

Ocotber 28, 2022
Revised Novemeber 3, 2023



ENTECH
ENGINEERING, INC.

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

Doug Hill
13985 Silverton Road
Colorado Springs, CO 80921

Re: OWTS – Wastewater Study
Hill Subdivision
Parcel Nos. 51290-04-018 and 51290-09-002
Alpaca Heights and Black Forest Road
El Paso County, Colorado
Entech Job No. 221947

Dear Mr. Hill:

The project consists of subdividing 16.49-acres; three rural residential lots are proposed as part of the subdivision. An existing home on Lot 1 will remain, and two new lots are proposed. The site is located southeast of the intersection of Hodgen Road and Black Forest Road, in El Paso County. The Black Forest Road right-of-way the for future road realignment is located in the western portion of the site between Lot 1 and Tract A.

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the NW $\frac{1}{4}$ of Section 29 Township 11 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 7 miles east of the town of Monument, southeast of the intersection of Hodgen Road and 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 sloping to the northeast for Lots 1 through 3 and gradually sloping to the west on Tract A. A minor drainage swale is located in the northeastern portion of the property on Lot 2. Water was not observed in the drainage at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included undeveloped agricultural and rural residential. The site contains field grasses, weeds, and ponderosa pines. The existing house with a water well and septic system located on Lot 1, will remain. Site photographs were taken and site mapping was completed on was September 21 and 28, 2022. Site photographs are included in appendix A. Test Borings and Test Pits were performed on September 28 and 29, 2022.

Total acreage involved in the proposed subdivision is 16.49-acres. Three rural residential lots are proposed as part of the subdivision. The proposed lot sizes range from 4.8-acres to 5.0-acres. The existing house and barns located on Lot 1 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.

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 artificial fill, potentially expansive soils, potentially seasonal shallow groundwater.

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Based on the proposed development plan, it appears that these areas will have 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

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 April 22, 2021.

Two test borings were drilled, and two test pits were excavated on the site to determine general suitability of the soil characteristics for residential construction. The locations of the test borings/pits are indicated on the Site Plan/Test Boring Location Map, Figure 3. The Test Boring and 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. 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 one soil type on the site. Complete descriptions of the soil type are presented in Appendix D. In general, the soils consist of sandy loam to loam. The soils are described as follows:

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<u>Type</u>	<u>Description</u>
15	Brussett Loam, 3 – 5% Slopes
68	Peyton-Pring Complex, 3 – 8% Slopes

The soils have been described to have rapid permeabilities. The soils are described as well suited for use as home sites. 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 Pits can be grouped into three general soil and rock types. The soils were classified using the Unified Soil Classification System (USCS). The test pit soils were also classified using the USDA Textural Soil Classification.

Soil Type 1 is a slightly silty to silty sand (SM-SW, SM). The sand soils were encountered in all of the test borings at depths ranging from the existing surface grade to 3 feet, and extending to a depth of 12 feet in Test Boring No. 1 or to the termination of Test Boring Nos. 2 and 3 (20 feet). These soils were encountered at medium dense to dense states and at dry to moist conditions. Samples tested had approximately 8 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits Testing resulted in a liquid limit of 19 and a plastic index of 2.

Soil Type 2 is a sandy clay to very sandy clay (CL). The clay soils were encountered in Test Boring No. 3, and in Test Pit Nos. 1 and 2. The clays were encountered at the existing ground surface and extended to depths of 3 feet bgs in Test Boring No. 3, and to the termination of the test pits (6 to 8 feet). The clay was encountered at firm to stiff consistencies and dry to moist conditions. The samples tested had 57 to 77 percent of the soil size particles passing the No. 200 sieve. Expansion pressure of 580 psf was determined by laboratory tests on samples of the clay soils. This magnitude of expansion is in the low expansion range.

Soil Type 3 is a silty sandstone (SM). The sandstone was encountered in Test Boring No. 1 at an approximate depth of 12 feet bgs and extended to the termination of the boring (20 feet). The sandstone was encountered at dense states and moist conditions. The sandstone had approximately 60 percent of the soil sized particles passing the No. 200 sieve. Atterberg Limits Testing resulted in liquid limit of no value and plastic indexes of non-plastic. Expansive claystone and siltstone is commonly interbedded in the Dawson Formation in the area.

Groundwater

Groundwater was not encountered in the test borings which were drilled to depths of 20 feet, or in the test pits which were excavated to depths of 6 to 8 feet. Groundwater is not anticipated to affect shallow foundations on the majority of the site. An area in the northern portion of Lot 2 has been identified as a potentially seasonal shallow groundwater area, and is discussed further later in this report. 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.

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Geology

Approximately 12 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 Black Forest 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 are described as follows:

Qaf Artificial Fill of Holocene Age: These are man-made fill deposits associated with a small embankment in the western portion of Lot 1.

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 Black Forest 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 and test pits logs used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

Drainage Areas

A minor drainage areas exist in the northeastern portion of the site on proposed Lot 2. No water was observed flowing in the drainage, however, this area has the potential for seasonal shallow groundwater. This area is indicated in the Geology/Engineering Geology Map (Figure 6) and are discussed below. Due to the size of the proposed lot this area can 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. 08041CO305G dated December 7, 2018 (Figure 7, Reference 7). Exact locations of floodplain and specific drainage studies are beyond the scope of this report.

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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 are presented in Appendix D. The soils are described as having moderate to rapid percolation rates. The existing septic system located on Lot 1 will remain. Observations of the leach field area indicated that the system is operating properly. Records for the existing septic system located on Lot 1 are included in Appendix E. The system for the existing home is a conventional infiltration trench system in series.

Soils encountered in the tactile test pits consisted of sandy clay. The limiting layers encountered in the test pits are the sandy clay, which corresponds with USDA Soil Type 4, with a LTAR value of 0.20 gallons per day per square foot. Bedrock or signs of groundwater were not encountered in the test pits. Absorption fields must be installed 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 lots due to the restrictive clay soils. 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 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.

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CLOSURE

This report has been prepared for Doug Hill, 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.

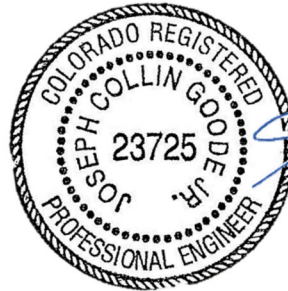
Respectfully Submitted,

ENTECH ENGINEERING, INC.

Reviewed by:



Logan L. Langford, P.G.
Senior Geologist



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

LLL

Encl.

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AAprojects/2022/221947 wws

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El Paso County, Colorado
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BIBLIOGRAPHY

1. Natural Resource Conservation Service, September 2, 2022. *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. Thorson, Jon P., 2003. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-6.
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 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 08041CO305G.

TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT DOUG HILL
PROJECT ALPACA HTS. & BLACK FOREST
JOB NO. 221947

SOIL TYPE	TEST BORING/ TEST PIT NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	TB-2	5			7.8	NV	NP				SM-SW	SAND, SLIGHTLY SILTY
2	TB-3	2-3			57.2				580		CL	CLAY, VERY SANDY
2	TP-1	2			77.4						CL	CLAY, SANDY
2	TP2	4			67.6						CL	CLAY, SANDY
3	TB-1	15			29.8	NV	NP				SM	SANDSTONE, SILTY

Table 2: Summary Test Boring Results


Test Boring No.	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
1	12	>20
2	>20	>20
3	>20	>20

Table 3: Summary Test Pit Results

Test Pit No.	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)	USDA Soil Type	LTAR Value
1	>8	>8	4*	0.20*
2	>6	>6	4*	0.20*

*- Conditions that will require an engineered OWTS

FIGURES

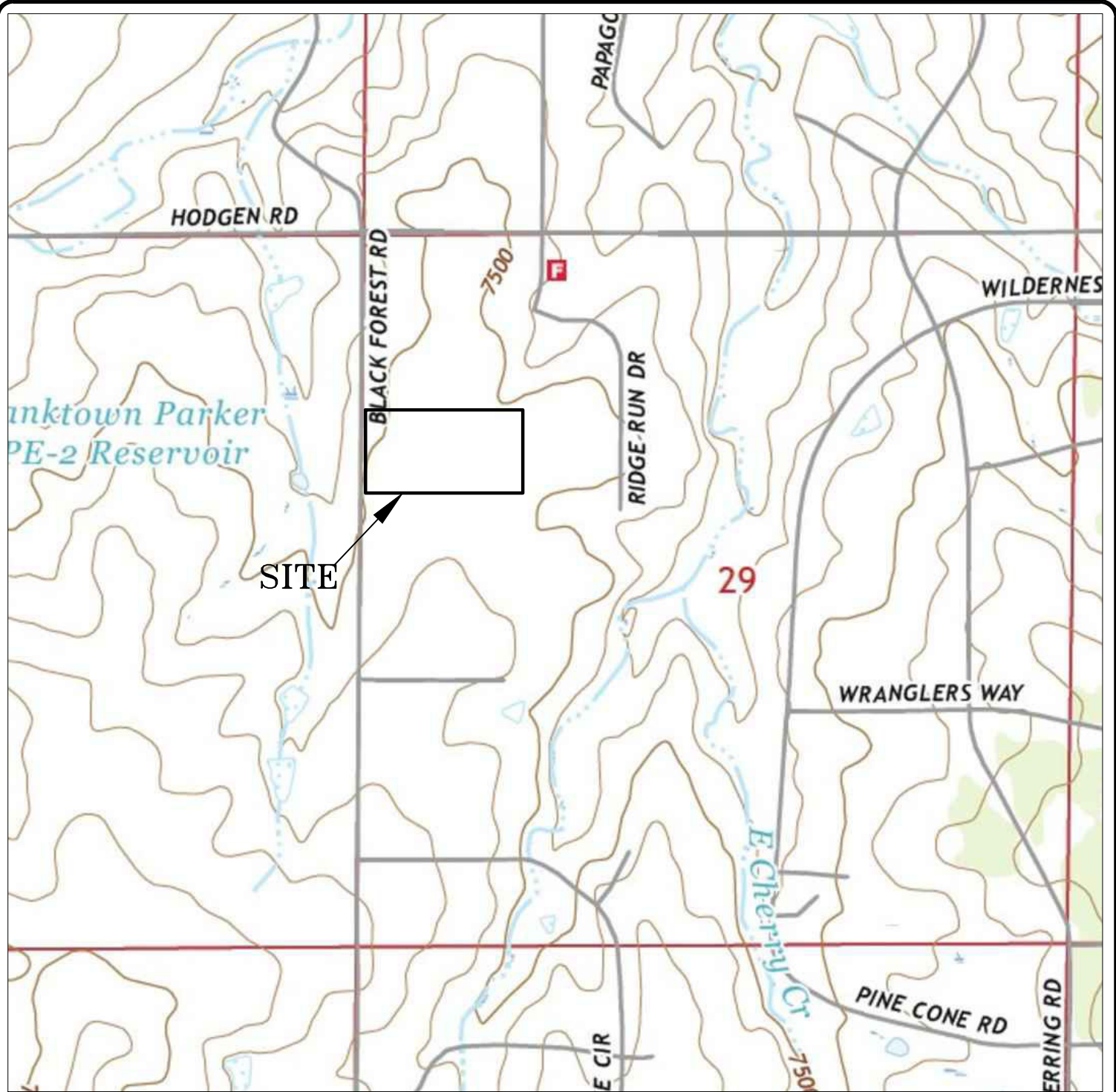
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VICINITY MAP
HILL SUBDIVISION
ALPACA HEIGHTS & BLACK FOREST ROAD
EL PASO COUNTY, CO.
FOR: DOUG HILL

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JOB NO.:
221947

FIG NO.:
1



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USGS TOPOGRAPHY MAP
 HILL SUBDIVISION
 ALPACA HEIGHTS & BLACK FOREST ROAD
 EL PASO COUNTY, CO.
 FOR: DOUG HILL

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 LLL

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 10/12/22

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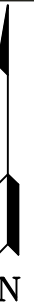
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 221947

FIG NO.:
 2



SITE



N



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SOIL SURVEY MAP
HILL SUBDIVISION
ALPACA HEIGHTS & BLACK FOREST ROAD
EL PASO COUNTY, CO.
FOR: DOUG HILL

DRAWN:
LLL

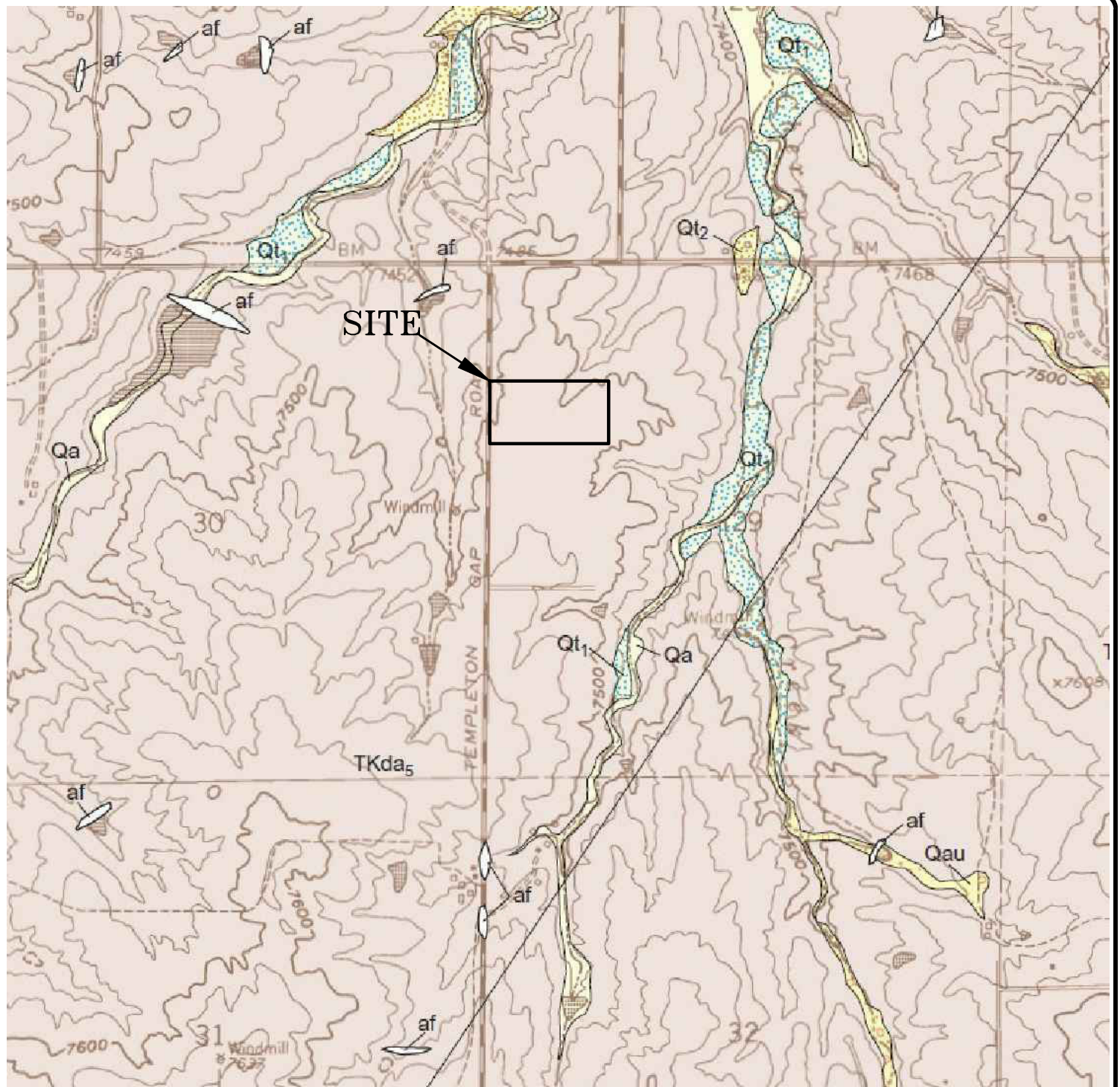
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JOB NO.:
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FIG NO.:
4



