Soils and Geology

Evaluation

For

Circle A Subdivision

17110 E Goshawk Rd.

September 10, 2019

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Principal, Professional Geologist

GWI

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PROJECT DESCRIPTION

The following presents the Soils and Geology Evaluation for the 14.9 Acre parcel located in the Southwest 1/4 of the Northeast ¼ of Section 23, Township 11 South, Range 65 West, of the 6th P.M. ("Property"). The Property is situated within the Kiowa Bijou Designated Groundwater Basin with the address 17110 E. Goshawk Road, Colorado Springs, CO 80908 in El Paso County (Figure 1).

The Project Site is 14.9 acres of land to be subdivided into 3 single- family residential RR-5 lots (Figure 2). Lot 1 is comprised of 4.957 acres, Lot 2 is 4.96 ACRES and Lot 3 will be 4.95 acres. There is an existing home on Lot 1 with an existing well and individual non-evaporative septic system. The soils at vacant Lots 2 and 3 are addressed herein with regard to soil investigations as it applies to proposed residential structures and septic system suitability. The water supply for lots 2 and 3 will be from individual wells, and wastewater will be treated by individual non-evaporative septic systems.

GEOLOGY and HYDROLOGY

The Project Site is located within the Black Forest Quadrangle near the southeastern portion of the Denver Basin, a geologic structural depression (Thorson 2003a, b). This asymmetrical structural basin is shallow-dipping toward the northeast. The uppermost materials are that of the Dawson Formation deposited during the early to possibly middle Eocene. Historically, braided streams eastwardly carried and deposited gravel, sand, silt and clays derived from weathered Precambrian Pike Peak Granite from the uplifted areas to the west.

Facies Unit 5 (TKda5) is the uppermost facies of the Dawson Formation and is mapped over the Project Site (Figure 3). Facies Unit 5 is described as generally permeable, well drained, with good foundation characteristics.

The Property slopes generally to the southeast with a higher topographic area located on Lot 1 (Figure 4). There is a shallow drainage area on the northern portion of the Project Site that

crosses Lot 2 from the northwest to southeasterly collecting and directing sheetwash during rainfall events towards West Kiowa Creek.

SOILS - NRCS

The National Resource Conservation Service (NRCS) identified two soil types with a northwest trend on the Property.

Type	Description	Percent Coverage
25	Elbeth Sandy Loam , 3 to 8 percent slopes	96
92	Tomah-Crowfoot Loamy sands 3 to 8 percent	4

Attachment 1 provides a complete description of the soils. All proposed buildable land is located within the area identified as Elbeth Sandy Loam. This drainage class is described as well drained and in Hydrologic Soil Group B which is defined as having a moderate infiltration rate and moderately fine to course textures. Runoff potential is medium. Samples discussed below indicate the upper eight feet of soils is comprised of interbedded sandy clay, sandy loam and sandy clay loam. Soils are derived from the Dawson formation which include arkosic sands with interbedded clays.

FIELD INVESTIGATIONS

OWTS and Foundation Design

Field soils investigations at the Project Site consisted of excavating five profile pits at Lot 2 (Site 1) and two profile pits at Lot 3 (Site 2) to evaluate suitability for Onsite Wastewater Treatment System (OWTS). In addition, two soil test borings, one on each of Lots 2 and 3, were drilled for foundation design.

The OWTS profile pits were excavated to a maximum depth of 8.5 feet below ground surface. Samples were collected from select intervals and were classified according to the U.S. Department of Agriculture soil classification system. Soil evaluation results for samples collected at Lot 2 identified Soil Type 4A (Ltr = 0.15), a massive sandy clay, was encountered in Test Pits 1, 2, 3, and 5 at a depth within the treatment zone that would require an Engineered OWTS. However, at the location of Test Pit 4, a suitable Sandy Clay Loam Type 3 (Ltr=0.35)

was encountered in the treatment zone identifying this location suitable for a conventional OWTS (Table 1). Soil evaluation results for samples collected at Lot 3 identified Soil Type 3 (Ltr=0.35) described as a Sandy Clay Loam and was identified as being a suitable location for a conventional OWTS . Attachment 2 presents the comprehensive signed Engineering Reports and the details of the test pit results for the evaluation of OWTS suitability.

One 4- inch test boring was drilled on each Lots 2 (Site 1) and 3 (Site 2) to depths to 20 feet below grade at the proposed foundation location (Figure 5). Soil samples were evaluated at five-foot intervals and testing included standard property tests, natural water content, Atterberg limits and Expansion Index tests (Attachment 3).

Soils encountered in the boring at Lot 2 was medium dense to dense, Clayey Sand with medium clay content, and high plasticity. Parr Engineering recommended the overexcavation of the native expansive soil and placement of property compacted structural fill material to a depth of 4-feet below the foundation. In addition, drilled cassions were recommended if significant moisture variances occur in the native soils, below the fill material.

Lot 3 soils were identified as predominately very dense, Silty, Clayey Sand with low clay content, and low plasticity. Parr Engineering recommended a shallow foundation of reinforced concrete with footings on the native soils.

