



**ENTECH**  
ENGINEERING, INC.

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

May 26, 2021  
Revised: February 14, 2022

Sally Bartels  
3647 Tuscanna Gove  
Colorado Springs, CO 80920

Re: OWTS – Wastewater Study  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

Dear Ms. Bartels:

### **GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION**

The site is located in a portion of the SW<sup>1</sup>/<sub>4</sub> of Section 19 Township 12 South, Range 65 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located immediately north of Colorado Springs city limits, north of Old Ranch Road and approximately <sup>3</sup>/<sub>4</sub> mile west of Black Forest 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 south-southeast. A minor drainage swale is located in the northern portion of the property. Water was not observed in the drainages at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included undeveloped and rural residential. The site contains field grasses, weeds, and ponderosa pines. The existing house with a water well and septic system located on proposed Lot 5 will remain. Site photographs taken May 21, 2021, are included in appendix A. Site mapping and test pit excavations were completed on May 21, 2021. Test Borings were drilled on December 22, 2020.

Total acreage involved in the proposed subdivision is 39.09-acres. Six rural residential lots and an open space, Tract A, are proposed as part of the subdivision. The proposed lot sizes range from 5.16-acres to 6.65-acres. The existing house located on Lot 5 will remain. The new lots will be serviced by individual wells and on-site wastewater treatment systems. The Site Plan is presented in Figure 3.

### **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 with regards to on-site wastewater treatment systems (OWTS).

### **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

Sally Bartels  
OWTS – Wastewater Study-Revised  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

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 May 21, 2021.

Three test pits were excavated on the site to determine general suitability for the use of on-site wastewater treatment systems and general soil characteristics for residential construction. Additionally, two test borings were drilled on the site to determine general soil characteristics. The locations of the test pits and test borings are indicated on the Site Plan/Test Pit Location Map, Figure 3. The Test Pit and Test Boring Logs are presented in Appendix A. 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 B.

## **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 three soil types on the site. Complete descriptions of the soil types are presented in Appendix C. In general, the soils consist of sandy loam to gravelly loamy sand. The soils are described as follows:

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

The soils have been described to have 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 pits consisted of sandy clay loam overlying very gravelly sandy loam to sandy loam. Bedrock was encountered at a depth of 4 feet in Test Pit No. 3. The samples of sands tested had approximately 6 to 21 percent of the soil size particles passing the No. 200 sieve.

The soils encountered in the test borings consisted of silty sand overlying silty sandstone. Bedrock was encountered at depths of 3 to 7 feet in the test borings. The upper sands were encountered at dense to very dense states and dry to moist conditions. The sandstone was

Sally Bartels  
OWTS – Wastewater Study-Revised  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

encountered at very dense states and moderate moisture conditions. The samples of sand tested had 16 percent of the soil size particles passing the No. 200 sieve. The samples of sandstone tested had 12 to 31 percent of the soil size particles passing the No. 200 sieve. The silty sand and sandstone typically have low expansion potential. Highly expansive claystone and siltstone lenses are commonly interbedded in the sandstone in the area.

### Groundwater

Groundwater or signs of seasonally occurring water were not encountered in the test pits, which were excavated to depths of 4 to 8 feet. Groundwater was not encountered in the test borings which were drilled to depths of 12 to 20 feet. Groundwater is not anticipated to affect shallow foundations on the majority of the site. An area of potentially seasonal shallow groundwater associated with a drainage area has been mapped in the northern portion of the site. Due to the size of the proposed lots, these areas can either be avoided or redirected around proposed structures or proposed soil treatment areas. 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 10 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 northerly direction (Reference 3). The bedrock underlying the site consists of the Dawson Formation of Tertiary to Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers of claystone or siltstone.

The geology of the site was evaluated using the *Geologic Map of the Falcon NW Quadrangle*, by Madole in 2003, (Reference 4, Figure 5). The Geology Map for the site is presented in Figure 6. One mappable unit was identified on this site which is described as follows:

**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 Falcon NW 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 Pueblo 1° x 2° Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 6). The test borings were used in evaluating the

Sally Bartels  
OWTS – Wastewater Study-Revised  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

### Drainage Areas

A minor drainage swale exists in the northern portion of the site. No water was observed flowing in the drainage at the time of the investigation, however, these areas have the potential for seasonal shallow groundwater. These areas are indicated on the Geology/Engineering Geology Map (Figure 6). 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 anticipated OWTS locations are not affected by these areas. The site does not lie within any floodplain zones according to the FEMA Map No. 08041CO527G dated December 7, 2018 (Figure 7, Reference 7). Exact locations of floodplain and specific drainage studies are beyond the scope of this report. Individual wastewater treatment systems must be located a minimum of 25 feet from dry gulches and 50 feet from water courses or floodplains.

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

The Natural Resource Conservation Service (Reference 1), previously the Soil Conservation Service (Reference 2) has been mapped with three soil descriptions. The Soil Survey Map (Reference 1) is presented in Figure 4, and the Soil Survey Descriptions (Reference 2) are presented in Appendix C. The soils are described as having rapid percolation rates. The existing septic system is located on Lot 5. Observations of the leach area indicated that the system is operating properly. Records for the existing septic system located on Lot 5 are included in Appendix D.

Soils encountered in the tactile test pits consisted of sandy clay loam overlying very gravelly sandy loam to sandy loam. The limiting layers encountered in the test pits are the very gravelly sandy loam, sandy clay loam, and the sandstone, which corresponds with USDA Soil Types R-1 and 3A, with an LTAR values of 0.50 and 0.30 gallons per day per square foot. Formational sandstone was encountered at approximately 4 feet in Test Pit No. 3 (Lot 3). Bedrock was not encountered in Test Pit Nos. 1 and 2 (Lots 2 and 4). However, the soils encountered in Test Pit No. 2 (Lot 4) consisted of residual soils derived from highly weathered sandstone bedrock. Very dense formational sandstone may be encountered near Test Pit No. 2, due to the residually weathered soils encountered in the test pit.

Signs of seasonally occurring groundwater were not observed in the test pits. Absorption fields must be maintained a minimum of 4 feet above groundwater, bedrock, or confining layers. Should groundwater or bedrock be encountered within 6 feet of the surface, designed systems will be required. Designed systems are anticipated on the northern portion of the site. Areas where conventional systems can be utilized may be determined with additional testing. Testing will be required on each lot to determine the site characteristics prior to construction.

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 designed systems are

Sally Bartels  
OWTS – Wastewater Study-Revised  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

anticipated for the majority of the lots, depending on soils encountered. The Septic Suitability Map is presented in Figure 8. Potential house locations, water wells, and two septic sites for the new lots are indicated on Figure 8. 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.

## CLOSURE

This report has been prepared for Sally Bartels, 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  
Geologist



Reviewed by:

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

KAH/jhr

Encl.

Entech Job No. 202498  
AAprojects/2020/202498 wws-rev

Sally Bartels  
OWTS – Wastewater Study-Revised  
Koinonia Ranch  
Parcel No. 52190-00-059  
6170 Old Ranch Road  
El Paso County, Colorado

## 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. Scott, Glen R.; Taylor Richard B.; Epis, Rudy C; and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, South-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022, Sheet 2.
4. Madole, Richard F., 2003. *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-08.
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. Scott, Glen R.; Taylor Richard B.; Epis, Rudy C; and Wobus, Reinhard A. 1978. *Geologic Structure Map of the Pueblo 1° x 2° Quadrangle, South-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022.
7. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO527G

