

October 30, 2020

Sonship Properties, LLC
P.O. Box 511
Rocky Ford, CO 81067



ENTECH
ENGINEERING, INC.

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

Attn: Justin Ensor

Re: OWTS – Wastewater Study
Prairie Ridge Subdivision
Brown Road
Parcel No. 61000-00-483
El Paso County, Colorado

Dear Mr. Ensor:

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the SE¼ of the SE¼ of Section 12, Township 11 South, Range 66 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located 8 miles east of Monument, Colorado, on Brown Road, north of Walker Road. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site varies from gently to moderately sloping generally to the south. The drainages on site flow in southerly and easterly directions through the property. No water was observed flowing in the minor drainage that bisects the property flowing south at the time of this investigation. Water was not observed flowing in the drainage that flows east in the southern portion of the site. Areas of ponded water were observed east of the property line in the embankment that exists east of the site. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. Additionally, some fill placement has occurred in the past. The site contains primarily low grasses, and field weeds. Site photographs, taken August 26, and September 24, 2020, are included in Appendix A. The approximate locations and directions of the photographs are indicated on Figure 3.

Total acreage involved in the proposed development is approximately 40 acres. Seven (7) single-family residential lots are proposed with areas of open space. Lot sizes range from 5 acres to 6 acres. The area will be serviced by individual wells and sewage treatment systems.

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).

PREVIOUS INVESTIGATION

The site was previously investigated by Entech Engineering, Inc. in a Soil, Geology, Geologic Hazard and Wastewater Study, dated May 31, 2007 (Reference 1). Information from this report was used in evaluating the site.

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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 August 26, 2020.

Three test borings/percolation tests from the previous report (Reference 1) and two 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. The test pits were completed on lot 1 and 7. The locations of the test pits are indicated on the Site Plan/Test Pit Location Map, Figure 3. The Test Pit 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, and Atterberg Limits, ASTM D-4318. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

Test Boring Logs from the percolation tests and laboratory testing from the previous report (Reference 1) is included in Appendix D.

SOIL AND GEOLOGIC CONDITIONS

Soil Survey

The Natural Resource Conservation Service (NRCS) (Reference 2, Figure 4), previously the Soil Conservation Service (Reference 3) has mapped two soil types on the site. Complete descriptions of the soil types are presented in Appendix E. In general, they vary from sandy loam and loamy sand to clay loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
15	Brussett loam, 3-5% slopes
69	Peyton-Pring complex, 8-15 % slopes

The soils have generally been described to have moderate to rapid permeabilities. Limitations on development include steep slopes, limited ability to support a load, shrink swell potential, and frost action potential. Possible hazards with soil erosion are present on the site. The erosion potential

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can be controlled with vegetation. The majority of the soils have been described to have moderate to high erosion hazards (Reference 2).

Soils

The soils encountered in the Test Borings of the percolation tests can be grouped into one general soil type. Bedrock was not encountered in any of the profile holes which were drilled to 10 feet. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 is a sandy clay (CL), and sandy clay – silt (CL- ML) encountered in all of the profile holes. These soils were encountered at stiff to very stiff consistencies and at moist conditions. Samples tested had approximately 69% to 79% of the soil sized particles passing the No. 200 Sieve. A swell of 1177 psf was measured in the FHA Swell Test. This swell pressure is in the moderate expansion range. The clays are also potentially collapsible. Consolidations of 0.4% and 0.6% were measured in the Swell/Consolidation Test. These values are in the low consolidation range.

The soils encountered in the test pits consisted of sandy clay. Samples tested had approximately 72% and 74% of the soil sized particles passing the No. 200 Sieve

The Test Pit Logs are presented in Appendix B, and the Laboratory test results from the test pits are presented in Appendix C. A Summary of Laboratory Test Results is presented in Table 1, the Test Boring Logs from the Profile Holes, Laboratory test results, and percolation testing results from the previous investigation are presented in Appendix D.

Groundwater

Groundwater was not encountered in any of the profile holes which were drilled to 10 feet. Groundwater was not encountered in the test pits which were excavated to 8 feet. Areas of seasonal and potentially seasonal shallow groundwater and ponded water have been mapped in the drainages on-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.

It should be noted that in the sandy materials on site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock or clays. 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.

Geology

Approximately 11 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

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Denver Basin. Bedrock in the area is typically gently dipping in a northeasterly direction (Reference 4). 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 Black Forest*, by Thorson in 2003, (Reference 5, Figure 5). The Geology Map for the site is presented in Figure 6. Four mappable units were identified on this site which is described as follows:

- Qaf Artificial Fill of Quaternary Age:** These are man-made fill deposits associated with the filled gullies in the central portion of the site.
- Qal Recent Alluvium of Quaternary Age:** These are recent stream deposits in the channels of the main drainages on site. Some areas have recent sand deposition, while others have highly organic soils.
- QTa Alluvium of Palmer Divide of Early Pleistocene or Pliocene Age:** These materials consist of water-deposited stream terrace deposits located along the Palmer Divide. They typically consist of silty to clayey sands with gravelly lenses and may contain areas of pebble and cobble lenses.
- 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 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 soil layer encountered on site was more than 10 feet thick and consisted of sandy, silty clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Black Forest Quadrangle* distributed by the Colorado Geologic Survey in 2003 (Reference 5, Figure 5), The *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6), and the *Geologic Map of the Pueblo 1° x 2° Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 7). The test borings and test pits were used in evaluating the site and is included in Appendices B and D. The Geology Map prepared for the site is presented in Figure 6.

Drainage Areas

A drainage exists in the southern portion of the site and a minor drainage in the central portion of the site that flow in easterly direction. No water was observed flowing in the drainages at the time of the investigation. These drainages have been mapped as potentially seasonal shallow and seasonal shallow groundwater areas (Figures 6 & 8).

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Parcel No. 6100-00-483
El Paso County, Colorado

In potentially seasonal shallow groundwater and seasonally shallow groundwater areas, we would anticipate the potential for periodically high subsurface moisture conditions and highly organic soils. Due to the potential for seasonal high groundwater conditions, on-site wastewater treatment systems are not recommended in these areas. Due to lot sizes, it is anticipated these areas can be avoided. The site does not lie within any floodplain zones according to the FEMA Map No. 08041CO305G dated December 7, 2018 (Figure 7, Reference 8). 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 2), previously the Soil Conservation Service (Reference 3) has been mapped with two soil descriptions. The Soil Survey Map (Reference 2) is presented in Figure 4, and the Soil Survey Descriptions (Reference 2) are presented in Appendix D. The soils are described as having moderate to rapid percolation rates.

Soils encountered in the tactile test pits consisted sandy clay. The limiting layers encountered in the test pits is the sandy clay, which corresponds with USDA Soil Type 4A with an LTAR values of 0.20 gallons per day per square foot. Bedrock was not encountered in the test pits, and signs of seasonally occurring groundwater were not observed in the test pits. Absorption fields must be maintained a minimum of 4 feet above groundwater or bedrock, or confining layer. Should groundwater or bedrock be encountered within 6 feet of the surface, designed systems will be required. Designed systems are for all of the lots due to the highly clayey soils, however, areas may be encountered on the lots where conventional systems would be suitable.

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 will be required for the new lot. The Septic Suitability Map is presented in Figure 8. Areas that should be avoided by septic systems are indicated on the septic suitability map. A possible house location, water well, and two septic sites for the new lots are indicated on Figure 8. **Individual soil testing is required for proposed construction 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.

CLOSURE

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

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El Paso County, Colorado

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.

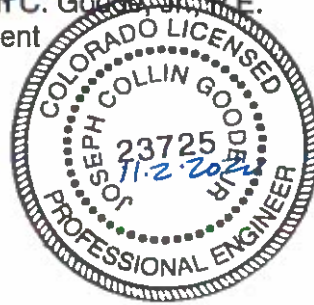
Reviewed by:



Logan L. Langford, P.G.
Geologist



Joseph C. Goodwin, P.E.
President



LLL/ao

Encl.

Entech Job No. 201794
AAprojects/2020/201794 wws

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OWTS – Wastewater Study
Prairie View Subdivision
Brown Road
Parcel No. 6100-00-483
El Paso County, Colorado

BIBLIOGRAPHY

1. Entech Engineering, Inc. dated May 31, 2007. *Soil, Geology, Geologic Hazard, and Wastewater Study, Prairie Ridge, El Paso County, Colorado*. Entech Job No. 94477.
2. Natural Resource Conservation Service, September 13, 2019. *Web Soil Survey*. United States Department Agriculture, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
3. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado*.
4. Scott, Glen R.; Taylor Richard B.; Epis, Rudy C; and Wobus, Reinhard A. 1978. *Geologic Map of the Pueblo 1° x 2° Quadrangle, South-Central Colorado*. Sheet 2. U.S. Geologic Survey. Map I-1022, Sheet 2.
5. Thorson, Jon P., 2003. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-6.
6. 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.
7. 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.
8. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041CO305G