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BLACK FOREST QUADRANGLE GEOLOGIC MAP
HILL SUBDIVISION
ALPACA HEIGHTS & BLACK FOREST ROAD
EL PASO COUNTY, CO.
FOR: DOUG HILL

DRAWN:
LLL

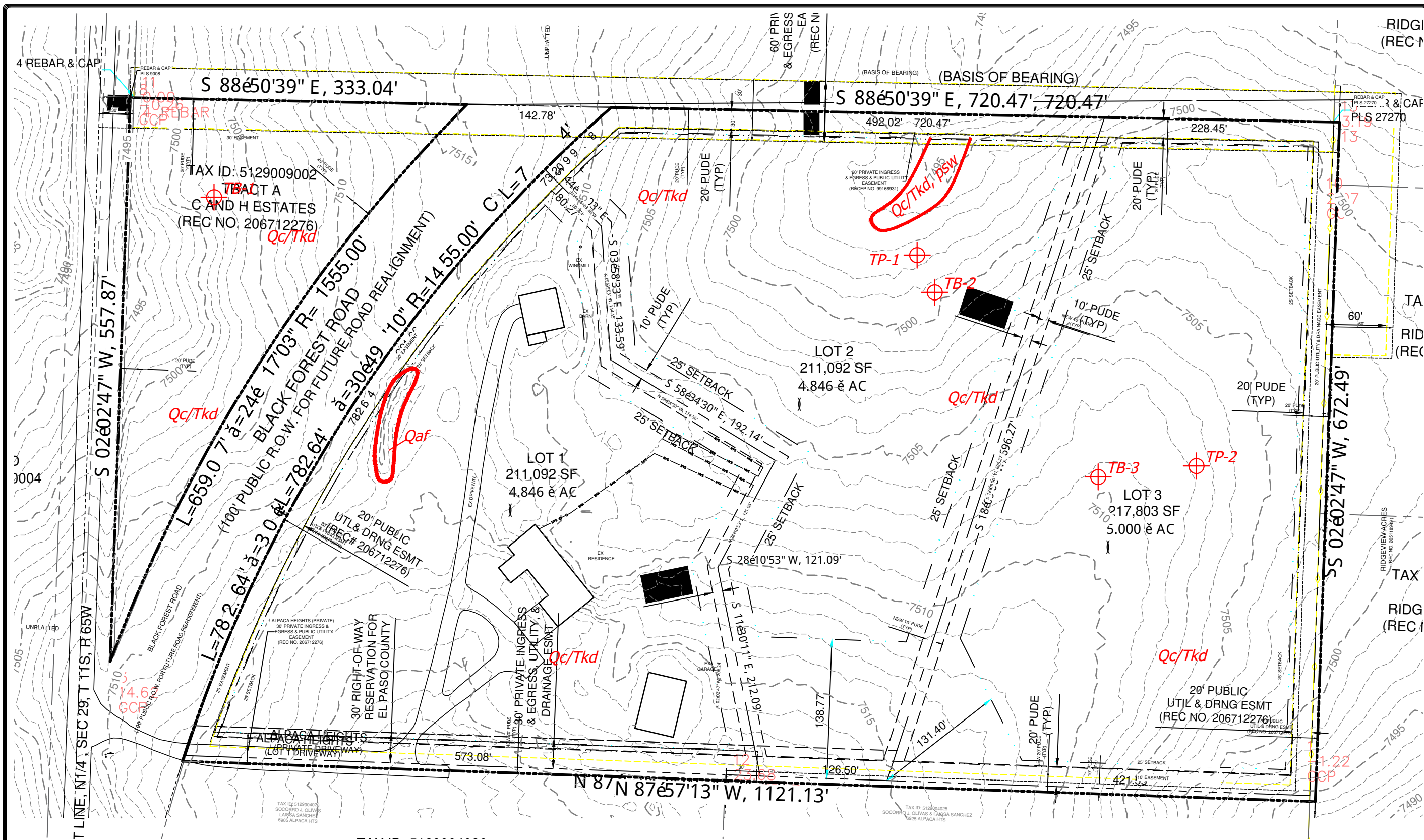
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JOB NO.:
221947

FIG NO.:
5



- Legend:**
- Qaf - Artificial Fill of Holocene Age man-made fill deposits associated with fill along the pipeline easement
 - 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 shallow groundwater area

REVISION	BY

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GEOLGY/ENGINEERING GEOLOGY MAP
HILL SUBDIVISION
ALPACA HEIGHTS & BLACK FOREST ROAD
EL PASO COUNTY, CO.
FOR: DOUG HILL