## TABLE

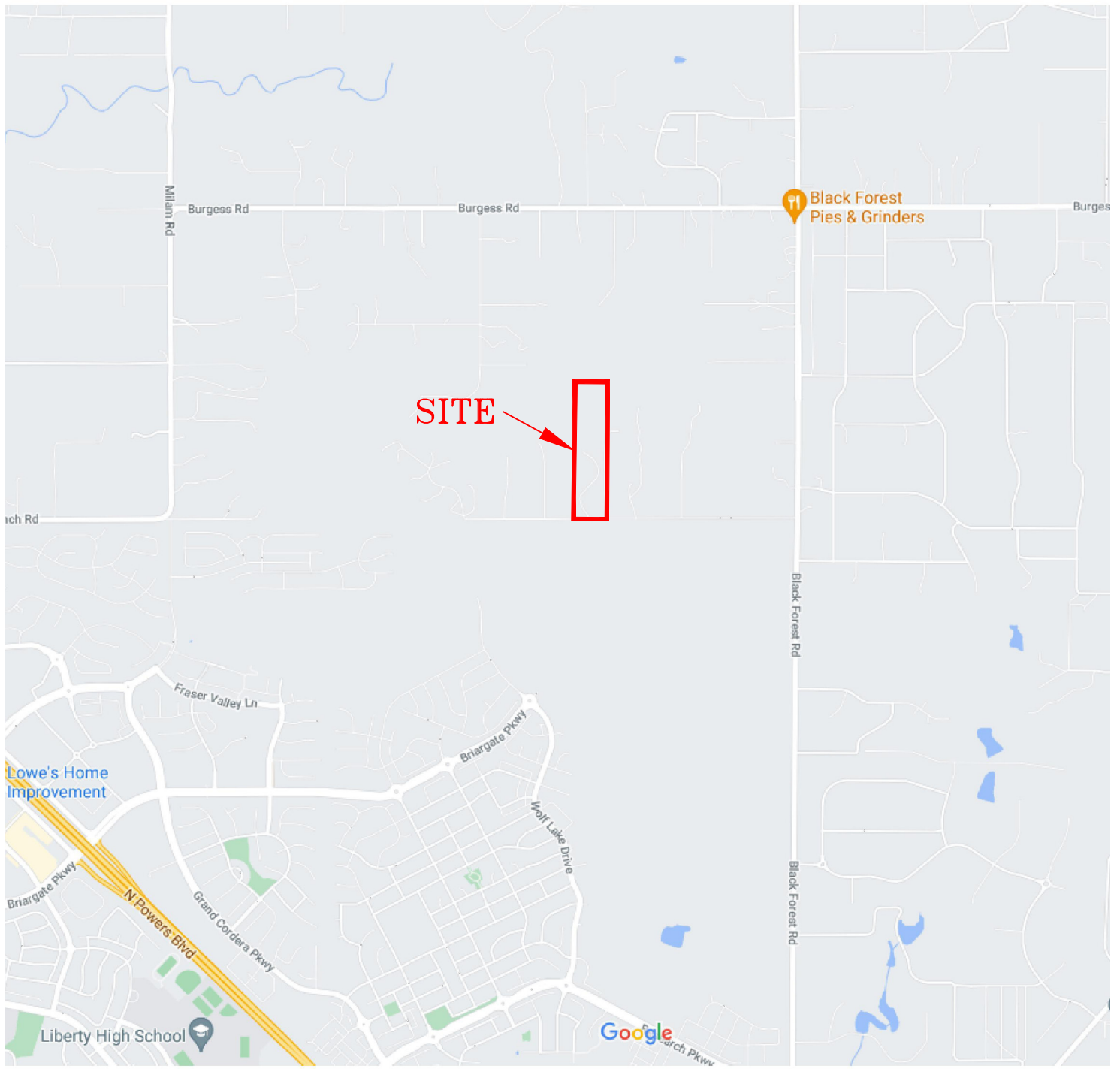
**Table 1: Summary Test Pit Results**

<b>Test Pit No.</b>	<b>Soil Type</b>	<b>USDA Soil Classification</b>	<b>Depth (ft)</b>	<b>Depth to Bedrock (ft.)</b>	<b>Classification of Bedrock</b>
1	Sandy Loam	2	1.5 to 8	N/A	None
2 <sup>1</sup>	Sandy Loam	R-1	3-8	N/A	Residual Soils of Dawson Formation
3 <sup>1</sup>	Sandy Clay Loam	3A	2 to 4	4'	None