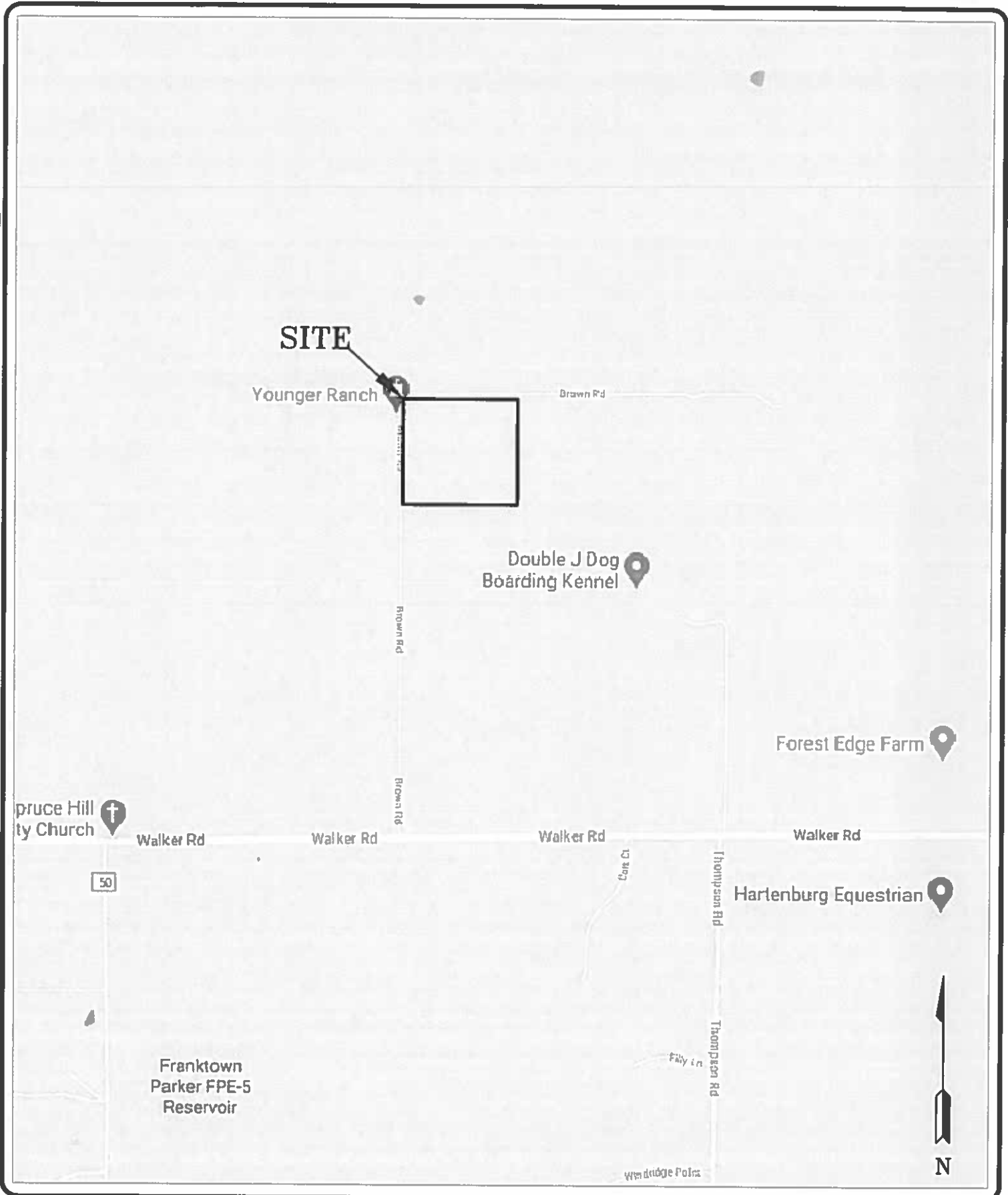
TABLES

Table 2: Summary Tactile Test Pit Results

Test Pit No.	USDA Soil Type	LTAR Value	Depth to Bedrock (ft.)	Depth to Seasonally Occurring Groundwater (ft.)
1	4A*	0.20*	N/A	N/A
2	4A*	0.20*	N/A	N/A

*- Conditions that will require an engineered OWTS

FIGURES



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VICINITY MAP
 PRAIRIE RIDGE SUBDIVISION
 BROWN ROAD
 EL PASO COUNTY, CO.
 FOR: SONSHIP PROPERTIES, LLC

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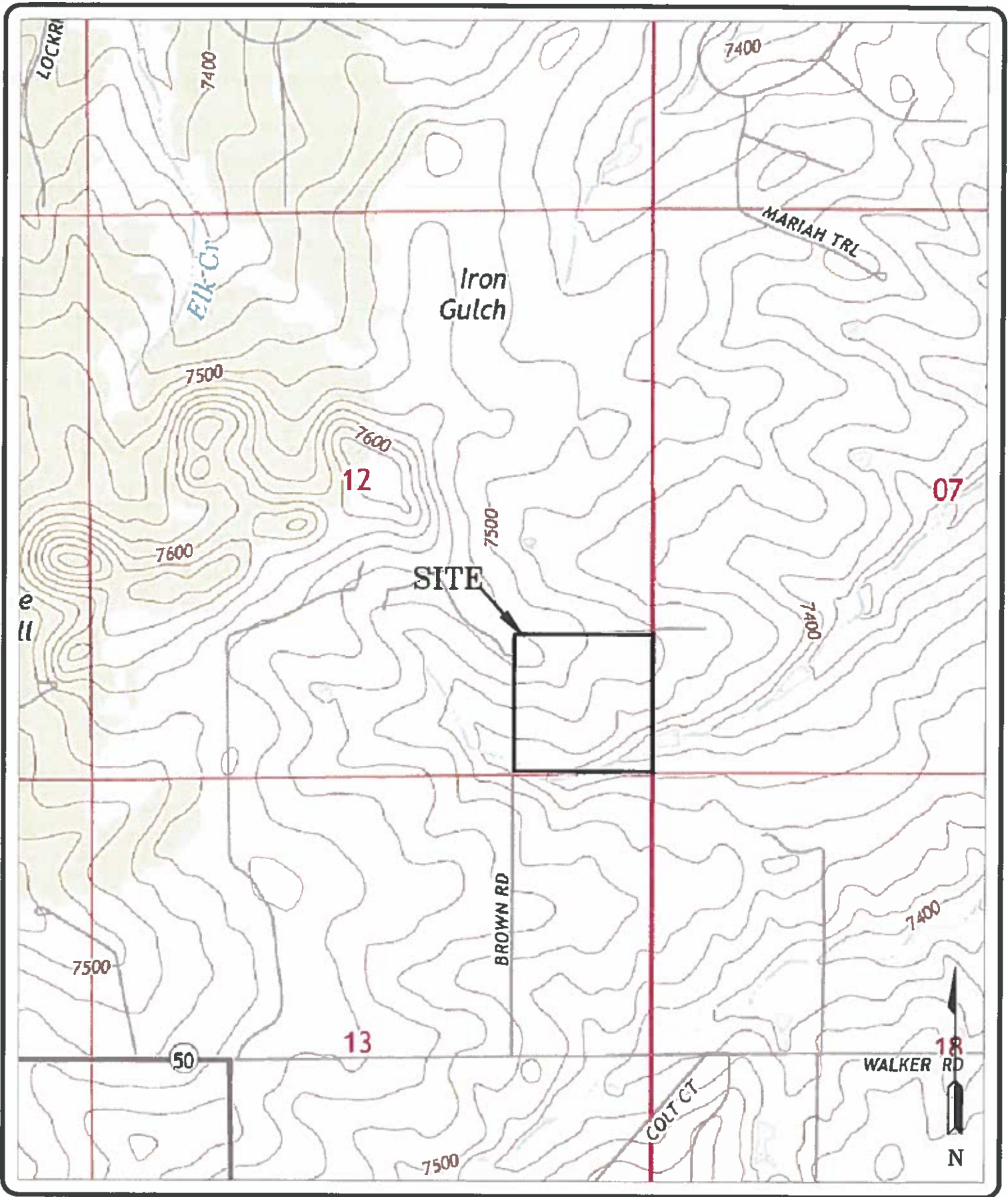
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FIG NO.:
 1



