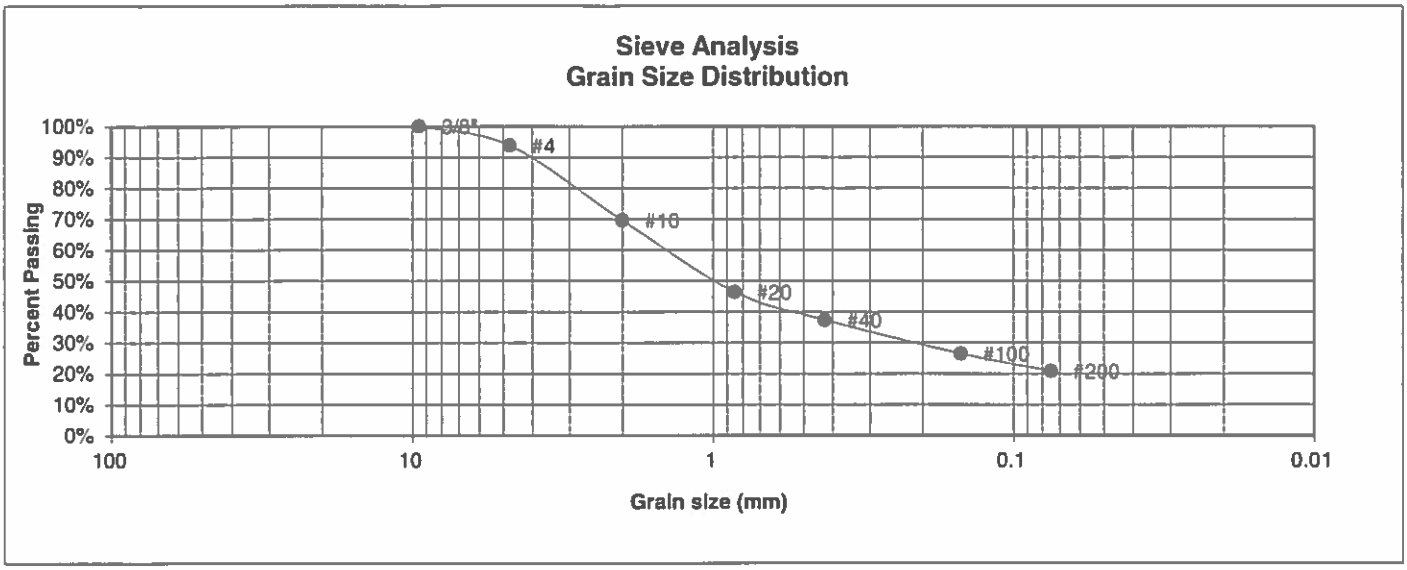
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			1/5/21

JOB NO.: 202824

FIG NO.: L-1

UNIFIED CLASSIFICATION	SM	CLIENT	ZONTA PARTNERSHIP
SOIL TYPE #	1	PROJECT	13580 BRIDLE BIT ROAD
TEST BORING #	2	JOB NO.	202824
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	93.8%
10	69.6%
20	46.4%
40	37.4%
100	26.5%
200	20.8%

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)	

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

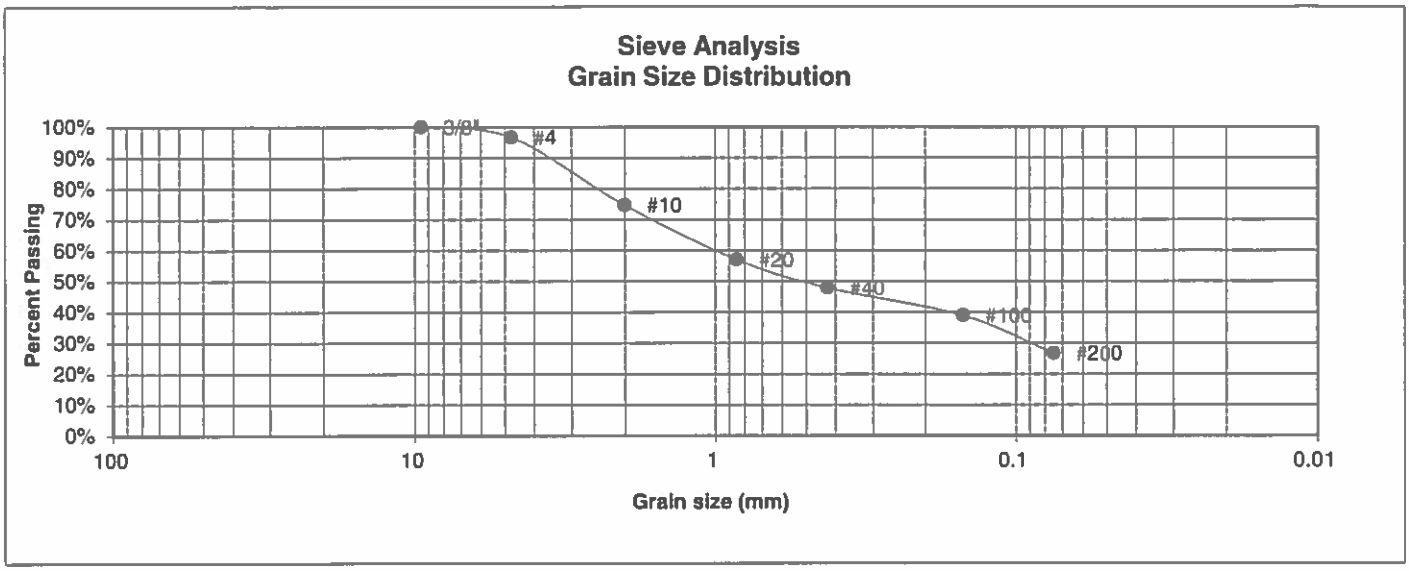
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		h	1/5/21

JOB NO.: 202824

FIG NO.: C-2

UNIFIED CLASSIFICATION	SC	CLIENT	ZONTA PARTNERSHIP
SOIL TYPE #	2	PROJECT	13580 BRIDLE BIT ROAD
TEST BORING #	3	JOB NO.	202824
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.7%
10	74.7%
20	57.0%
40	47.9%
100	39.0%
200	26.7%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	34
Plastic Index	16

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:
			1/5/21

JOB NO.: 202824

FIG NO.: C-3

APPENDIX D: Soil Survey Descriptions

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

41—Kettle gravelly loamy sand, 8 to 40 percent slopes

Map Unit Setting

National map unit symbol: 368h
Elevation: 7,000 to 7,700 feet
Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand
Bt - 16 to 40 inches: gravelly sandy loam
C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020