Notes: <sup>1</sup> Design System Required



## FIGURES



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

VICINITY MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN:  
JAC

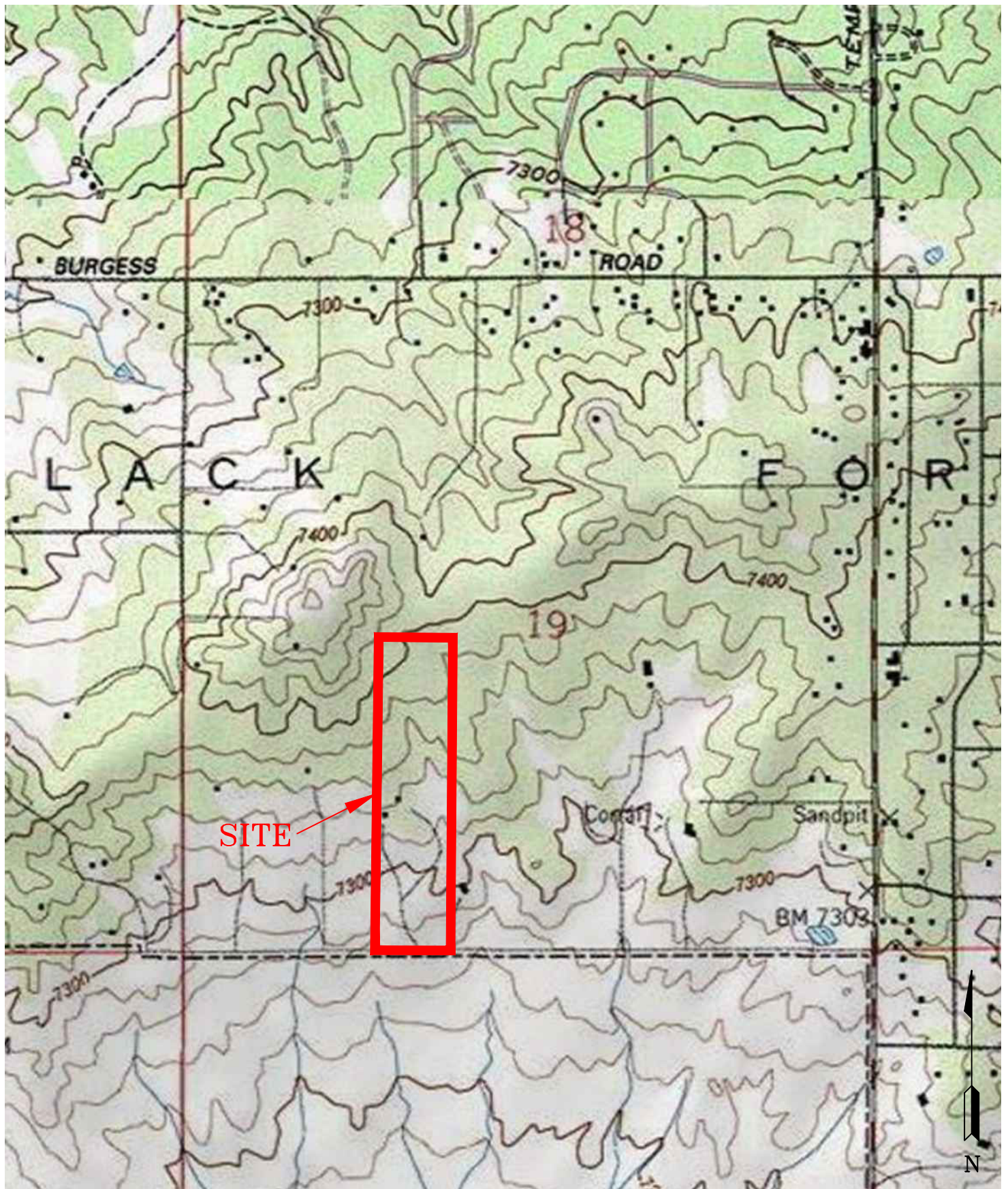
DATE:  
05/24/21

CHECKED:  
KAH

DATE:  
05/24/21

JOB NO.:  
202498

FIG NO.:  
1



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

USGS MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN:  
JAC

DATE:  
05/24/21

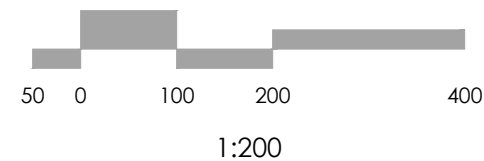
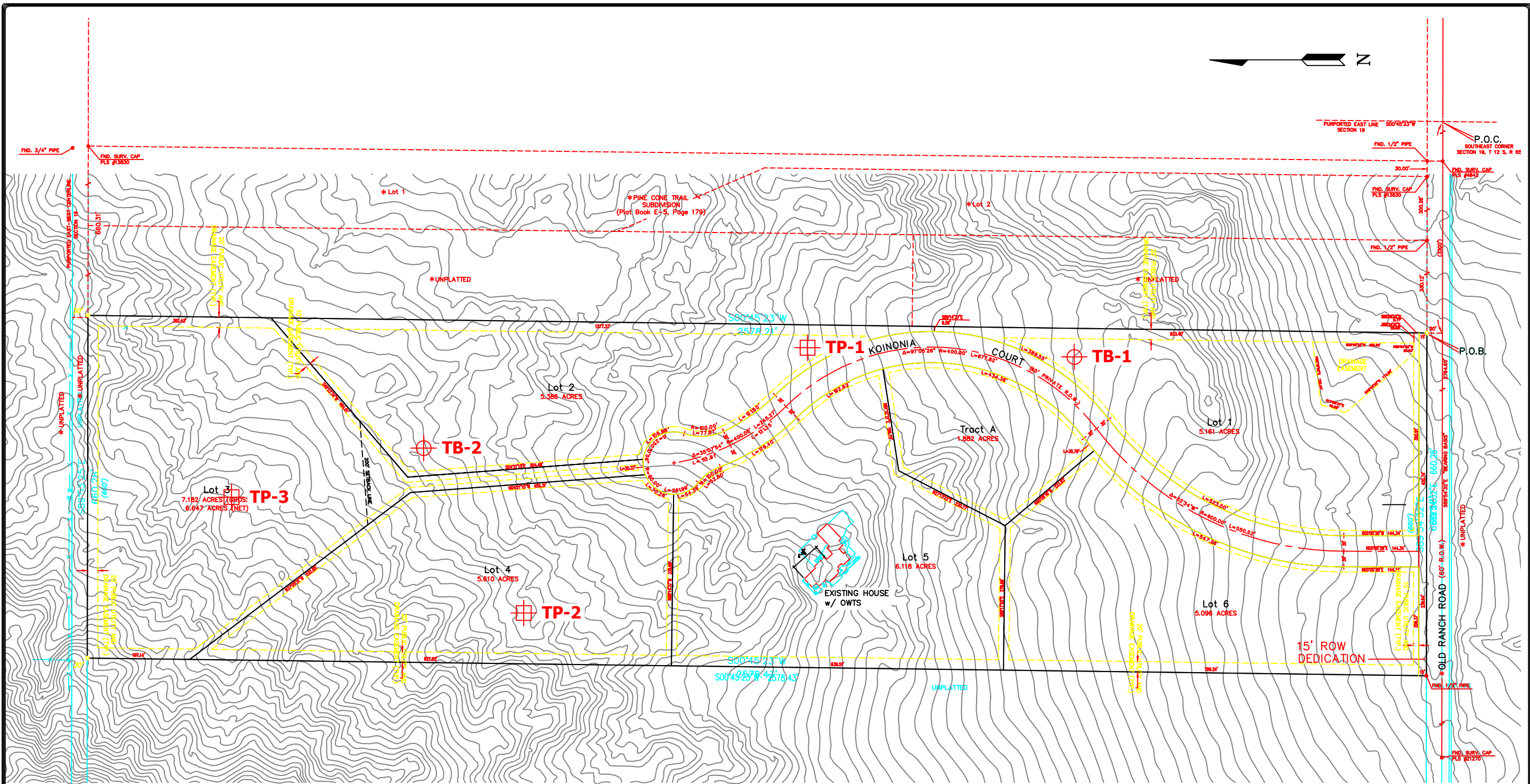
CHECKED:  
KAH

DATE:  
05/24/21

JOB NO.:  
202498

FIG NO.:  
2





- ⊕ TB- APPROXIMATE TEST BORING LOCATIONS AND NUMBERS
- ⊞ TP- APPROXIMATE TEST PIT LOCATIONS AND NUMBERS

REVISION	BY

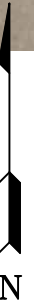
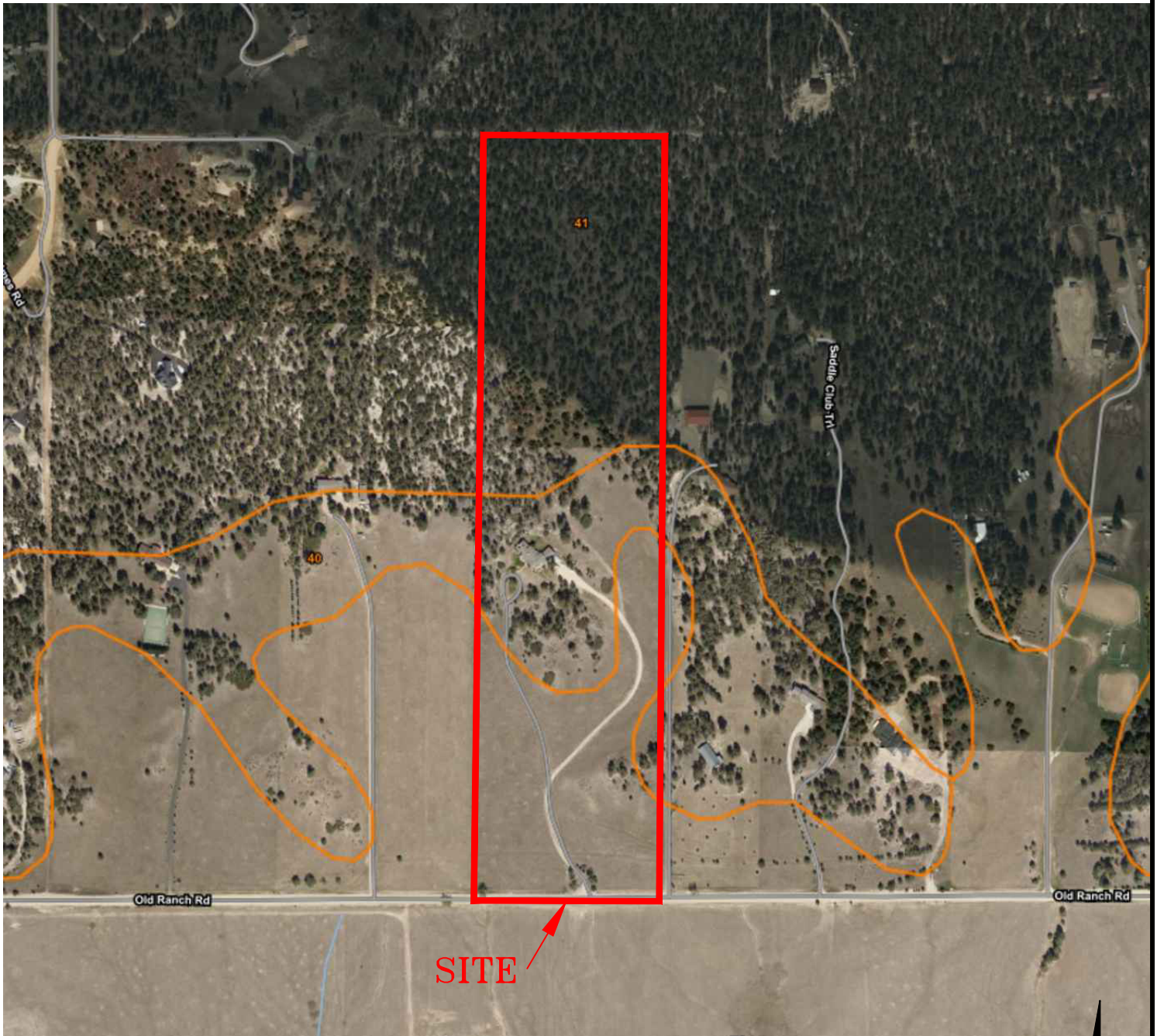
**ENTECH**  
ENGINEERING, INC.