DRAWN L.L.
CHECKED
DATE 11/3/23
SCALE AS SHOWN
JOB NO. 221947
FIGURE No. 6



080410
eff. 12/

300ft

-104.699 39.064 Degrees



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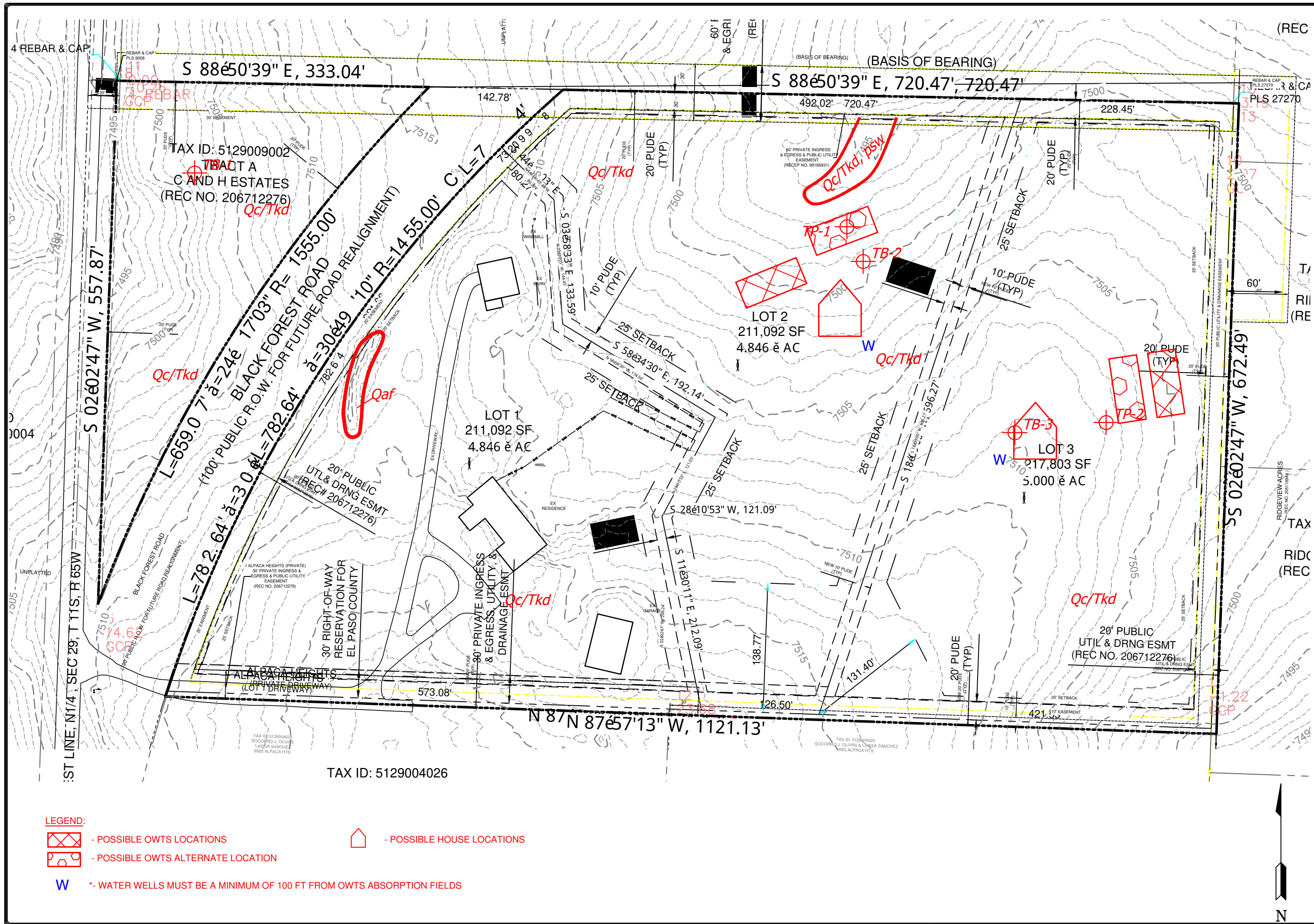
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COLORADO SPRINGS, CO. 80907 (719) 531-5599

FEMA FLOODPLAIN MAP
HILL SUBDIVISION
ALPACA HEIGHTS & BLACK FOREST ROAD
EL PASO COUNTY, CO.
FOR: DOUG HILL

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JOB NO.:
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FIG NO.:
7



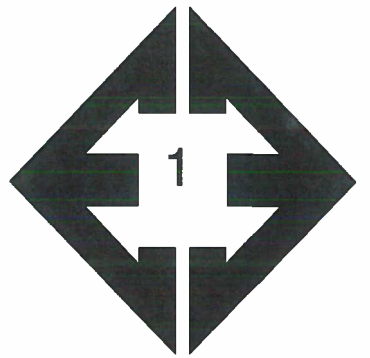
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SEPTIC SUITABILITY MAP
 HILL SUBDIVISION
 ALPACA HEIGHTS & BLACK FOREST ROAD
 EL PASO COUNTY, CO.
 FOR: DOUG HILL

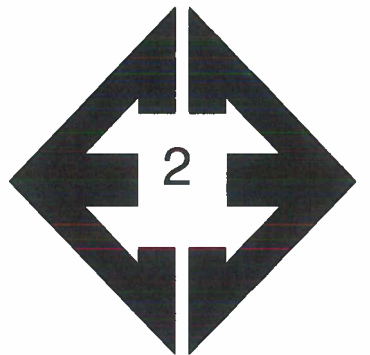
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DATE	11/3/23
SCALE	AS SHOWN
JOB NO.	221947
FIGURE No.	8

APPENDIX A: Photographs



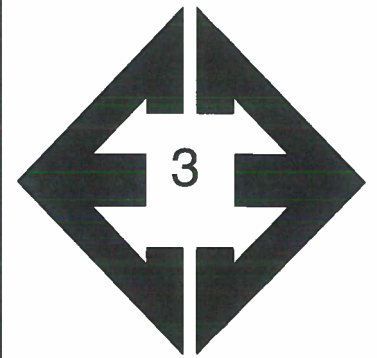
**Looking northwest
from the southern
portion of the site.**

September 21, 2022



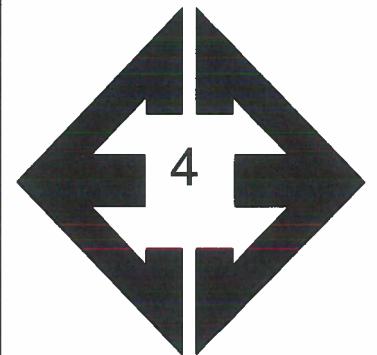
**Looking northwest
from the central
portion of the site.**

September 21, 2022



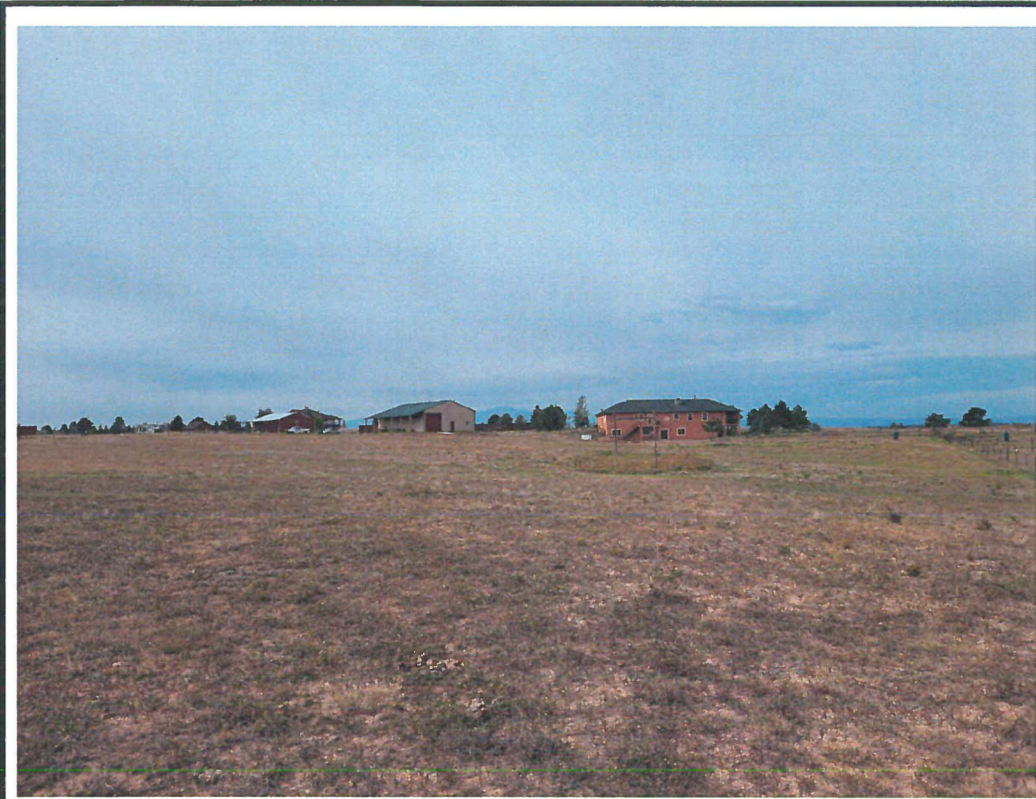
**Looking north along
from the southeastern
portion of the site.**