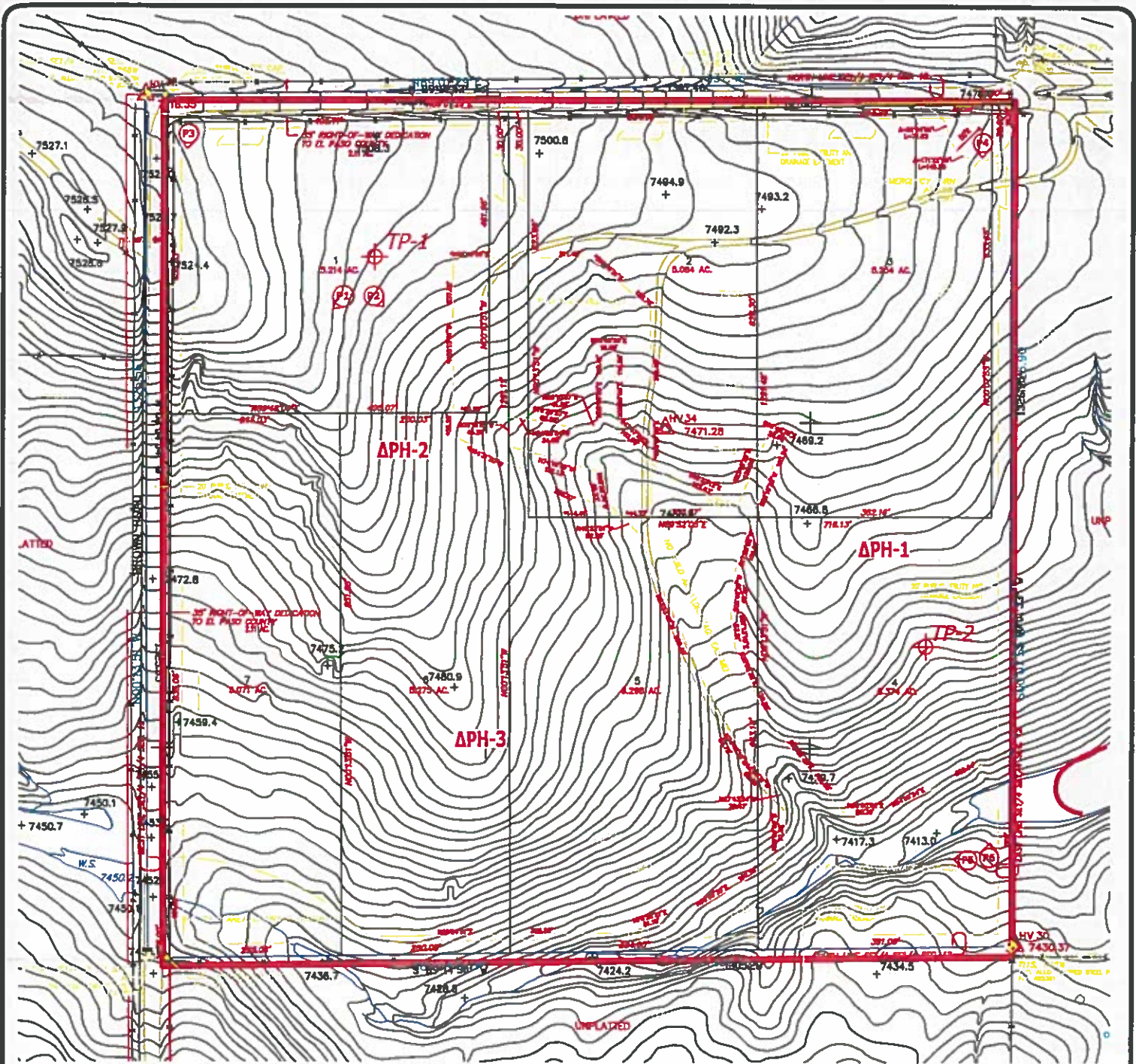

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USGS MAP
PRAIRIE RIDGE SUBDIVISION
BROWN ROAD
EL PASO COUNTY, CO.
FOR: SONSHIP PROPERTIES, LLC

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FIG NO.:
2



-  TP- APPROXIMATE TEST PIT LOCATION AND NUMBER
-  - APPROXIMATE TEST PIT LOCATION AND NUMBER




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SITE PLAN/TESTING LOCATION MAP
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BROWN ROAD
EL PASO COUNTY, CO.
FOR: SONSHIP PROPERTIES, LLC

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FIG NO.:
3



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**SOIL SURVEY MAP
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 EL PASO COUNTY, CO.
 FOR: SONSHIP PROPERTIES, LLC**

**DRAWN:
 LLL**

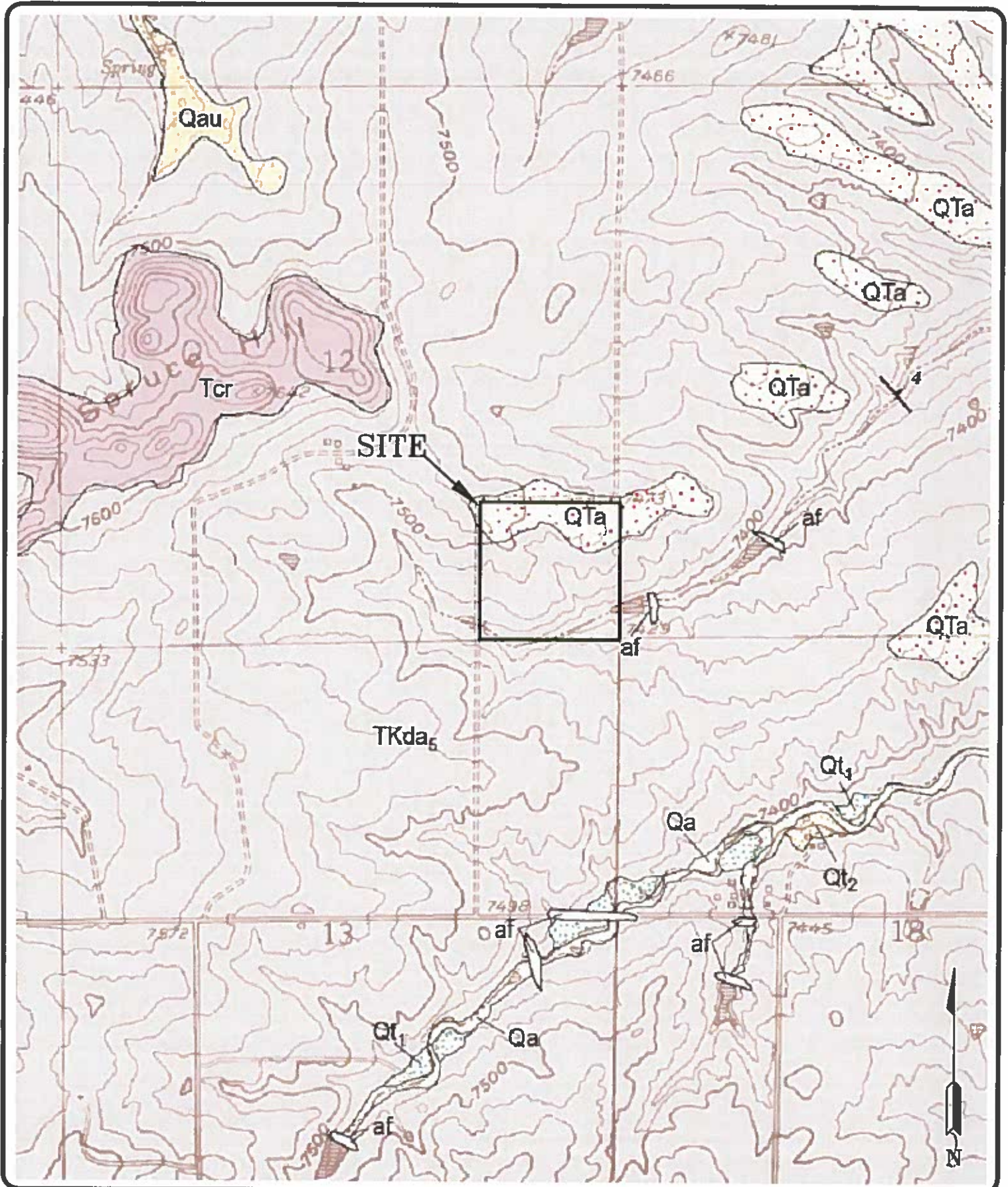
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**FIG NO.:
 4**



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BLACK FOREST QUADRANGLE GEOLOGIC MAP
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BROWN ROAD
EL PASO COUNTY, CO.
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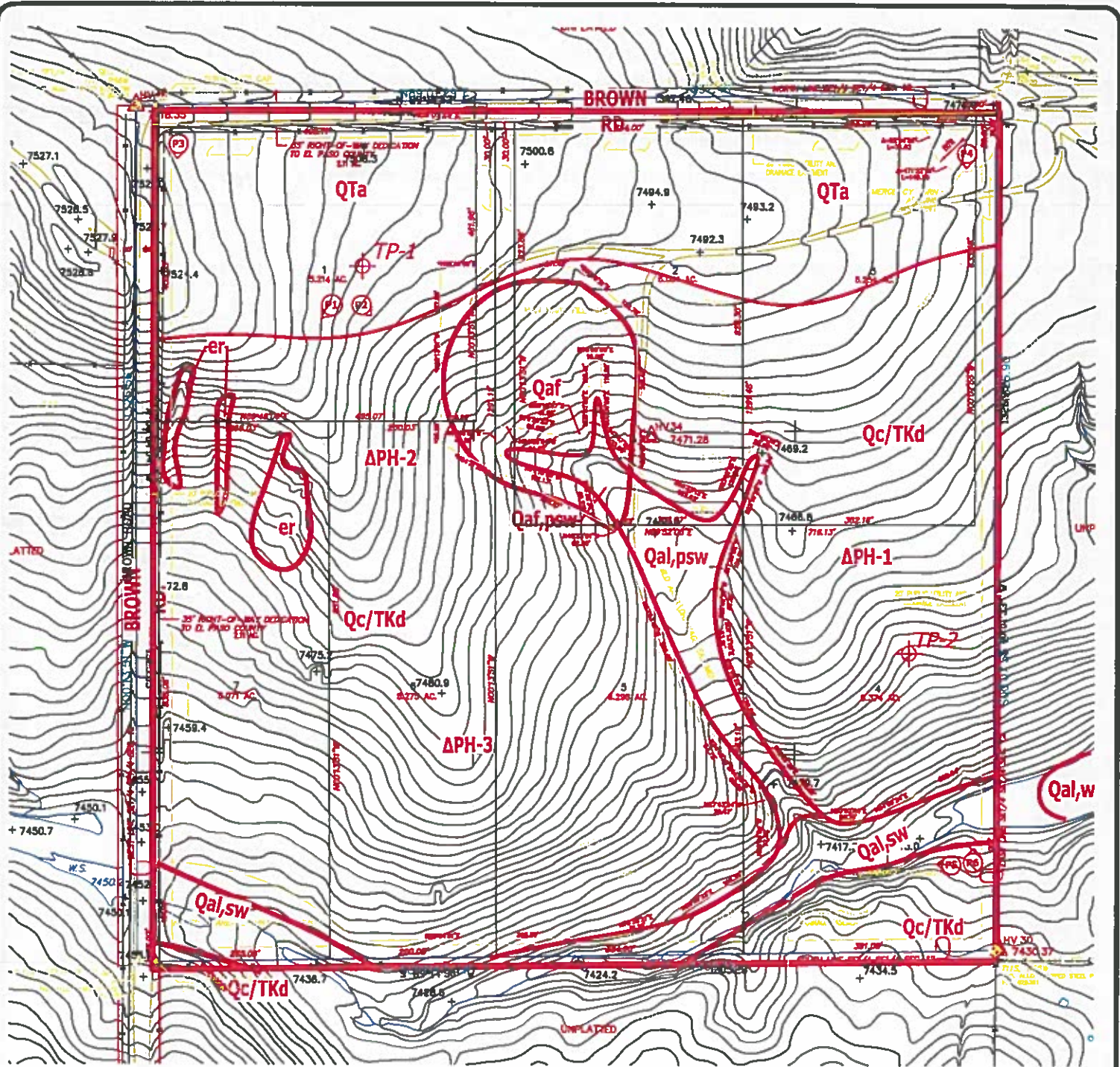
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FIG NO.:
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- Legend:**
- Qaf - Artificial Fill of Holocene Age: man-made fill deposits
 - Qal - Alluvium of Holocene and Pleistocene Age: recent alluvium associated with the drainages on site
 - QTa - Alluvium of Palmer Divide of Early Pleistocene or Pliocene Age: stream terrace deposits located along the Palmer Divide
 - QcTKd - 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 shallow groundwater area
 - sw - seasonal shallow groundwater area
 - er - areas of erosion
 - w - areas of ponded water