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

SITE PLAN/TEST PIT MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN JAC
CHECKED
DATE 05/24/21
SCALE AS SHOWN
JOB NO. 202498
FIGURE No. 3





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

SOIL SURVEY MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN:  
JAC

DATE:  
05/24/21

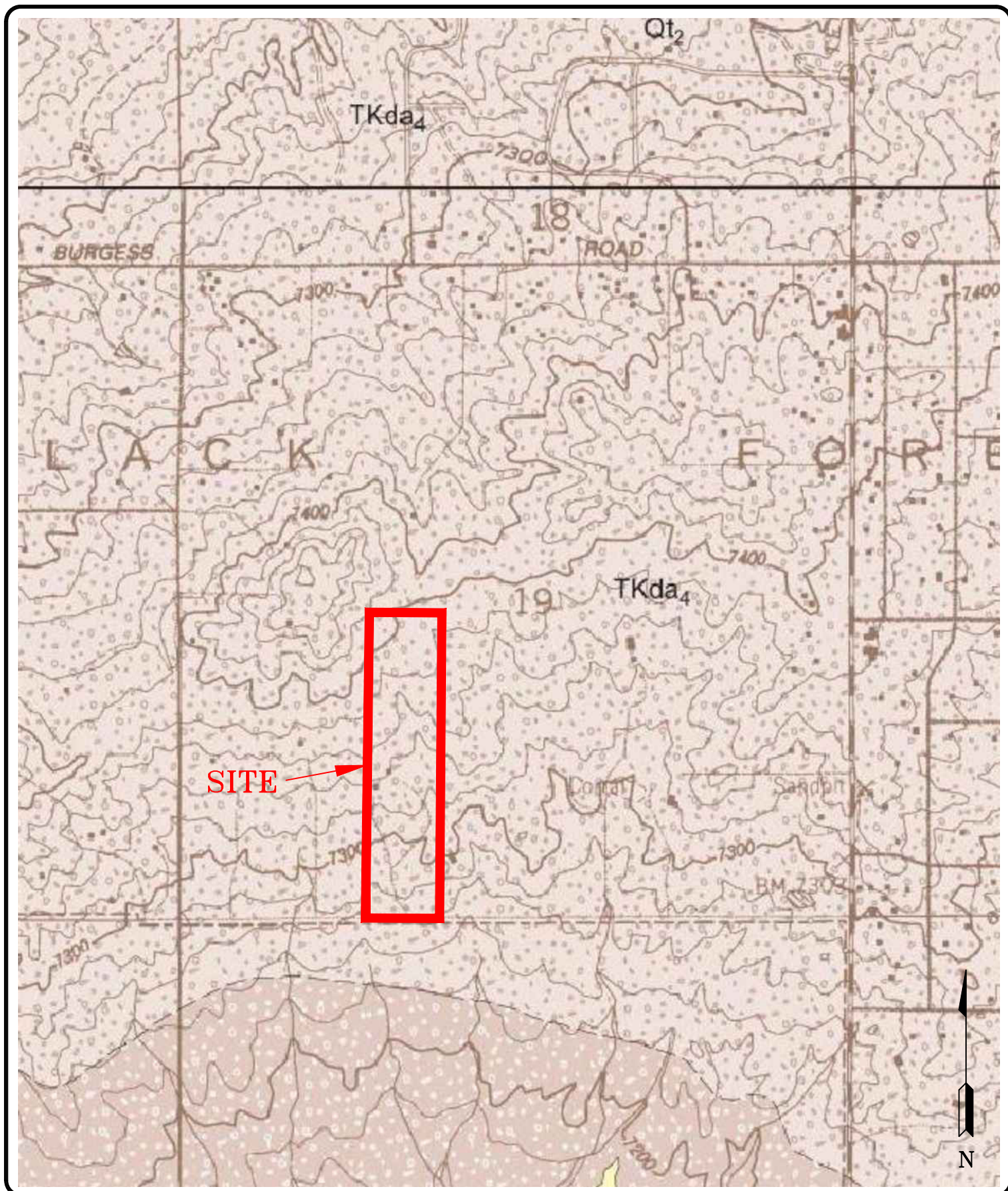
CHECKED:  
KAH

DATE:  
05/24/21

JOB NO.:  
202498

FIG NO.:  
4





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

FALCON NW QUADRANGLE GEOLOGIC MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN:  
JAC

DATE:  
05/24/21

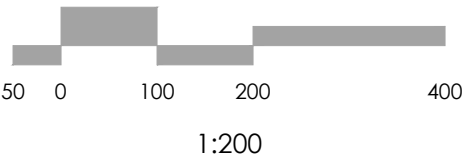
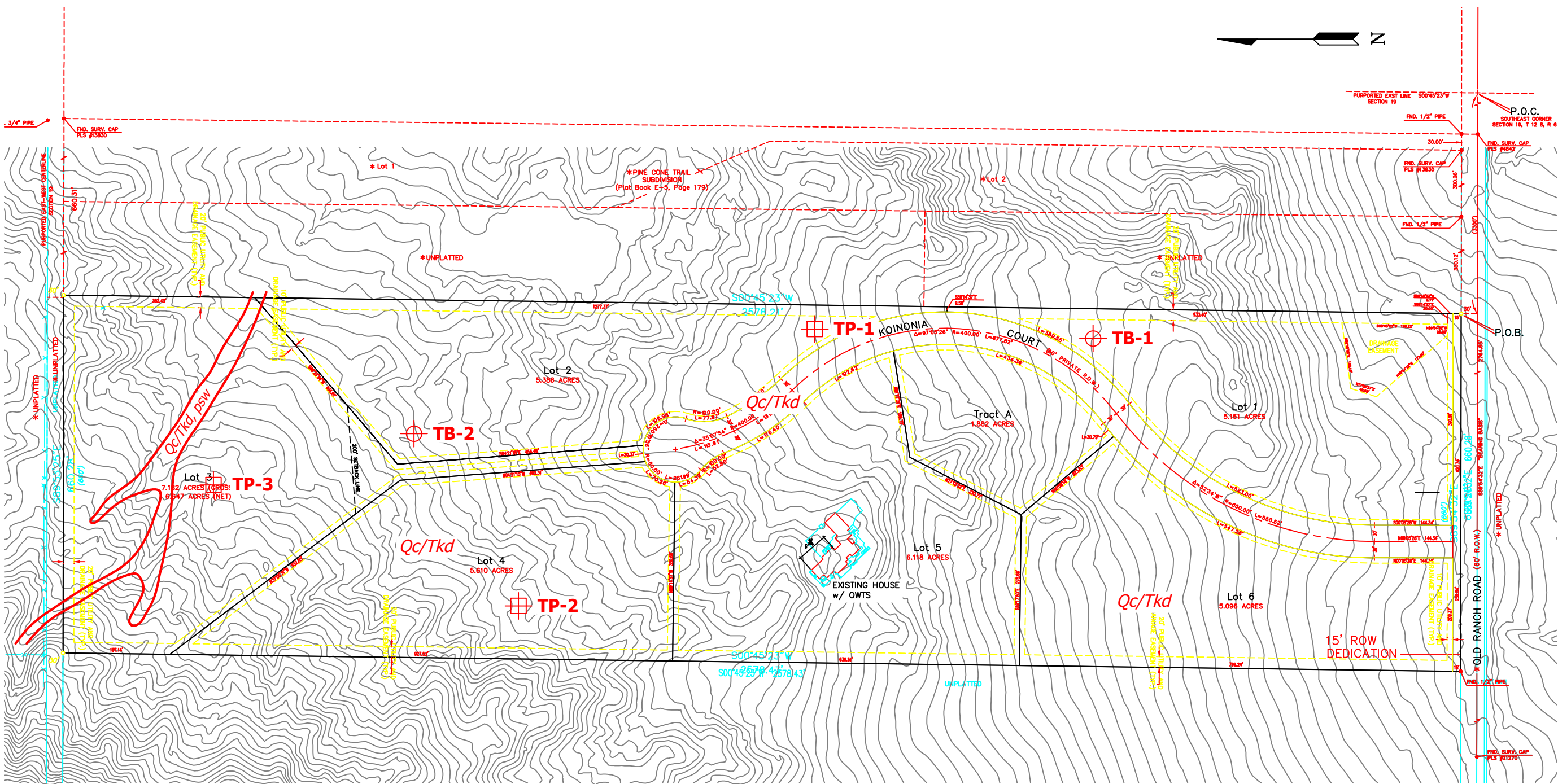
CHECKED:  
KAH

DATE:  
05/24/21

JOB NO.:  
202498

FIG NO.:  
5





- Legend:**
- Qc/TKd - Colluvium of Quaternary Age overlying Dawson Formation of Tertiary to Cretaceous Age: colluvial and residual soils overlying arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone
  - psw - potentially seasonal shallow groundwater area

REVISION	BY

ENTECH

ENGINEERING, INC.

COLORADO SPRINGS, CO. 80907

(719) 531-5599

GEOLOGY/ENGINEERING GEOLOGY MAP

SGWW

6170 OLD RANCH ROAD

EL PASO COUNTY, CO.