September 21, 2022



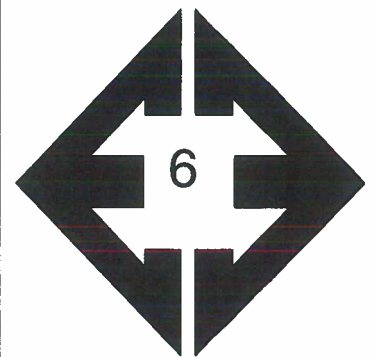
**Looking northeast
from the southern
portion of the site.**

September 21, 2022



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

September 21, 2022



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

September 28, 2022

APPENDIX B: Test Boring & Test Pit Logs

TEST BORING NO. 1
 DATE DRILLED 9/28/2022
 Job # 221947

TEST BORING NO. 2
 DATE DRILLED 9/28/2022
 CLIENT DOUG HILL
 LOCATION ALPACA HTS. & BLACK FOREST

REMARKS

DRY TO 17', 9/29/22

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

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			28	5.1	1
5			20	9.1	1
10			18	9.6	1
15			50	6.4	3
20			50	7.5	3
			6"		
			6"		

REMARKS

DRY TO 19', 9/29/22

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

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			27	2.3	1
5			18	1.0	1
10			20	5.1	1
15			18	6.8	1
20			24	4.0	1



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TEST BORING LOG

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DATE:

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DATE:
 10/4/22






JOB NO.:
 221947

FIG NO.:

B-1

TEST BORING NO. 3
 DATE DRILLED 9/28/2022
 Job # 221947

TEST BORING NO.
 DATE DRILLED
 CLIENT DOUG HILL
 LOCATION ALPACA HTS. & BLACK FOREST

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
DRY TO 18', 9/29/22													
CLAY, VERY SANDY, TAN, STIFF, MOIST				18	8.0	2							
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO DENSE, MOIST TO DRY	5			20	5.6	1		5					
	10			33	2.5	1		10					
	15			27	4.2	1		15					
	20			18	3.8	1		20					



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TEST BORING LOG

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DATE:
 10/4/22



























JOB NO.:
 221947

FIG NO.:

B-2

TEST PIT NO. 1
 DATE EXCAVATED 9/29/2022
 Job # 221947

TEST PIT NO. 2
 DATE EXCAVATED 9/29/2022
 CLIENT DOUG HILL
 LOCATION ALPACA HTS & BLACK FOREST RD

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 @ 6-feet 0-inches							
topsoil (0-4 inches)	1						topsoil (0-4 inches)	1						
sandy clay, fine to medium grained, brown, moist	2			bl	m	4	sandy clay, fine to medium grained, brown, moist	2			bl	m	4	
	3							3						
	4							4				bl	m	4
	5			bl	m	4		5				bl	m	4
	6							6				bl	m	4
	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

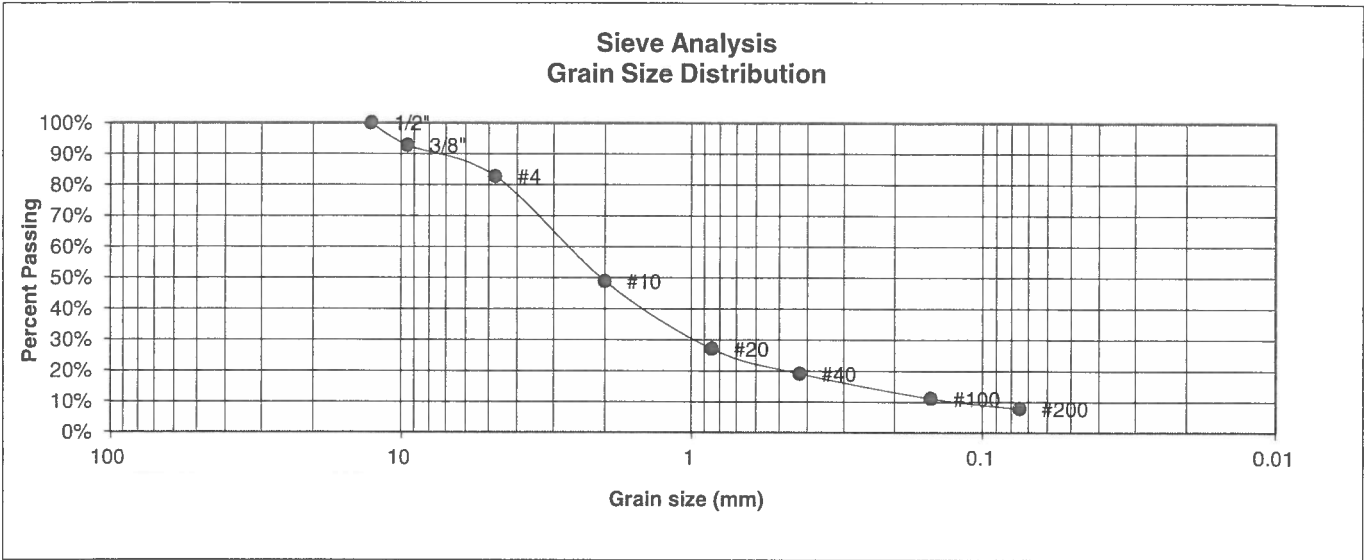
TEST PIT LOG

DRAWN: jhr	DATE: 10/3/2022	CHECKED: LLL	DATE: 10/4/22
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JOB NO.:
221947
 FIG NO.:
B-3

APPENDIX C: Laboratory Test Results

BORING NO.	2	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	5	AASHTO CLASSIFICATION		JOB NO.	221947
CLIENT	DOUG HILL				
PROJECT	ALPACA HTS. & BLACK FOREST				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	92.7%
4	82.7%
10	48.9%
20	27.1%
40	19.1%
100	11.1%
200	7.8%

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)



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**LABORATORY TEST
RESULTS**

DRAWN:

DATE:

CHECKED:
LLL

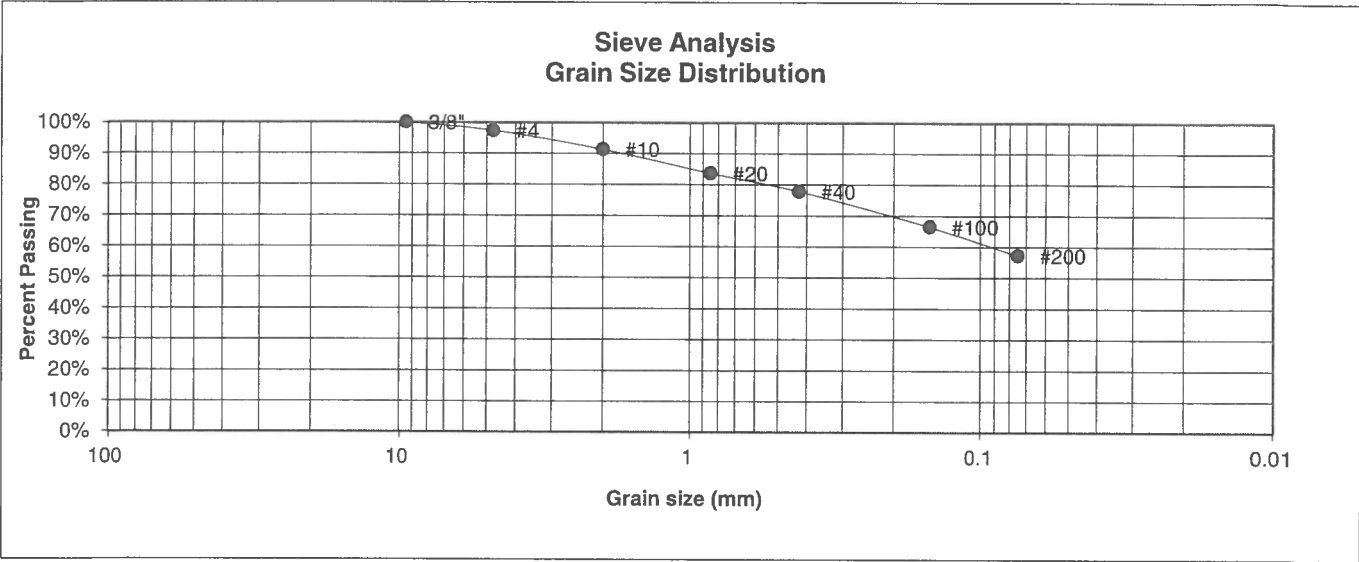
DATE:
10/4/22

JOB NO.:
221947

FIG NO.:

C-1

BORING NO. 3	UNIFIED CLASSIFICATION	CL	TEST BY	BL
DEPTH(ft) 2-3	AASHTO CLASSIFICATION		JOB NO.	221947
CLIENT DOUG HILL				
PROJECT ALPACA HTS. & BLACK FOREST				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.3%
10	91.3%
20	83.7%
40	77.8%
100	66.5%
200	57.2%

Atterberg
Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start 7.9%
Moisture at finish 20.9%
Moisture increase 13.0%
Initial dry density (pcf) 103
Swell (psf) 580



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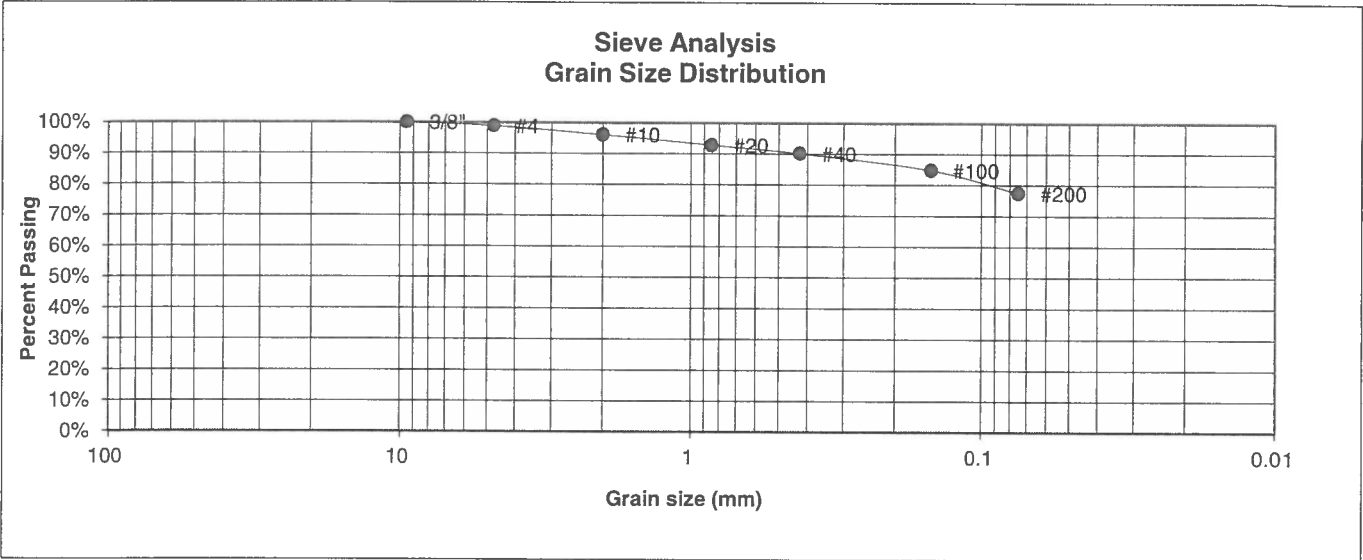
LABORATORY TEST
RESULTS

DRAWN:	DATE:	CHECKED: LL	DATE: 10/4/22
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JOB NO.:
221947

FIG NO.:
C-2

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	CL	<u>TEST BY</u>	BL
DEPTH(ft)	2	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	221947
CLIENT	DOUG HILL				
PROJECT	ALPACA HEIGHTS AND BLACK FOREST				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.9%
10	96.0%
20	92.8%
40	90.1%
100	84.8%
200	77.4%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST
RESULTS**

DRAWN:

DATE:

CHECKED:
LLL

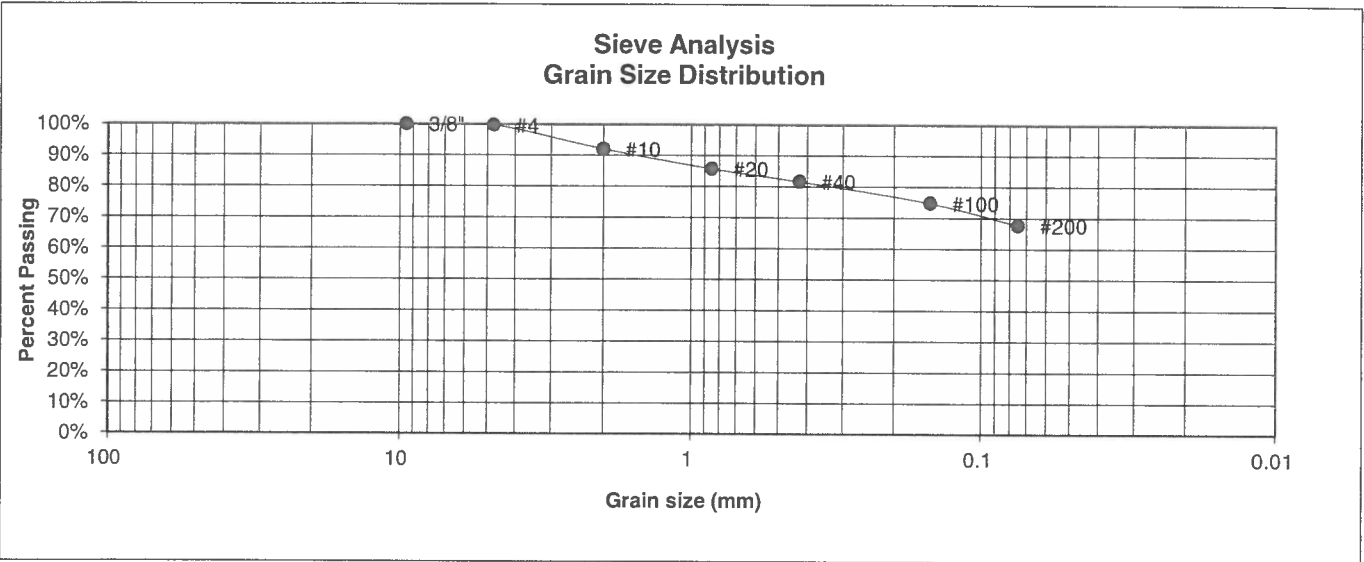
DATE:
10/4/22

JOB NO.:
221947

FIG NO.:

C-3

BORING NO.	TP-2	UNIFIED CLASSIFICATION	CL	TEST BY	BL
DEPTH(ft)	4	AASHTO CLASSIFICATION		JOB NO.	221947
CLIENT	DOUG HILL				
PROJECT	ALPACA HEIGHTS AND BLACK FOREST				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	92.0%
20	85.7%
40	81.6%
100	74.7%
200	67.6%

Atterberg Limits
 Plastic Limit
 Liquid Limit
 Plastic Index

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



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**LABORATORY TEST
RESULTS**

DRAWN:

DATE:

CHECKED:
LL

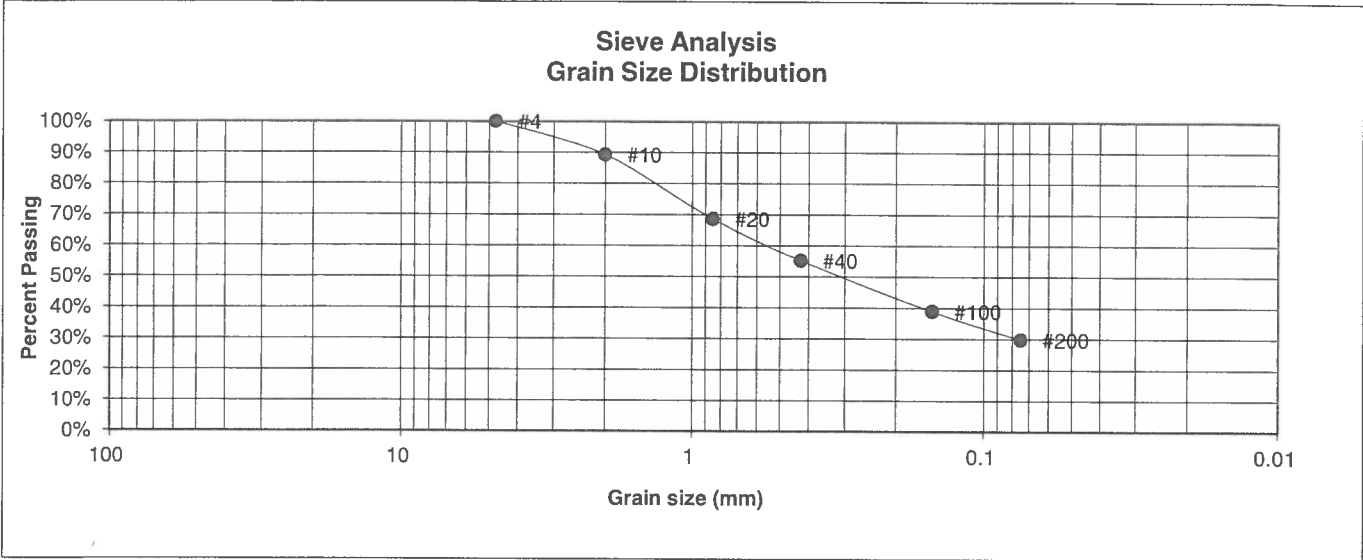
DATE:
10/4/22

JOB NO.:
221947

FIG NO.:

C-4

BORING NO.	1	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	15	AASHTO CLASSIFICATION		JOB NO.	221947
CLIENT	DOUG HILL				
PROJECT	ALPACA HTS. & BLACK FOREST				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	89.2%
20	68.6%
40	55.2%
100	38.9%
200	29.8%

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:
LLL

DATE:
10/4/02

JOB NO.:
221947

FIG NO.:

C-5

APPENDIX D: 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 supply, 0 to 60 inches: 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 - Loamy Park

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 20, Sep 2, 2022

El Paso County Area, Colorado

68—Peyton-Pring complex, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369f

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 loam

C - 35 to 60 inches: sandy 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

Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4c

Hydrologic Soil Group: B

Ecological site: R049XY216CO - 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: 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 supply, 0 to 60 inches: 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 - Loamy Park

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 20, Sep 2, 2022

APPENDIX E: El Paso County Health Department Septic Records

ON 0032229

222P

EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT
INDIVIDUAL SEWAGE DISPOSAL SYSTEM INSPECTION FORM

Permit #

Date May 13, 2005

APPROVED: Yes No

APN 5129004018

Environmental Health Specialist: Brad Wallace

Address 6910 Alpacas Heights Owner STEWART

Legal Description TR in NW 4 Sec. 29-11-65

Residence # Bedrooms 4 Commercial System Installer J+K Excavating

SEPTIC TANK:

Commercial Noncommercial Construction Material Concrete Capacity Gallon 1,500

DISPOSAL FIELD:

Trench: Depth (Range) _____ Width _____ Total Length _____ Sq. Ft. _____

Bed: Depth (Range) _____ Length _____ Width _____ Sq. Ft. _____

Depth of Rock _____ Under PVC _____ Type of cover on Rock _____

DRYWELLS: # of Pits _____ Rings (Pit 1) _____ Rings (Pit 2) _____ Working Depth #1 _____ #2 _____

Size (L x W) #1 _____ #2 _____ Total Sq. Ft. _____

ROCKLESS SYSTEMS:

Standard Chamber: Type Infiltrators #Chambers 5 Sq. Ft./Chamber 15.5 Bed _____ Trench X

High Profile Units: Type Chamber _____ #Chambers _____ Sq. Ft./Chamber _____ Bed _____ Trench _____

Reduction Allowed 40 % Sq. Ft. Required 1,524 Depth (Range) 30" - 36"

Sq. Ft. Installed _____ Equivalent Sq. Ft. Installed with Reduction 1,524 FT²

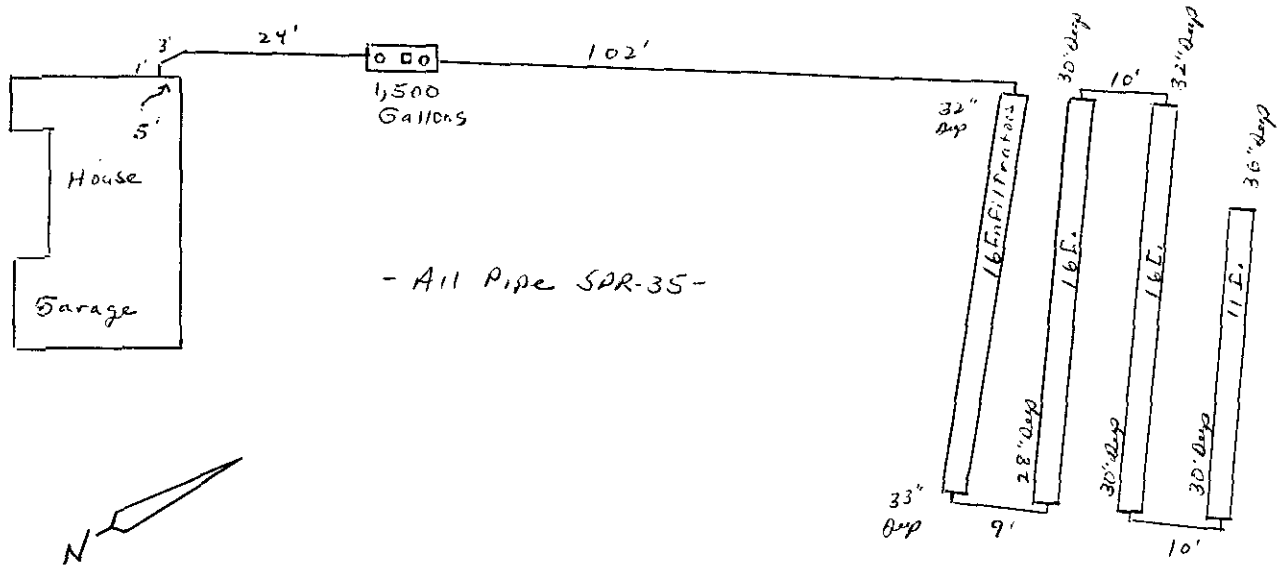
Engineer Design: Y Engineering Firm _____

Approval letter provided? Y N

Well installed at time of septic system inspection? Y Public Water? _____

*Approval will be revoked if in the future the well is found to be within 50 feet of the septic tank and/or 100 feet of the disposal field.