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ENGINEERING GEOLOGY MAP
PRAIRIE RIDGE SUBDIVISION
BROWN ROAD
EL PASO COUNTY, CO.
FOR: SONSHIP PROPERTIES, LLC

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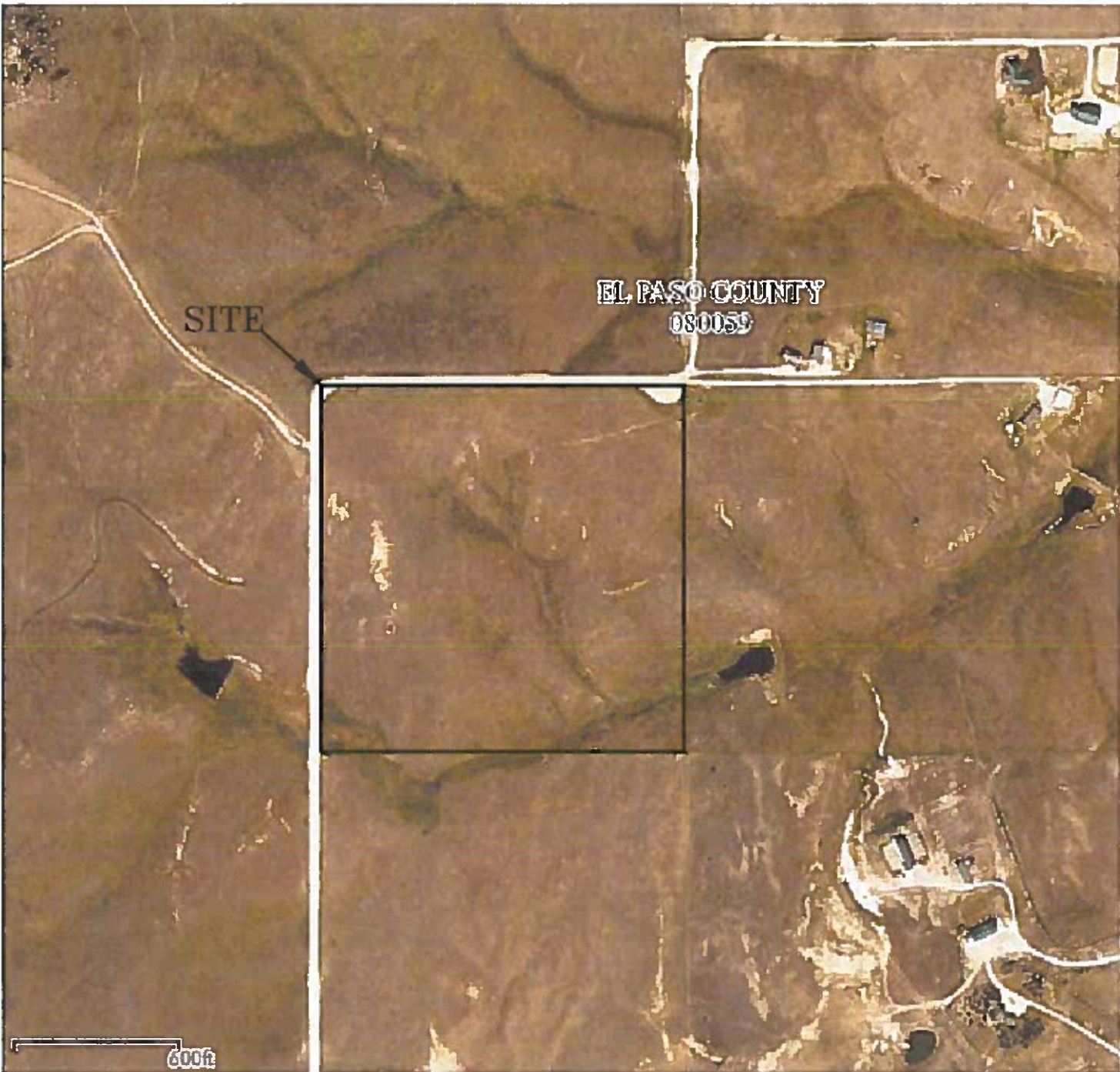
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FIG NO:
 6



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FEMA FLOODPLAIN MAP
 PRAIRIE RIDGE SUBDIVISION
 BROWN ROAD
 EL PASO COUNTY, CO.
 FOR: SONSHIP PROPERTIES, LLC

JOB NO.:
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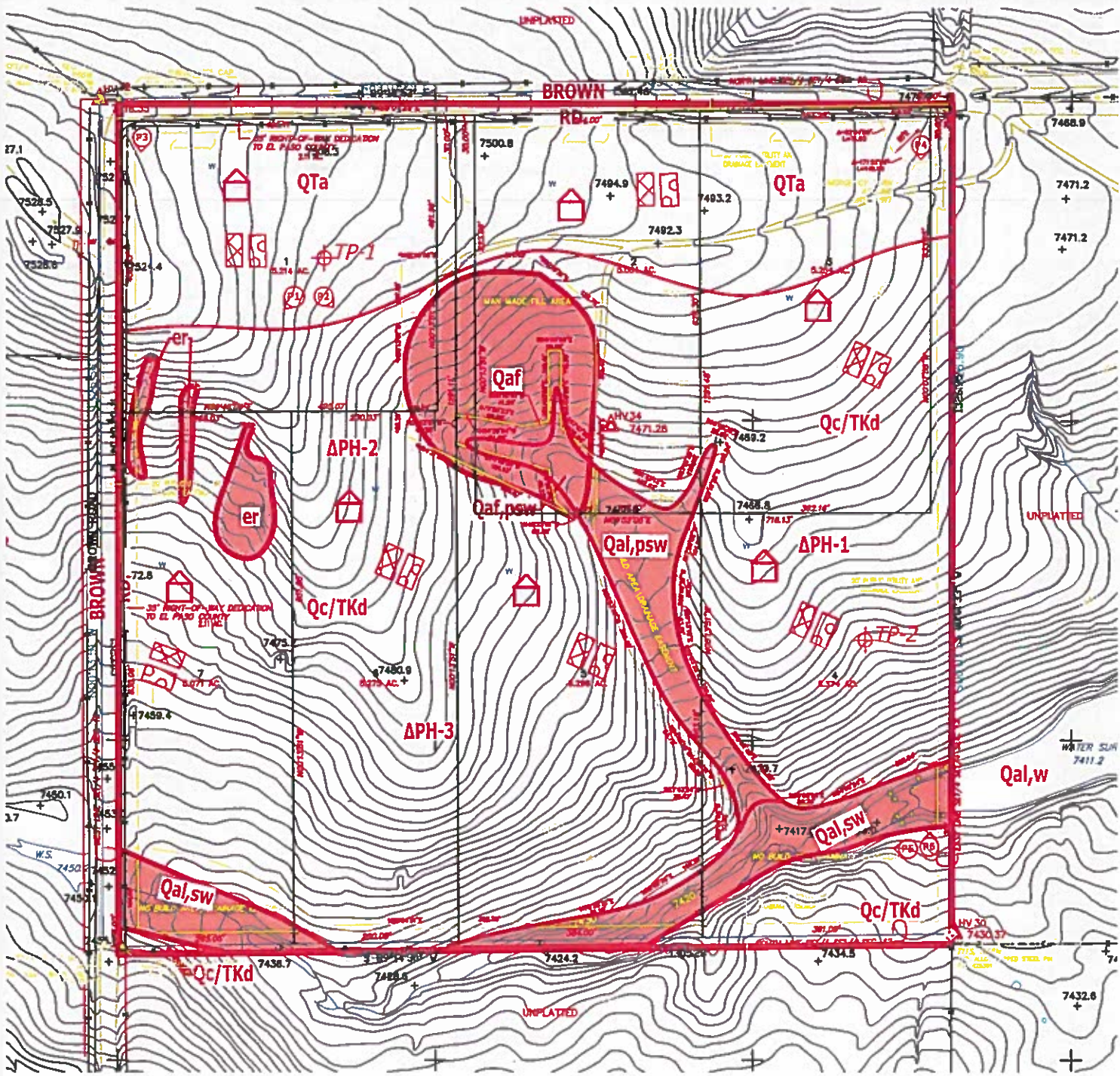
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DATE:



LEGEND:

-  - POSSIBLE OWTS LOCATIONS
 -  - POSSIBLE OWTS ALTERNATE LOCATIONS
 -  - POSSIBLE HOUSE LOCATIONS
 -  - * - WATER WELLS MUST BE A MINIMUM OF 100 FT FROM OWTS ABSORPTION FIELDS
- *AREAS MAPPED WITH ER, PSW, SW, AND AF ARE NOT SUITABLE OTWS LOCATIONS 