FOR: SALLY BARTELS

DRAWN

JAC

CHECKED

KAH

DATE

05/24/21

SCALE

1:200

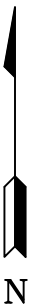
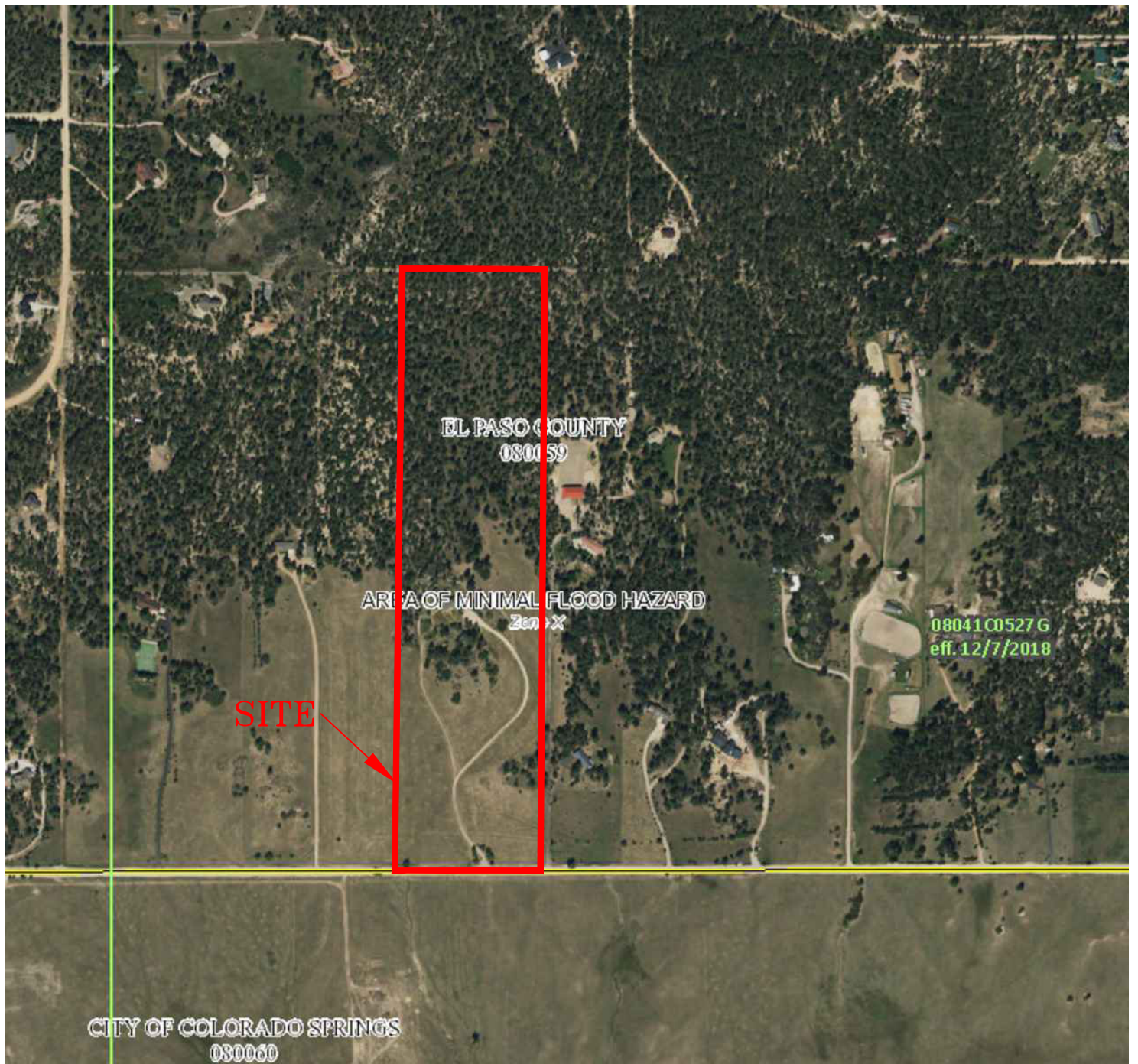
JOB NO.

202498

FIGURE No.

6





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

FLOODPLAIN MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN:  
JAC

DATE:  
05/24/21

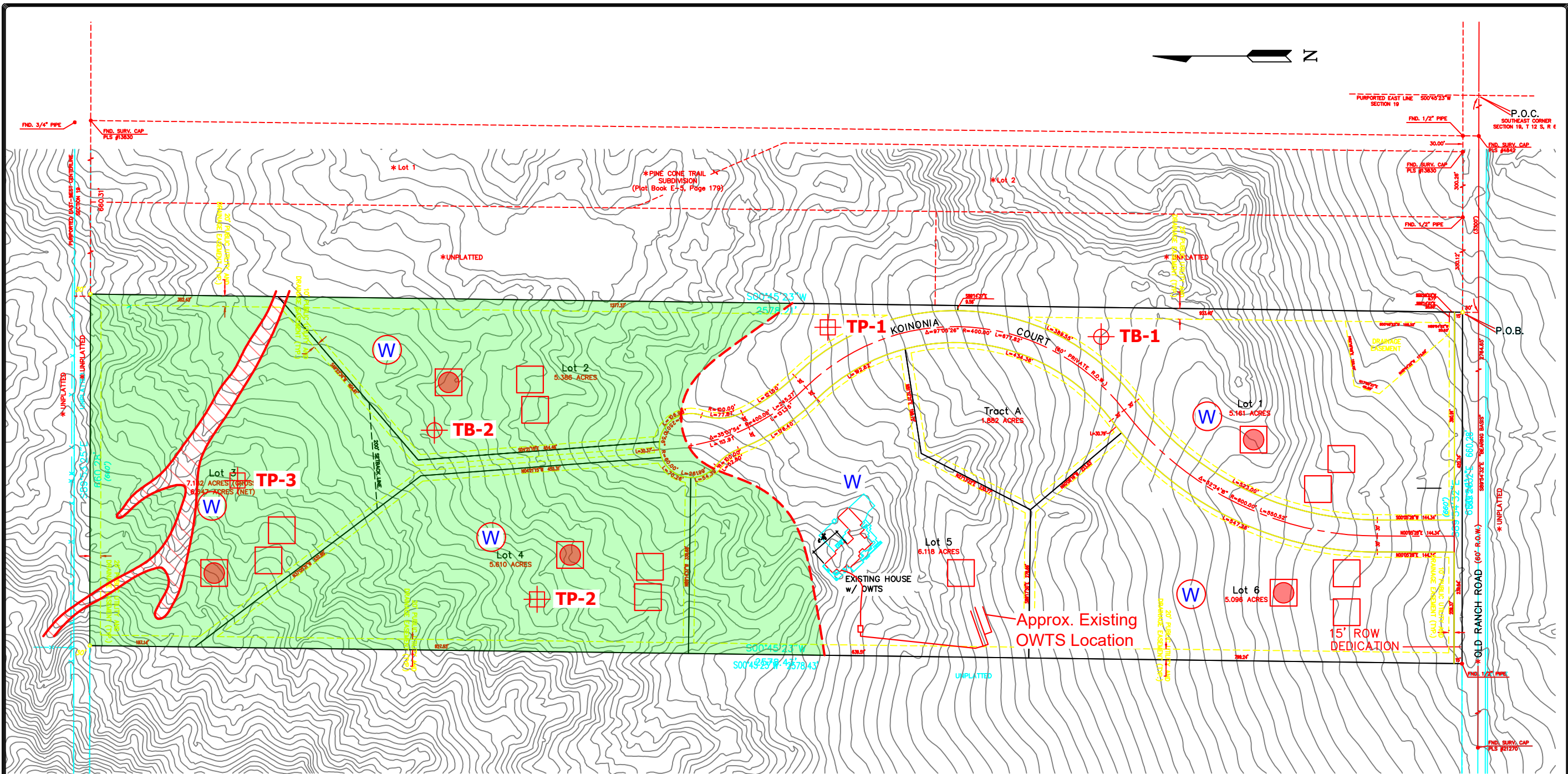
CHECKED:  
KAH

DATE:  
05/24/21



JOB NO.:  
202498






FIG NO.:  
7

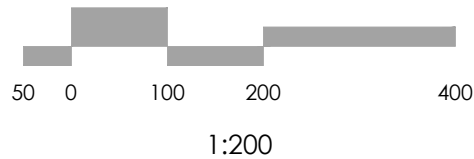




LEGEND:

-  - POTENTIAL HOUSE LOCATION
-  - POTENTIAL OWTS LOCATIONS

-  - APPROX. EXISTING WELL LOCATIONS
-  - APPROX. EXISTING WELL LOCATIONS
-  - AREAS WHERE CONVENTIONAL SYSTEMS ARE ANTICIPATED UNLESS UNSUITABLE SOILS OR SHALLOW BEDROCK ARE ENCOUNTERED, REQUIRING DESIGNED SYSTEMS.
-  - AREAS WHERE SEPTIC SYSTEMS ARE NOT RECOMMENDED.
-  - AREAS DESIGNED SYSTEMS ARE ANTICIPATED DUE TO SHALLOW BEDROCK