NOTES:



INDIVIDUAL SEWAGE DISPOSAL SYSTEM PERMIT

222

OWNER NAME: CHARLES AND HELEN STEWART PERMIT NUMBER: ON0006324
ADDRESS: 6910 ALPACA HEIGHTS DATE PERMITTED: 4/7/2005
CITY, STATE, ZIP: COLORADO SPRINGS CO 80908 PHONE NUMBER: 7194885594
INSTALLED BY:

This permit is issued in accordance with 25-10-107 Colorado Revised Statutes. PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of twelve (12) months from date of issue- whichever occurs first-(unless work is in progress). If both a building and an ISDS permit are issued for the same property and construction has not commenced prior to the expiration date of the building permit, the ISDS permit shall expire at the same time as the building permit. This permit is revokable if all stated requirements are not met.

Sewage disposal system to be installed by an El Paso County Licensed System Contractor or the property owner.

THIS PERMIT DOES NOT DENOTE APPROVAL OF ZONING AND ACREAGE REQUIREMENTS.

Rosemary C. Baker-Martin

DIRECTOR, EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT

PERMIT EXPIRATION DATE :
Expires twelve months from date of issue

Brad Walker 578-3127
ENVIRONMENTALIST / PHONE NUMBER*

* NOTE: FOR INSPECTIONS CALL 575-8699 BEFORE 8:30 A.M. OF THE DAY TO BE INSPECTED.
(WEEKENDS & HOLIDAYS EXCLUDED)

LEAVE THE ENTIRE SEWAGE DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION.

WATER SOURCE: WELL

MINIMUM SEPTIC TANK SIZE : 1,500 GALLONS MINIMUM ABSORPTION AREA REQUIRED 1,524 SQ FT

PLANNING DEPARTMENT ENUMERATION FLOOD PLAIN WASTEWATER N/A

COMMENTS:

INSTALL LEACH FIELD IN AREA AND AVERAGE DEPTH (34 INCHES) OF PERCOLATION TEST. RUNOFF FROM HOUSE MUST NOT FLOW INTO LEACH FIELD AREA. LEACH FIELD AREA MUST NOT BE COMPACTED BY VEHICLE OR LIVESTOCK TRAFFIC, A BARRIER IS RECOMMENDED.

The Health Office shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable time for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

FOR ADMINISTRATIVE USE ONLY

Permit Ready: 4-7-05 *MW* Called _____ Mailed _____
Final Inspection Requested: BY: John - JOK Date Called In: 5/13/05 7:36
Phone # 331-4321 Septic Site will be ready: afternoon
481-2417

EL PASO COUNTY ENVIRONMENTAL HEALTH SERVICES

301 South Union Boulevard • Colorado Springs, CO • 80910-3123 • (719) 578-3125 • Fax: (719) 578-3188

ALL PAYMENTS ARE DUE AT TIME OF SUBMITTAL IN CASH OR CHECK

APPLICATION FOR AN ON-SITE WASTEWATER TREATMENT SYSTEM PERMIT

NEW CONSTRUCTION MINOR REPAIR MAJOR REPAIR/ADD

Owner: ~~Charles & Helen Stewart~~ Charles & Helen Stewart Daytime Phone: (719) 458-5594

Address of Property: ~~6910 HIPACA HTS~~ 6910 HIPACA HTS City & Zip: Colorado Springs 80908

Legal Description: TR IN NW4 SEC 29-11-15 DES

Owner's MAILING Address: 2200 Twining Rd. City, State & Zip: Larkspur, CO 80118

Lot Size: 36.29 Tax Schedule #: 5129000005

Type of Building: Frame Modular Mobile Commercial Manufactured Other
Water Supply: Well or Spring Cistern Public Inside City Limits: No Yes-City

MAIL PERMIT OR PICK UP PERMIT THERE IS AN ADDITIONAL RESIDENCE ON THIS PROPERTY

MAXIMUM POTENTIAL NUMBER OF BEDROOMS <u>4</u>			
Percolation Test Attached <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Basement <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Garbage Disposal <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Clothes Washer <input checked="" type="checkbox"/> Y <input type="checkbox"/> N

I have supplied a plot plan as described on the back of this form. I acknowledge the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the Department to be made and furnished by an applicant for purposes of evaluating the application, and issuance of the permit is subject to such terms and conditions as deemed necessary to ensure compliance with rules and regulations adopted pursuant to C.R.S. 25-10-107 et. seq. I hereby certify all represented to be true and correct to the best of my knowledge and belief, and are designed to be relied on by the El Paso County Department of Health and Environment in evaluating the same for purposes of issuing the permit applied for herein. I further understand any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application and in legal action for perjury as provided by law.

OWNER'S SIGNATURE Charles Stewart Date 3/29/05

You will be notified by telephone when your permit is ready for pick up. Please allow a minimum of 10 days for new septic.

DEPARTMENT OF HEALTH USE ONLY

1,500 Gallons Minimum Tank Capacity 1524 FT² Minimum Absorption Area 4-6-05 Date of Site Inspection

REMARKS: Install leach field in area and average depth (39") of perc test. Runoff from house must NOT flow into leach field area. Leach field area must not be compacted by vehicle or livestock traffic, a barrier is recommended.

EHS INSPECTOR Brad Wallen DATE 4-6-05 APPROVED DENIED

FEES AS OF 01/01/04:
NEW CONSTRUCTION \$483.00 + Planning Department Surcharge of \$30. = \$513.00 CK # 1007
MAJOR REPAIR/ADDITION \$489.00
MINOR REPAIR/ADDITION \$263.00

DATE TO PLANNING / WASTEWATER: _____
DATE TO FLOODPLAIN/ENUMERATIONS: 04/04/05

PLEASE COMPLETE THE BACK OF THIS FORM

1) We require an original of your PERCOLATION (PERC) TEST with an original professional engineer's (PE) stamp and signature as well as a plot of the percolation test hole locations with measurements from a fixed reference point.

2) PROPI ROAD RETU

COUNTY HEALTH DEPARTMENT

OT NUMBER MUST BE POSTED AND CLEARLY VISIBLE FROM BE CLEARLY MARKED OR AN ADDITIONAL CHARGE FOR A MAY BE ASSESSED.

3) A PLO

- 1) a no
- 2) prop
- 3) prop

04-01-2006 FRI 470

not to scale) on an 8 1/2 x 11 sheet of paper. The plot plan must include:

- 6) driveway (proposed or existing)
- 7) driveway (proposed or existing and name of adjoining street)

4) Initial a PLAN.

- W
- Ci

OWE NEW	457.00
OWE ENTY SURCH.	119.00
SUBTL	525.00
TOTAL	525.00
CHGE	517.00
CHARGE	28.00
	5.00

ires that apply to your property and INCLUDE them on your PLOT

- Adjacent property well(s)
- Subsoil drain
- Waterline
- within 100 feet of your proposed septic system and INCLUDE on your

5) Initial a PLOT P

ITEM	
DESCR	

Lake(s)

Stream(s)

Natural drainage course(s)

Dry Gulch(es)

6) GIVE COMPLETE DIRECTIONS TO THE PROPERTY FROM A MAIN HIGHWAY

I-25 North to the monument / Hwy 105 Exit
 to EAST on Hwy 105 to Hwy 83
 Take 83 South to Hodgen Rd.
 turn left (east) on Hodgen to Black Forest Rd.
 Turn Right (south) on Black Forest Road
 property located on left hand side.
 turn left onto Alpaca Heights.