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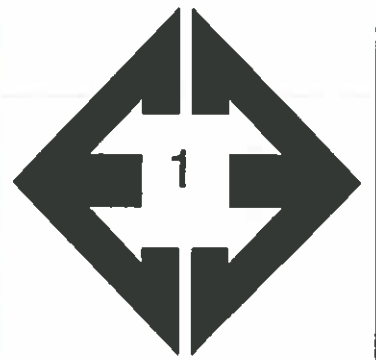
OWTS SUITABILITY MAP
PRAIRIE RIDGE SUBDIVISION
BROWN ROAD
EL PASO COUNTY, CO.
FOR: SONSHO PROPERTIES, LLC

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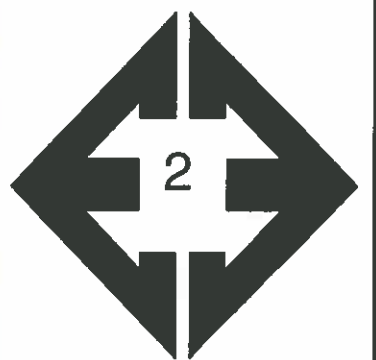
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APPENDIX A: Photographs



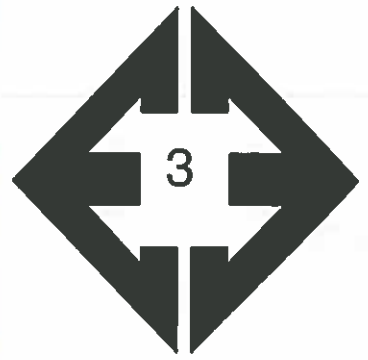
**Looking southwest
from the northwest
portion of the site.**

August 26, 2020



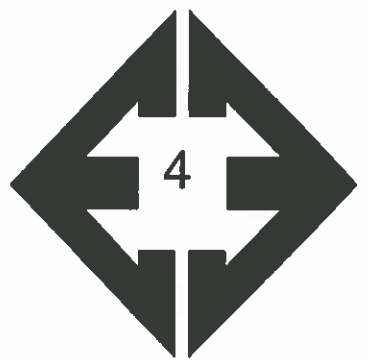
**Looking southeast
from the northwest
portion of the site.**

August 26, 2020



**Looking south from
the northwestern
corner of the site.**

August 26, 2020



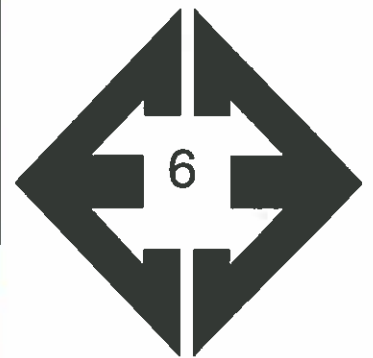
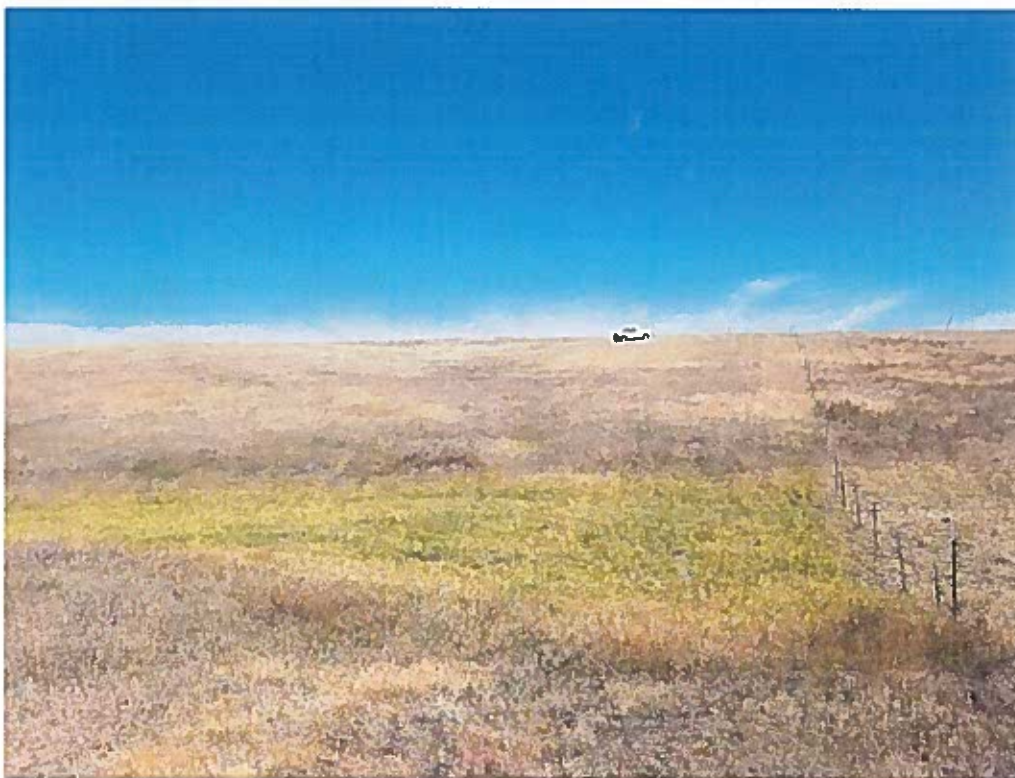
**Looking south from
the northeastern
portion of the site.**

August 26, 2020



**Looking west along
the drainage in the
southern portion of the
site.**

September 24, 2020



















**Looking north from the
southeastern corner of
site.**

September 24, 2020

APPENDIX B: Test Pit Logs

TEST PIT NO. 1
 DATE EXCAVATED 8/26/2020
 Job # 201794

TEST PIT NO. 2
 DATE EXCAVATED 8/26/2020
 CLIENT SONSHIP PROPERTIES, LLC
 LOCATION BROWN 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
Lot 1							Lot 4						
topsoil sandy clay, dark brown	1			ma	s	4A	topsoil sandy clay, dark brown	1			ma	s	4A
sandy clay, brown	2						sandy clay, brown	2					
	3							3					
	4							4					
	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

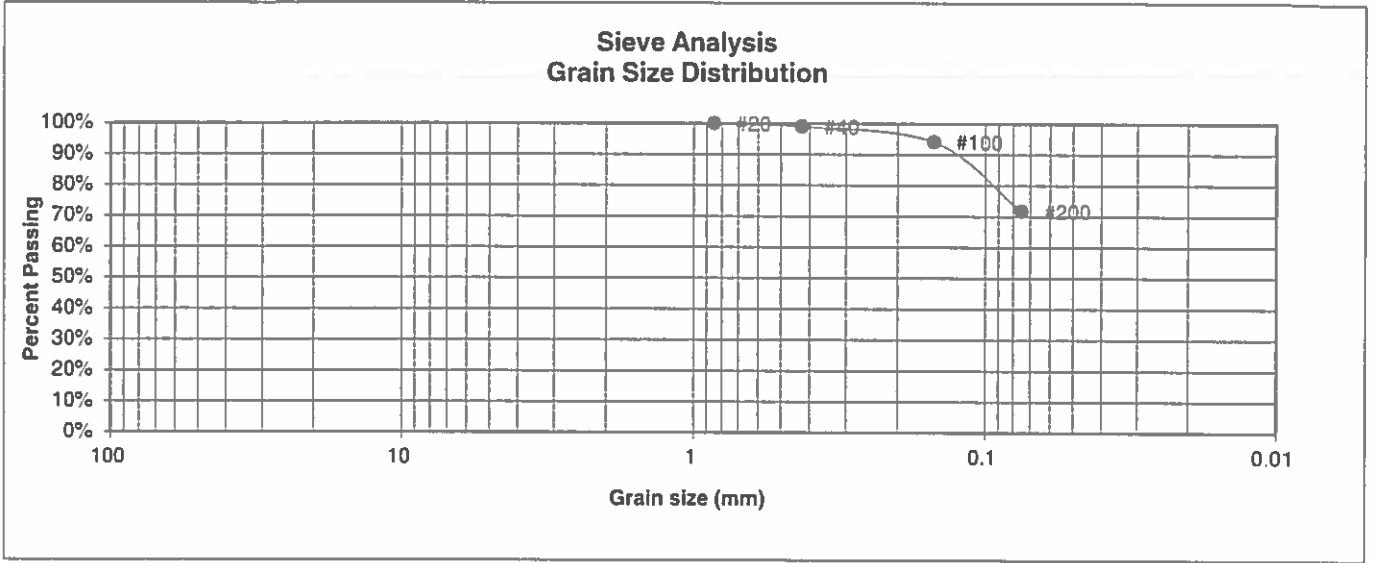
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201794

FIG NO:
B-1

APPENDIX C: Laboratory Test Results

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	CL	<u>TEST BY</u>	BL
DEPTH(ft)	3	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	201794
CLIENT	SONSHIP PROPERTIES				
PROJECT	BROWN ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	100.0%
40	99.0%
100	94.1%
200	71.7%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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**LABORATORY TEST
RESULTS**