REVISION	BY

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



SEPTIC SUITABILITY MAP  
SGWW  
6170 OLD RANCH ROAD  
EL PASO COUNTY, CO.  
FOR: SALLY BARTELS

DRAWN JHR
CHECKED KAH
DATE 2/14/22
SCALE 1:200
JOB NO. 202498
FIGURE No. 8

## **APPENDIX A: Test Pit Logs and Test Boring Logs**

TEST PIT NO. 1  
 DATE EXCAVATED 5/20/2021  
 Job # 202498

TEST PIT NO. 2  
 DATE EXCAVATED 5/20/2021  
 CLIENT Salley Bartels  
 LOCATION 6170 Old Ranch 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, moist	1						topsoil, sandy clay loam, brown, moist	1					
	2						sandy clay loam, fine to coarse grained, dark brown, very moist	2			ma		3A
sandy loam, fine to coarse grained, yellowish brown, moist	3			gr	m	2	gravelly sandy loam, fine to very coarse grained, pale brown, moist, residual soils	3			gr	m	R-1
	4							4					
	5			gr	m	2		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



**ENTECH  
 ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:  
 jhr

DATE:  
 5/26/21

CHECKED:

DATE:

JOB NO.:  
 202498  
 FIG NO.:

TEST PIT NO. 3  
 DATE EXCAVATED 5/20/2021  
 Job # 202498

DATE EXCAVATED 5/20/2021  
 CLIENT Sally Bartels  
 LOCATION 6170 Old Ranch 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
Refusal due to bedrock @ 48"													
topsoil, sandy clay loam, brown, moist	1							1					
sandy loam, fine to coarse grained, reddish brown, moist	2			ma		3A		2					
sandy clay loam, fine to coarse grained, reddish brown, moist	3			ma		3A		3					
	4							4					
Silty Sandstone	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



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST PIT LOG**

DRAWN:  
jhr

DATE:  
5/26/21

CHECKED:

DATE:

JOB NO.:  
202498

FIG NO.:

TEST BORING NO. 1  
 DATE DRILLED 12/22/2020  
 Job # 202498

TEST BORING NO. 2  
 DATE DRILLED 12/22/2020  
 CLIENT SALLY BARTELS  
 LOCATION 6170 OLD RANCH ROAD

REMARKS

DRY TO 20', 12/22/20

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

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			32	3.0	
5			50	6.9	
10			50 4"	12.5	
15			50 9"	10.1	
20			50 4"	12.7	

REMARKS

DRY TO 12', 12/22/20

12" TOPSOIL, SAND, SILTY, FINE  
 TO COARSE GRAINED, BROWN,  
 VERY DENSE, DRY  
 SANDSTONE, SILTY, FINE TO  
 COARSE GRAINED, TAN, VERY  
 DENSE, MOIST

\* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			50 11"	2.4	
5			50 11"	4.8	
10			50 4"	10.3	
15			*	8.6	
20					



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:

DATE:

CHECKED:

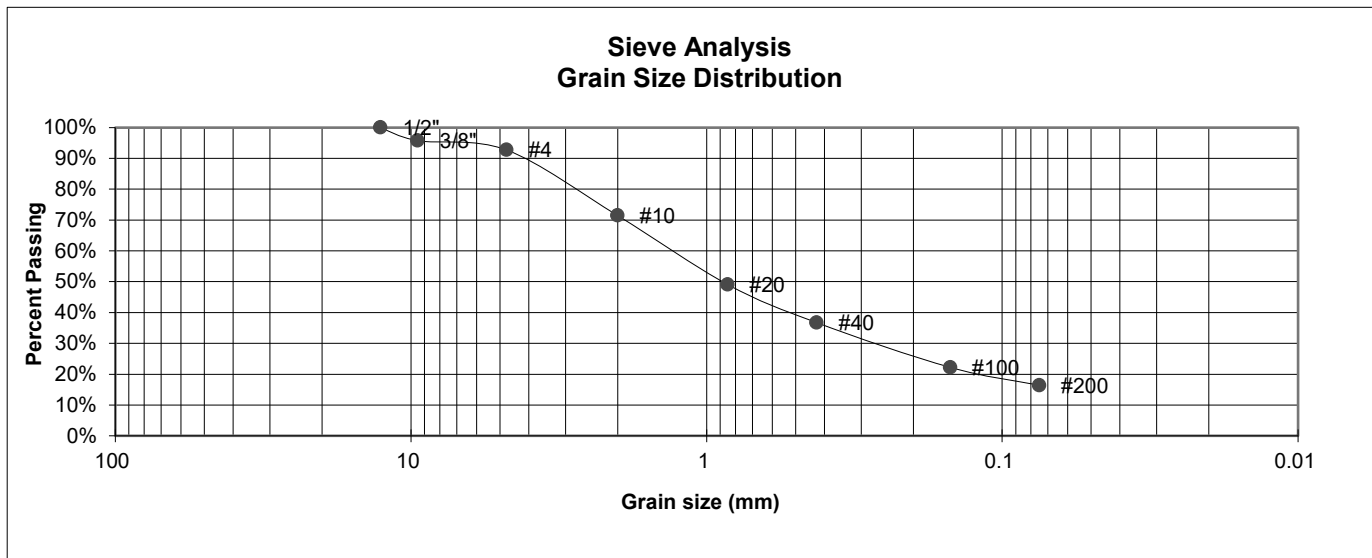
DATE:

JOB NO.:  
 202498

FIG NO.:

## **APPENDIX B: Laboratory Test Results**

BORING NO.	1	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	95.8%
4	92.7%
10	71.4%
20	49.1%
40	36.7%
100	22.2%
200	16.4%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

## LABORATORY TEST RESULTS

DRAWN:

DATE:

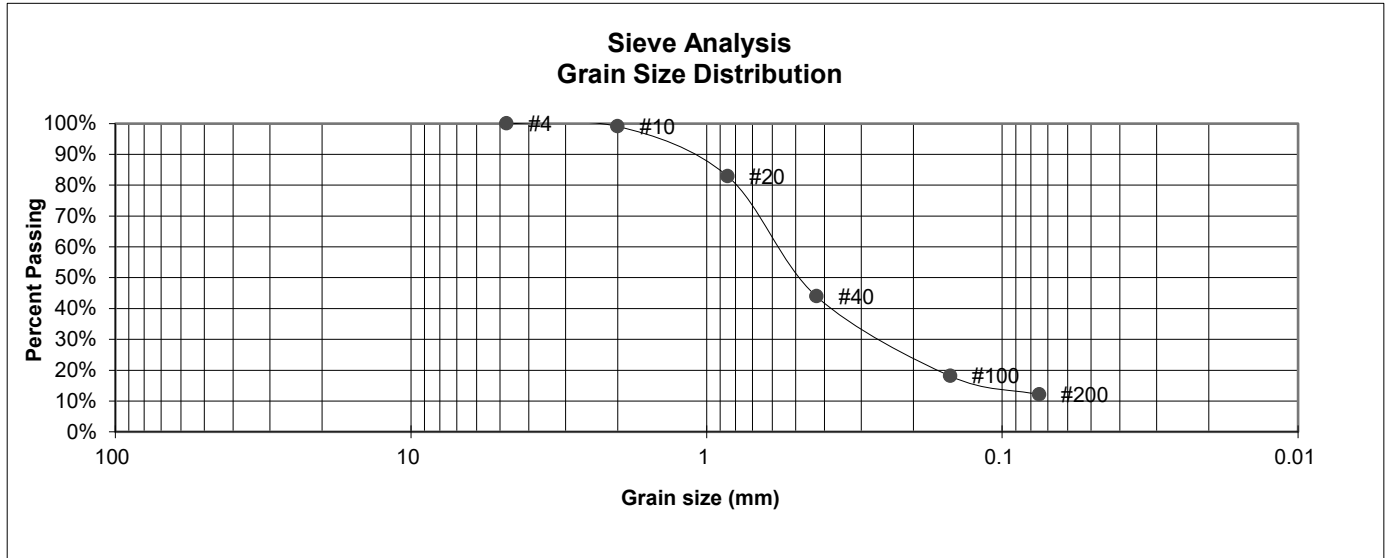
CHECKED:

DATE:

JOB NO.:  
202498

FIG NO.:

BORING NO.	1	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	15	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer	Atterberg Limits
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4	100.0%	<u>Swell</u>
10	99.0%	Moisture at start
20	82.9%	Moisture at finish
40	44.0%	Moisture increase
100	18.1%	Initial dry density (pcf)
200	12.1%	Swell (psf)



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:

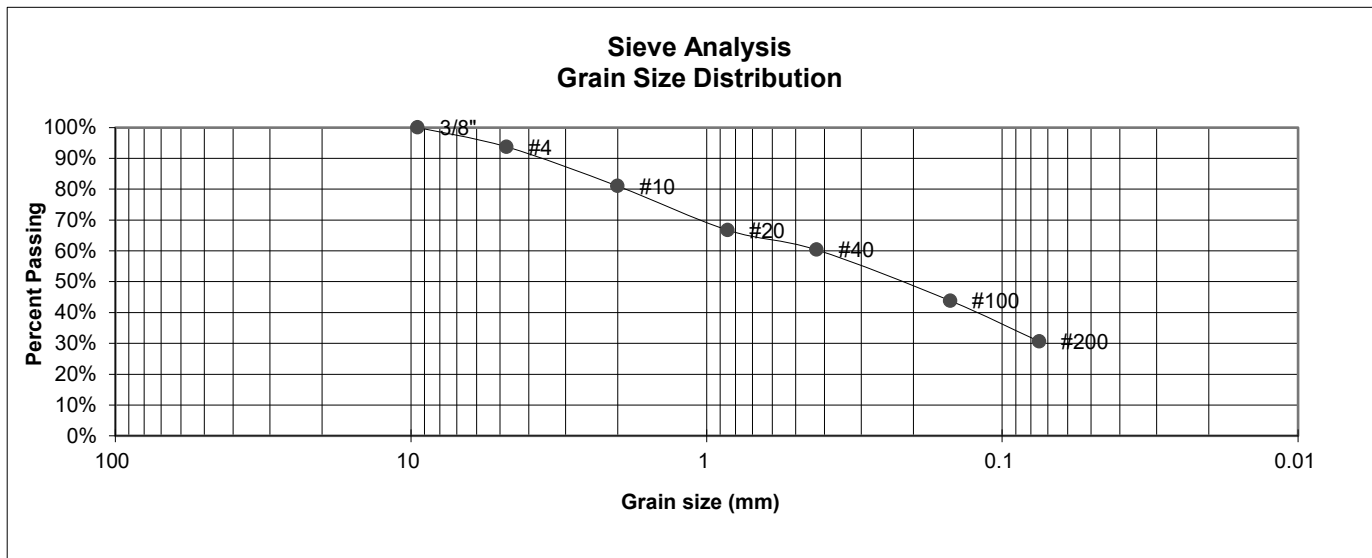
DATE:

JOB NO.:  
202498

FIG NO.:



BORING NO.	2	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	5	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.7%
10	81.0%
20	66.7%
40	60.4%
100	43.8%
200	30.6%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

## LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:

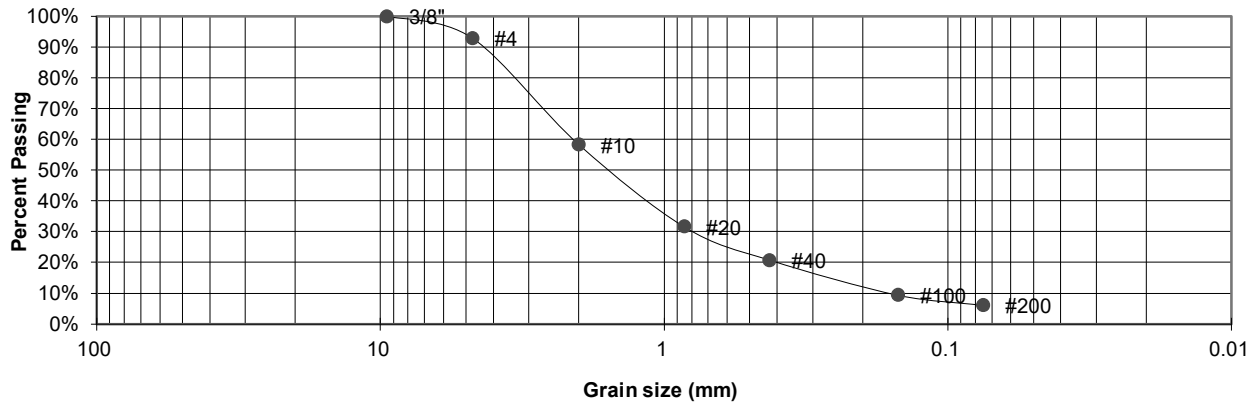
DATE:

JOB NO.:  
202498

FIG NO.:

BORING NO.	TP-2	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	5	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				

### Sieve Analysis Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.0%
10	58.3%
20	31.7%
40	20.7%
100	9.4%
200	6.1%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

### LABORATORY TEST RESULTS

DRAWN:

DATE:

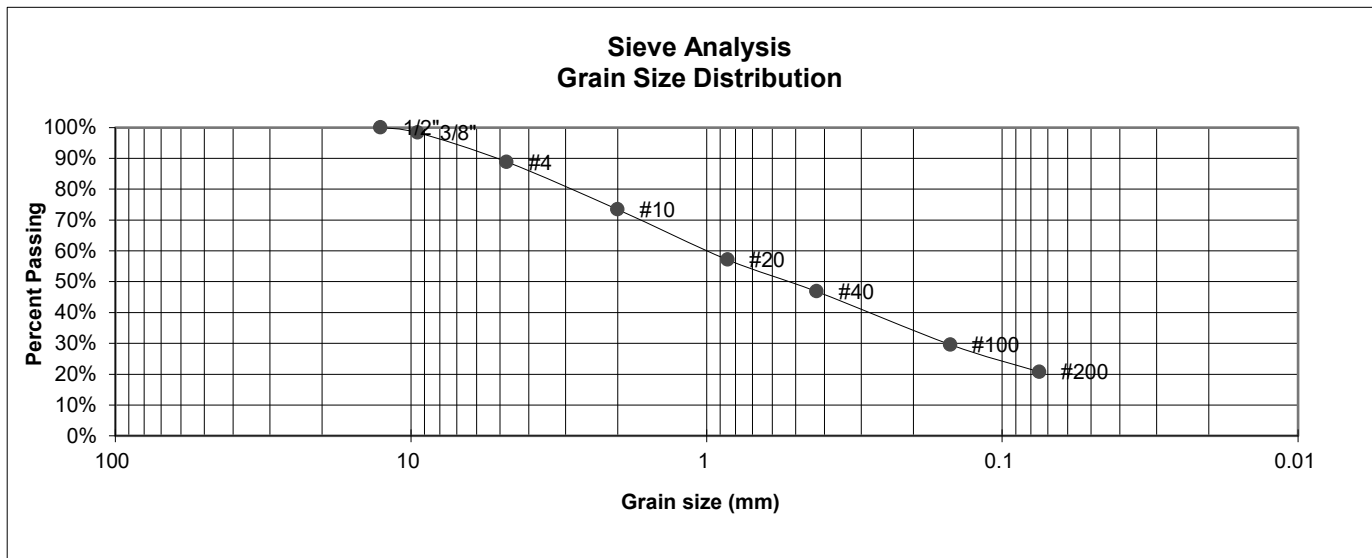
CHECKED:

DATE:

JOB NO.:  
202498

FIG NO.:

BORING NO.	TP-2	UNIFIED CLASSIFICATION	SC	TEST BY	BL
DEPTH(ft)	2	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.3%
4	88.9%
10	73.4%
20	57.1%
40	46.8%
100	29.6%
200	20.7%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

## LABORATORY TEST RESULTS

DRAWN:

DATE:

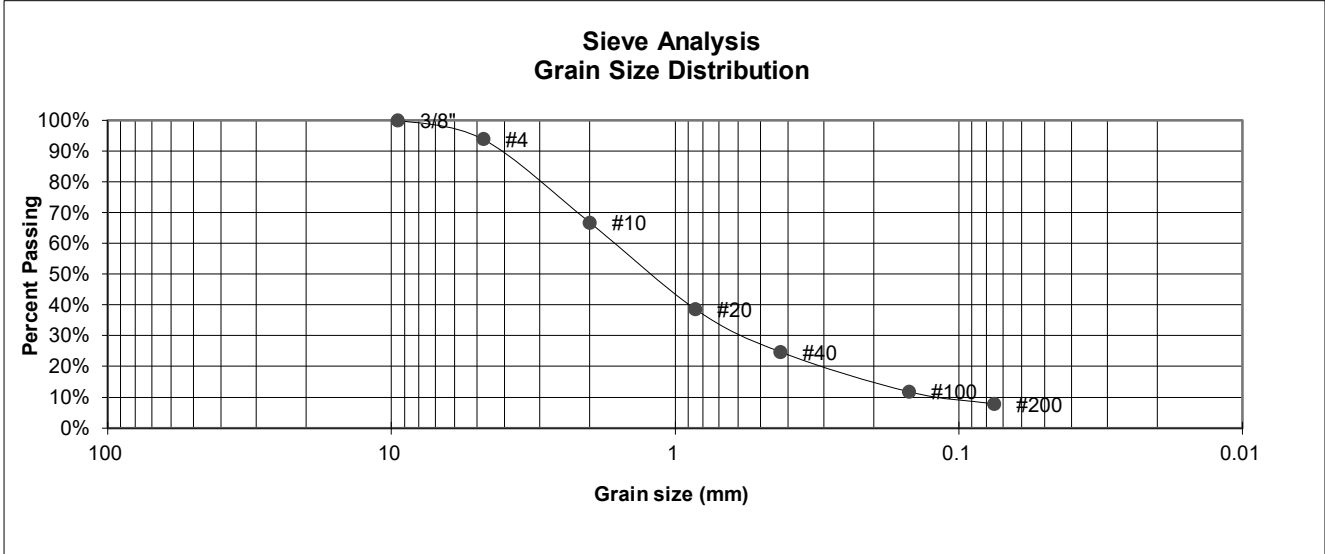
CHECKED:

DATE:

JOB NO.:  
202498

FIG NO.:

BORING NO.	TP-1	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	5	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer	Atterberg Limits
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"	100.0%	
4	94.0%	<u>Swell</u>
10	66.7%	Moisture at start
20	38.7%	Moisture at finish
40	24.7%	Moisture increase
100	11.8%	Initial dry density (pcf)
200	7.9%	Swell (psf)



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

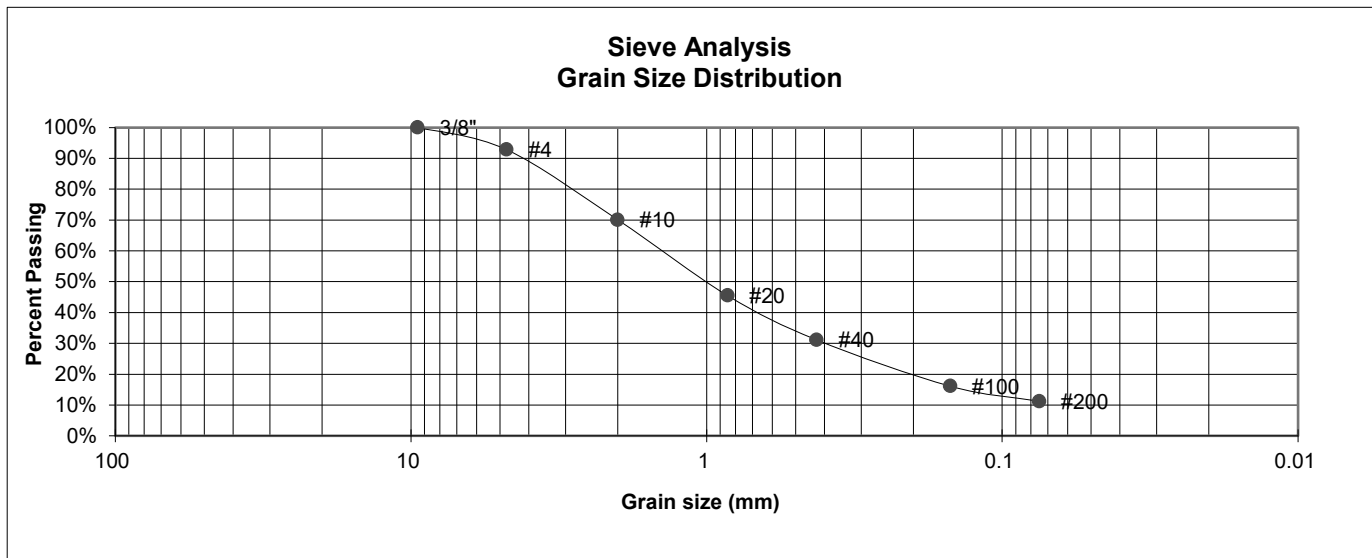
LABORATORY TEST  
RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
--------	-------	----------	-------

JOB NO.:  
202498

FIG NO.:

BORING NO.	TP-3	UNIFIED CLASSIFICATION	SC-SW	TEST BY	BL
DEPTH(ft)	2	AASHTO CLASSIFICATION		JOB NO.	202498
CLIENT	SALLY BARTELS				
PROJECT	6170 OLD RANCH ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	92.8%
10	70.1%
20	45.5%
40	31.1%
100	16.1%
200	11.2%

Atterberg  
Limits  
Plastic Limit  
Liquid Limit  
Plastic Index

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



**ENTECH  
ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

## LABORATORY TEST RESULTS

DRAWN:

DATE:

CHECKED:

DATE:

JOB NO.:  
202498

FIG NO.:

## **APPENDIX C: Soil Survey Descriptions**

## El Paso County Area, Colorado

### 40—Kettle gravelly loamy sand, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 368g

*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:* 3 to 8 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  
(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):* 4e

*Hydrologic Soil Group:* B

*Hydric soil rating:* No

#### Minor Components

##### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

## 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:*

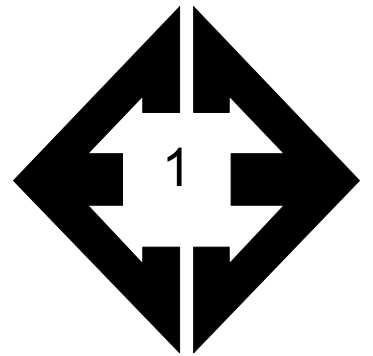
*Hydric soil rating:* No

**Data Source Information**

Soil Survey Area: El Paso County Area, Colorado

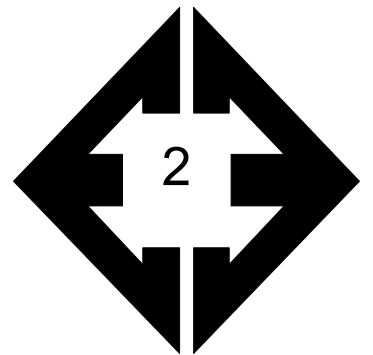
Survey Area Data: Version 18, Jun 5, 2020

## **APPENDIX D: El Paso County Health Department Septic Records**



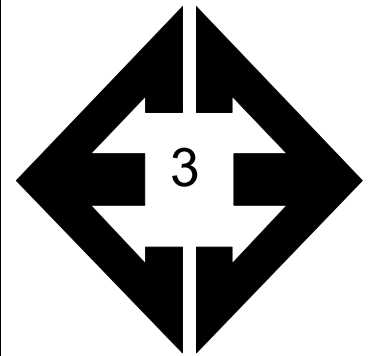
**Looking west from the  
east-central portion of  
the site.**

May 21, 2021



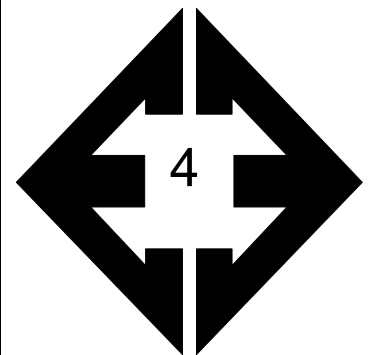
**Looking northeast from  
the western portion of  
the site.**

May 21, 2021



**Looking southeast  
from the western  
portion of the site.**

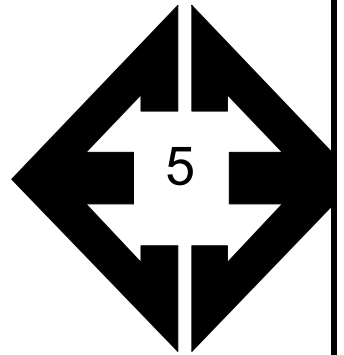
May 21, 2021



**Looking southeast  
down drainage in the  
northern portion of the  
site.**

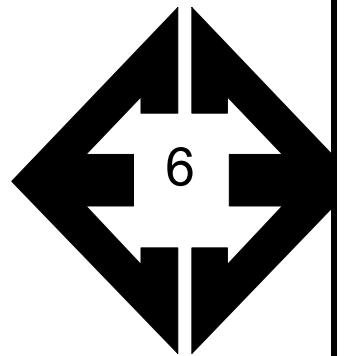
May 21, 2021





**Looking south from  
the north-central  
portion of the site.**

May 21, 2021



**Looking north from  
the south-central  
portion of the site.**

May 21, 2021