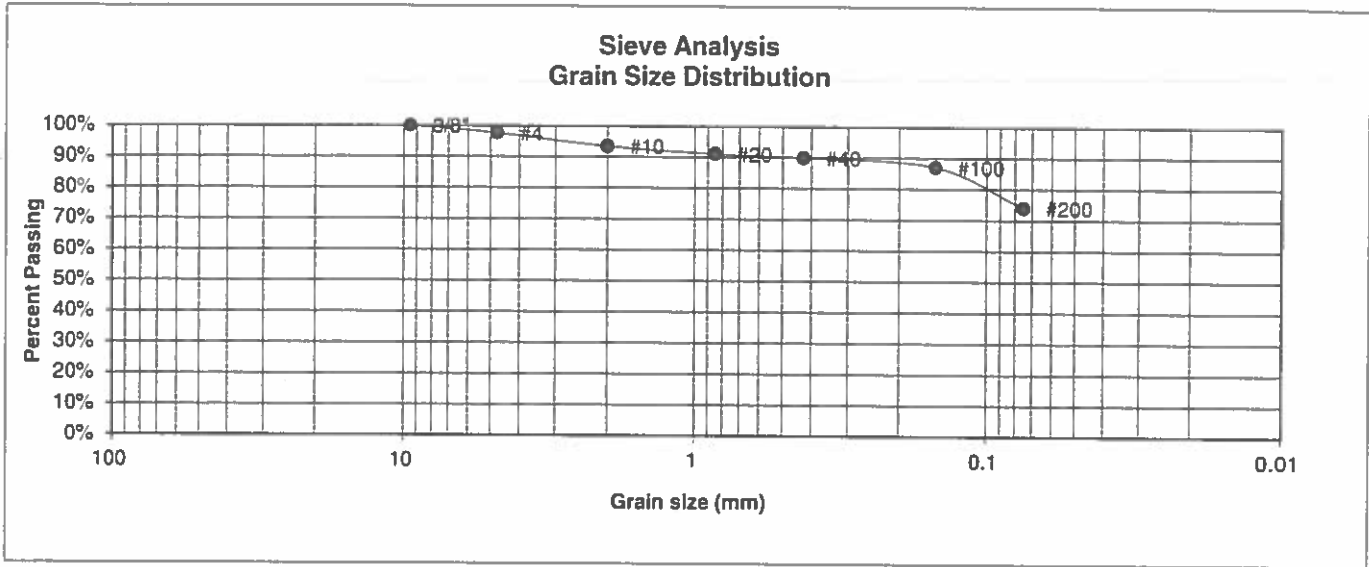
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201794

FIG NO.:

C-1

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	CL	<u>TEST BY</u>	BL
DEPTH(ft)	6	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	201794
CLIENT	SONSHIP PROPERTIES				
PROJECT	BROWN ROAD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.6%
10	93.4%
20	91.0%
40	89.9%
100	87.1%
200	74.0%

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**

DRAWN:	DATE:	CHECKED: LL	DATE: 9/21/20
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FIG NO:
C-2

**APPENDIX D: Test Boring Logs, Laboratory Test Results, &
Percolation Testing Results Entech Job No. 94477**

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

CLIENT PRAIRIE RIDGE PROP.
 PROJECT PRAIRIE RIDGE
 JOB NO. 94477

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	5-10			71.5				1177		CL-ML	CLAY-SILT, SANDY
1	2	10	9.0	93.1	78.9	28	11			-0.6	CL	CLAY, SANDY
1	3	5	6.6	94.1	69.2	24	6			-0.4	CL-ML	CLAY-SILT, SANDY

Table 2: Summary of Percolation Test Results

Percolation Test No.	Percolation Rate (min/in)	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	320	>10	>10
2	267	>10	>10
3	160	>10	>10

PROFILE HOLE NO 1
 DATE DRILLED 5/14/2007
 Job # 94477



PROFILE HOLE NO 2
 DATE DRILLED 5/14/2007
 CLIENT PRAIRIE RIDGE PROP.
 LOCATION PRAIRIE RIDGE

REMARKS

REMARKS



DRY TO 10', 5/15/07

CLAY-SILT, SANDY, BROWN TO TAN, STIFF TO VERY STIFF, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			18	8.7	1
10			30	8.4	1
15					
20					

DRY TO 10', 5/15/07

CLAY, SANDY, BROWN TO TAN, STIFF, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			19	6.8	1
10			16	8.9	1
15					
20					



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PROFILE HOLE LOG

DRAWN:	DATE:	CHECKED: <i>RJA</i>	DATE: 5/21/07
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JOB NO.:

FIG NO.:



PROFILE HOLE NO 3
 DATE DRILLED 5/14/2007
 Job # 94477

PROFILE HOLE NO.
 DATE DRILLED
 CLIENT PRAIRIE RIDGE PROP.
 LOCATION PRAIRIE RIDGE

REMARKS

REMARKS

DRY TO 10', 5/15/07
 CLAY-SILT, SANDY, BROWN
 TO TAN, STIFF, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			18	6.5	1	5					
10			18	7.3	1	10					
15						15					
20						20					



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PROFILE HOLE LOG

DRAWN:

DATE:

CHECKED:

DATE:

AW

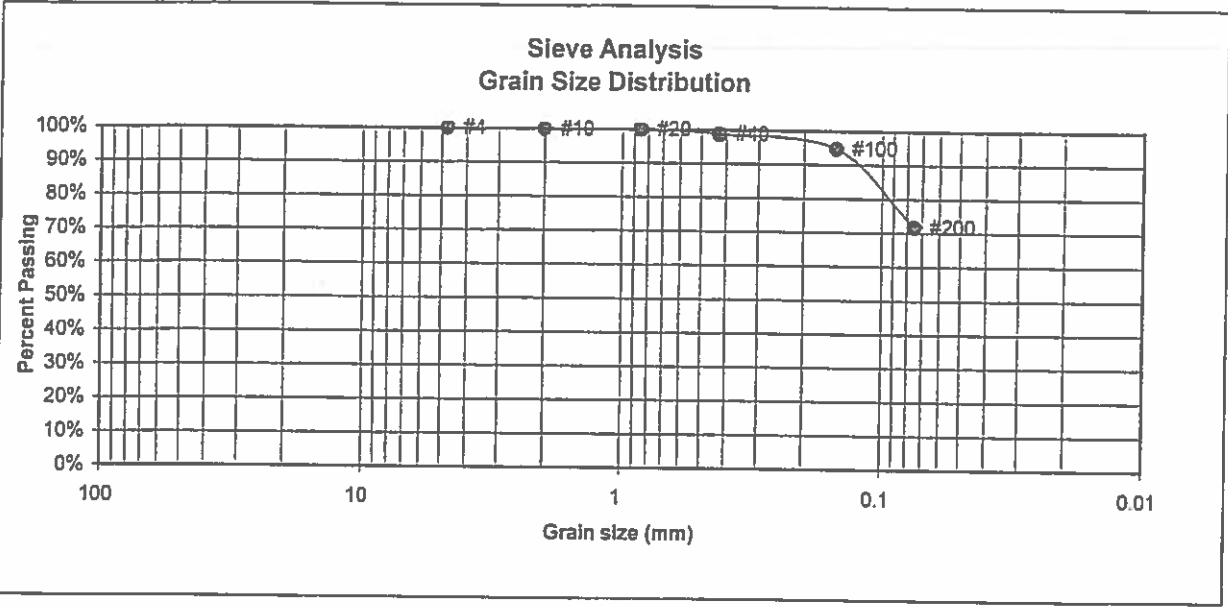
5/21/07

JOB NO.:

FIG NO.:

APPENDIX C: Laboratory Test Results

UNIFIED CLASSIFICATION CL-ML		CLIENT	PRAIRIE RIDGE PROP.
SOIL TYPE #	1	PROJECT	PRAIRIE RIDGE
TEST BORING #	1	JOB NO.	94477
DEPTH (FT)	5-10	TEST BY	DG



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	99.8%	Moisture at start	10.0%
20	99.9%	Moisture at finish	22.1%
40	98.7%	Moisture increase	12.1%
100	94.7%	Initial dry density (pcf)	100
200	71.6%	Swell (psf)	1177



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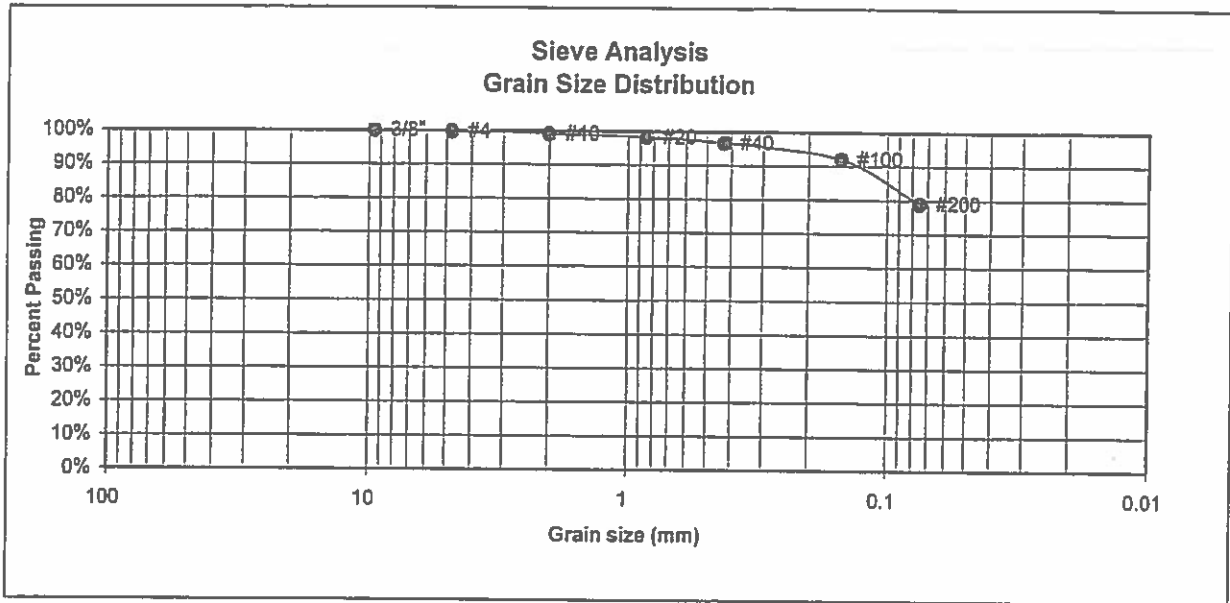
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: <i>KAT</i>	DATE: 5/21/07
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JOB NO.:

FIG NO.:

UNIFIED CLASSIFICATION	CL	CLIENT	PRAIRIE RIDGE PROP.
SOIL TYPE #	1	PROJECT	PRAIRIE RIDGE
TEST BORING #	2	JOB NO.	94477
DEPTH (FT)	10	TEST BY	DG



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	99.0%
20	98.1%
40	96.6%
100	91.9%
200	78.9%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	28
Plastic Index	11

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



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**LABORATORY TEST
RESULTS**

DRAWN:

DATE:

CHECKED:

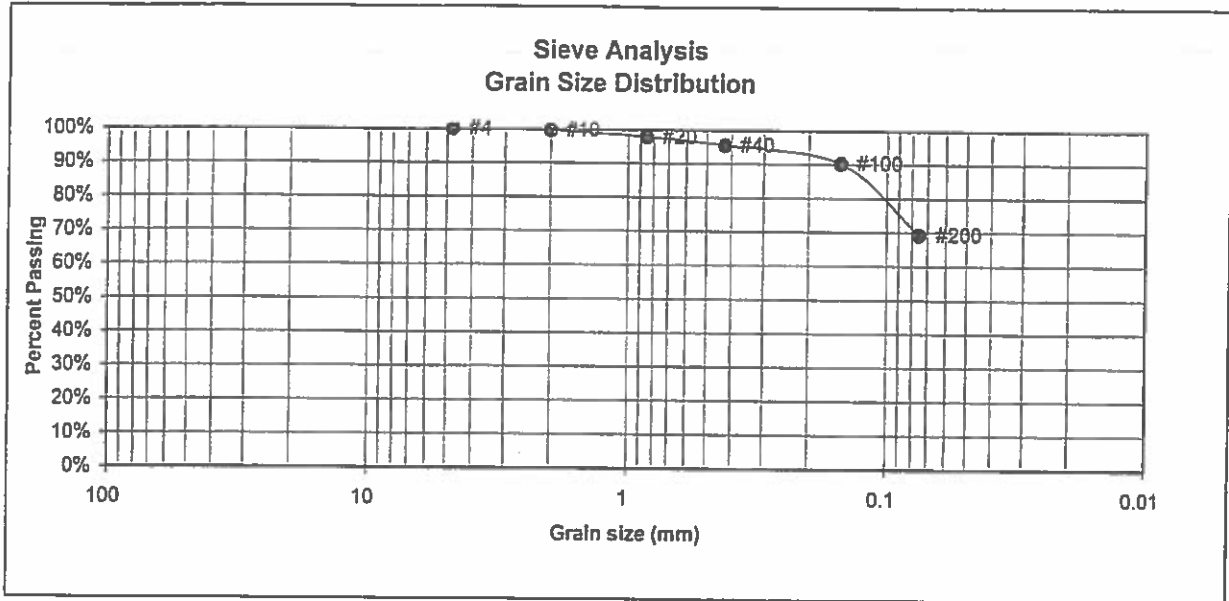
DATE:

1/28 *5/21/07*

JOB NO.:

FIG NO.:

UNIFIED CLASSIFICATION	CL-ML	CLIENT	PRAIRIE RIDGE PROP.
SOIL TYPE #	1	PROJECT	PRAIRIE RIDGE
TEST BORING #	3	JOB NO.	94477
DEPTH (FT)	5	TEST BY	DG



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.6%
20	97.8%
40	95.4%
100	90.2%
200	69.2%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	24
Plastic Index	6

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



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**LABORATORY TEST
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>DG</i>	5/21/07

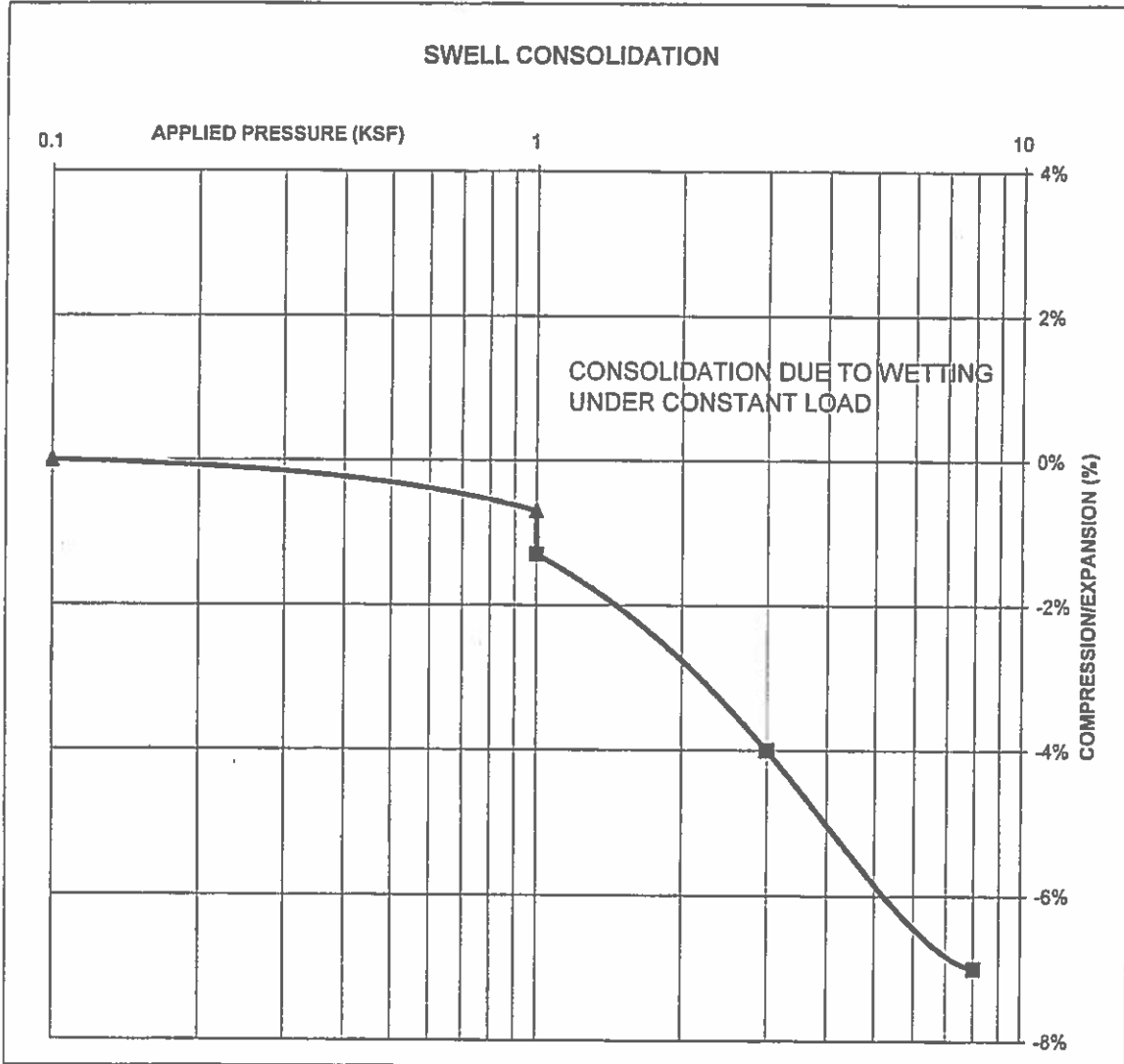
JOB NO.:

FIG NO.:

CONSOLIDATION TEST RESULTS

TEST BORING #	2	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)	93		
NATURAL MOISTURE CONTENT	9.0%		
SWELL/CONSOLIDATION (%)	-0.6%		

JOB NO. 94477
CLIENT PRAIRIE RIDGE PROP.
PROJECT PRAIRIE RIDGE



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**SWELL CONSOLIDATION
 TEST RESULTS**

DRAWN:

DATE:

CHECKED:

DATE:

BAK *5/21/07*

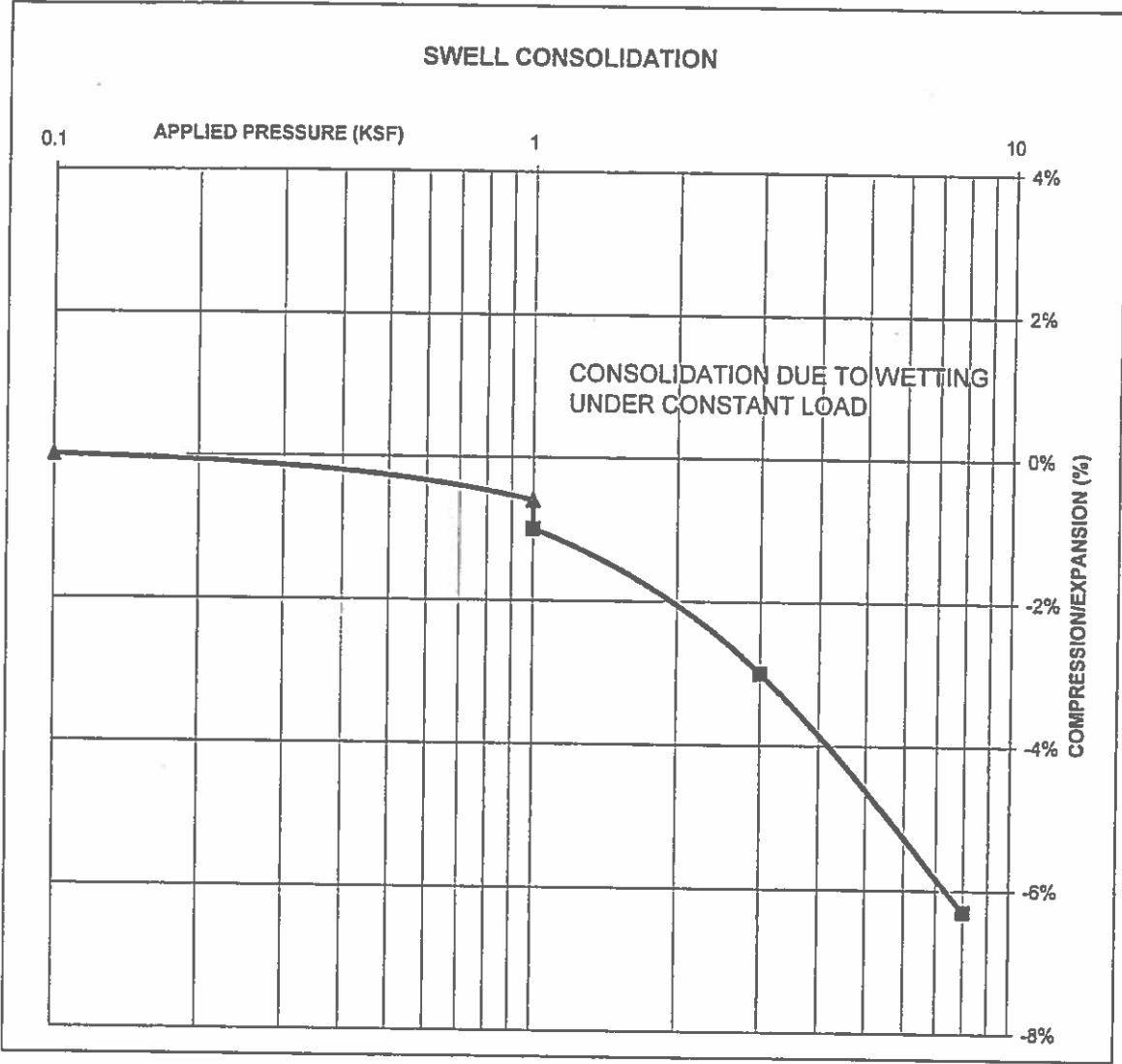
JOB NO.:

FIG NO.:

CONSOLIDATION TEST RESULTS

TEST BORING #	3	DEPTH(ft)	5
DESCRIPTION	CL-M	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)	94		
NATURAL MOISTURE CONTENT	6.6%		
SWELL/CONSOLIDATION (%)	-0.4%		

JOB NO. 94477
 CLIENT PRAIRIE RIDGE PROP.
 PROJECT PRAIRIE RIDGE




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SWELL CONSOLIDATION TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		<i>[Signature]</i>	5/21/07

JOB NO.:
 FIG NO.:

Client: PRAIRIE RIDGE PROP.
 Test Location: PRAIRIE RIDGE

Job Number: 94477

PERCOLATION HOLES-TEST NO. 1

Date Holes Prepared: 5/14/2007

Date Hole Completed: 5/15/2007

Hole No. 1
 Depth: 32"

Hole No. 2
 Depth: 33"

Hole No. 3
 Depth: 34"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/16	1	10	1/16	1	10	1/8
2	10	0	2	10	0	2	10	0
3	10	1/16	3	10	0	3	10	0

Perc Rate (min./in.): 240

Perc Rate (min./in.): 480

Perc Rate (min./in.): 240

Average Perc Rate (min./in.) 320

PROFILE HOLE

Date Profile Hole Completed: 5/14/2007

Depth: 0-10'
 Visual Classification: Clay-silt, sandy, dark brown to tan

Remarks

No Bedrock
 No Groundwater

18 Blows / ft. @ 4'
 30 Blows / ft. @ 9'

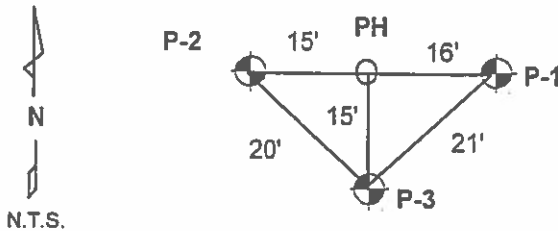
Required Area of Absorption Field: N/A* Sq. Ft./gpd sewage volume
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom with garbage disposal and washing machine

Remarks:

* - Due to slow percolation rate, a designed system or additional drilling is recommended

Observer: Blake Leonard

By:



N.T.S.



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PERCOLATION TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		<i>[Signature]</i>	5/21/07

JOB NO.:

FIG NO.:

Client: PRAIRIE RIDGE PROP.
 Test Location: PRAIRIE RIDGE

Job Number: 94477

PERCOLATION HOLES-TEST NO. 2

Date Holes Prepared: 5/14/2007

Date Hole Completed: 5/15/2007

Hole No. 1
 Depth: 41"

Hole No. 2
 Depth: 38"

Hole No. 3
 Depth: 37"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/16	1	10	1/8	1	10	0
2	10	0	2	10	1/4	2	10	1/8
3	10	0	3	10	0	3	10	0

Perc Rate (min./in.): 480

Perc Rate (min./in.): 80

Perc Rate (min./in.): 240

Average Perc Rate (min./in.) 267

PROFILE HOLE

Date Profile Hole Completed: 5/14/2007

Depth	Visual Classification	Remarks
0-10'	Clay, sandy, brown to light brown	No Bedrock No Groundwater

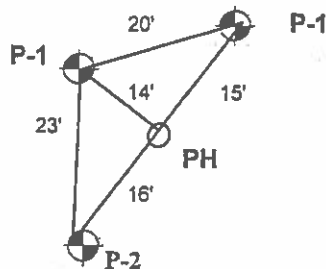
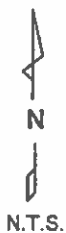
19 Blows / ft. @ 4'
 16 Blows / ft. @ 9'

Required Area of Absorption Field: N/A* Sq. Ft./gpd sewage volume
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom with garbage disposal and washing machine
 Remarks:

* - Due to slow percolation rate, a designed system or additional drilling is recommended

Observer: Blake Leonard

By:



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PERCOLATION TEST RESULTS

DRAWN:	DATE:	CHECKED: <i>BLA</i>	DATE: <i>5/15/07</i>
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JOB NO.:

FIG NO.:

Client: PRAIRIE RIDGE PROP.
 Test Location: PRAIRIE RIDGE

Job Number: 94477

PERCOLATION HOLES-TEST NO. 3

Date Holes Prepared: 5/14/2007

Date Hole Completed: 5/15/2007

Hole No. 1
 Depth: 32"

Hole No. 2
 Depth: 34"

Hole No. 3
 Depth: 38"

Hole No. 1			Hole No. 2			Hole No. 3		
Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)	Trial	Time (min.)	Water Level Change (in.)
1	10	1/8	1	10	1/16	1	10	0
2	10	0	2	10	1/16	2	10	1/8
3	10	1/8	3	10	0	3	10	1/8

Perc Rate (min./in.): 120

Perc Rate (min./in.): 240

Perc Rate (min./in.): 120

Average Perc Rate (min./in.) 160

PROFILE HOLE

Date Profile Hole Completed: 5/14/2007

Depth	Visual Classification	Remarks
0-2'	Sand, clayey, dark brown	
2-10'	Clay-Silt, sandy, brown to light brown	No Bedrock No Groundwater

18 Blows / ft. @ 4'

18 Blows / ft. @ 9'

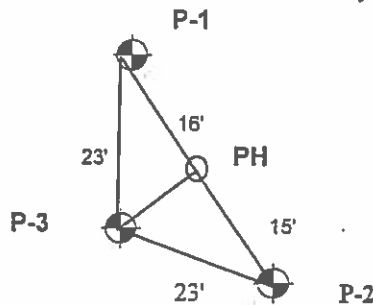
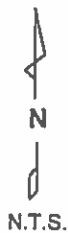
Required Area of Absorption Field: N/A* Sq. Ft./gpd sewage volume
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom
 Required Area of Absorption Field: N/A* Sq. Ft./bedroom with garbage disposal and washing machine

Remarks:

* - Due to slow percolation rate, a designed system or additional drilling is recommended

Observer: Blake Leonard

By:



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PERCOLATION TEST RESULTS

DRAWN:	DATE:	CHECKED: <i>[Signature]</i>	DATE: 5/21/07
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JOB NO.:

FIG NO.:

APPENDIX E: Soil Survey Descriptions

El Paso County Area, Colorado

15—Brussett loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 367k
Elevation: 7,200 to 7,500 feet
Frost-free period: 115 to 125 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Brussett

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits

Typical profile

A - 0 to 8 inches: loam
BA - 8 to 12 inches: loam
Bt - 12 to 26 inches: clay loam
Bk - 26 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 5 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): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

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

69—Peyton-Pring complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 369g

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Peyton and similar soils: 40 percent

Pring and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peyton

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 and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 12 inches: sandy loam

Bt - 12 to 25 inches: sandy clay loam

BC - 25 to 35 inches: sandy clay loam

C - 35 to 60 inches: sandy loam

Properties and qualities

Slope: 8 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R049XB216CO - Sandy Divide

Hydric soil rating: No

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: 8 to 15 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): 6e

Hydrologic Soil Group: B

Ecological site: R049XB222CO - Loamy Park

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