GEOLOGIC HAZARDS

The Project Site was evaluated for geologic hazards that may impact development. Hazards identified in the El Paso County Land Development Code including: Mining, wildfire, polluted water, landfills, fill areas in buildable areas, contamination; airports and major utility facilities, and landslides were not identified on the Project Site. The National Flood Hazard map delineated the Property and surrounding area an "area of Minimal Flood Hazard" (FEMA 2018). The Project Site is not located in a flood plain (Figure 6).

Erosion

The surface topography across the Project Site is predominately flat with gentle slopes of less than 5%. The Property is covered by Pondeosa Pines and native grasses and low potential for erosion except where disturbed by excavation.

Expansive Soils

Site specific sampling results indicate that, within profile pits excavated to evaluate suitability for OWTS design, expansive potential of the soils was determined to be high at four of five locations at Lot 2. One location was identified to be suitable for a conventional OWTS. In the 20-foot boring at the proposed building location, expansive soil was also identified.

The expansive potential of the soils was determined to be low at Lot 3 in the two profile pits at the proposed OWTS location and in the soil boring at the building location. Due to potential variability, soils at both Lots 2 and 3 will need to be re-evaluated upon completion of the foundation excavation and prior to the placement of any framework.

Groundwater and Surface Water

Groundwater was not encountered during excavation of the 7 profile pits or 2 foundation borings However, there is a possibility for periodic high moisture conditions and frost heave from shallow perched water.

Seismic

Structural Engineers Association of California's and California's Office of Statewide Health Planning and Development developed an open-source web interface that uses the USGS web services to retrieve the seismic design data and presents it in a report format. Approximately 16 miles to the west of the Property is Ute Pass Fault. The fault is not active in recent times but earthquakes within the area have occurred as recent as 2007. The results of the USGS seismic design tool is provided as Attachment 4.

MINERAL RESOURCES

The Project Site is not included in the maps of aggregate deposits or known mineral resources. Colorado Geological Mineral Resources Derivative Map indicates a low potential to contain economically viable mineral resources.

CONCLUSION

The Project Site is compatible with the proposed development of single-family rural residential lots. The OWTS for Lot 2 was identified as requiring an engineered individual wastewater treatment system at 4 of 5 test pit locations and suitable for a conventional OWTS at one location. The proposed location of the conventional OWTS location and an alternative location is shown on Figure 5. The primary OWTS location at Lot 3 was identified as being suitable for a conventional system. Geologic hazards were not identified at the Project Site that would inhibit the proposed expansion of rural residential use. However, expansive soils were identified on Lot 2 which can be mitigated by standard engineering practices.

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REFERENCES AND RESOURCES

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Parr Engineering and Consulting Inc. June 12, 2019 Profile Pit Evaluation, 17110 E Goshawk Road Colorado Springs CO 80908, JN 19.203A

Parr Engineering and Consulting Inc. June 12, 2019 Subsurface Soil Investigation 17110 E Goshawk Road Colorado Springs CO 80908, JN 19.203A

Parr Engineering and Consulting Inc. June 12, 2019 Subsurface Soil Investigation 17110 E Goshawk Road Colorado Springs CO 80908, JN 19.203B

Parr Engineering and Consulting Inc. August 2, 2019 Profile Pit Evaluation 17110 E Goshawk Road Colorado Springs CO 80908, JN 19.203A

Schwochow, S.D; et al. 1974. Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties. Colorado Geological Survey, Special Publication 5-B.

Thorson, Jon P., 2003a. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey Open -File Report 03-06. Map Scale 1:24,000.

USGS Groundwater Watch. https://groundwaterwatch.usgs.gov/
Colorado Active Water Level Network.

https://earthquake.usgs.gov/hazards/designmaps/; SEAOC/OSHPD Seismic Design Maps Tool

TABLE 1
OTWS PROFILE TEST PITS LOT 2

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
Profile Pit 1								
		Topsoil						
2		Sandy Clay	Massive	Structureless	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	2.5Y 4/6 (Moist)
4	■							
6								
		Total Depth= 6'-0"						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
Profile Pit 2								
		Topsoil						
2		Sandy Clay	Massive	Structureless	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	2.5Y 4/6 (Moist)
4								
6								
		Total Depth= 6'-0"						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
Test Pit 3								
		Topsoil						
2	■	Sandy Clay	Massive	Structureless	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	10YR 4/6 (Moist)
4	■	Sandy Loam	Granular	Strong	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	10YR 5/4 (Moist)
6								
		Total Depth= 7'-0"						
8								
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
Test Pit 4								
		Topsoil						
2	■	Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	5YR 4/6 (Moist)
4	■	Sandy Clay	Granular	Strong	No	**Type 3 (LTAR = 0.35)**	<35%	10YR 6/4 (Moist)
6	■	Sandy Loam	Granular	Strong	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	2.5Y 6/3 (Moist)
8								
		Total Depth= 8'-0"						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

Test Pit 5

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2	■	Sandy Clay	Massive	Structureless	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	10YR 5/4 (Moist)
4								
6	■	Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	10YR 6/2 (Moist)
8								
		Total Depth= 8'-6"						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

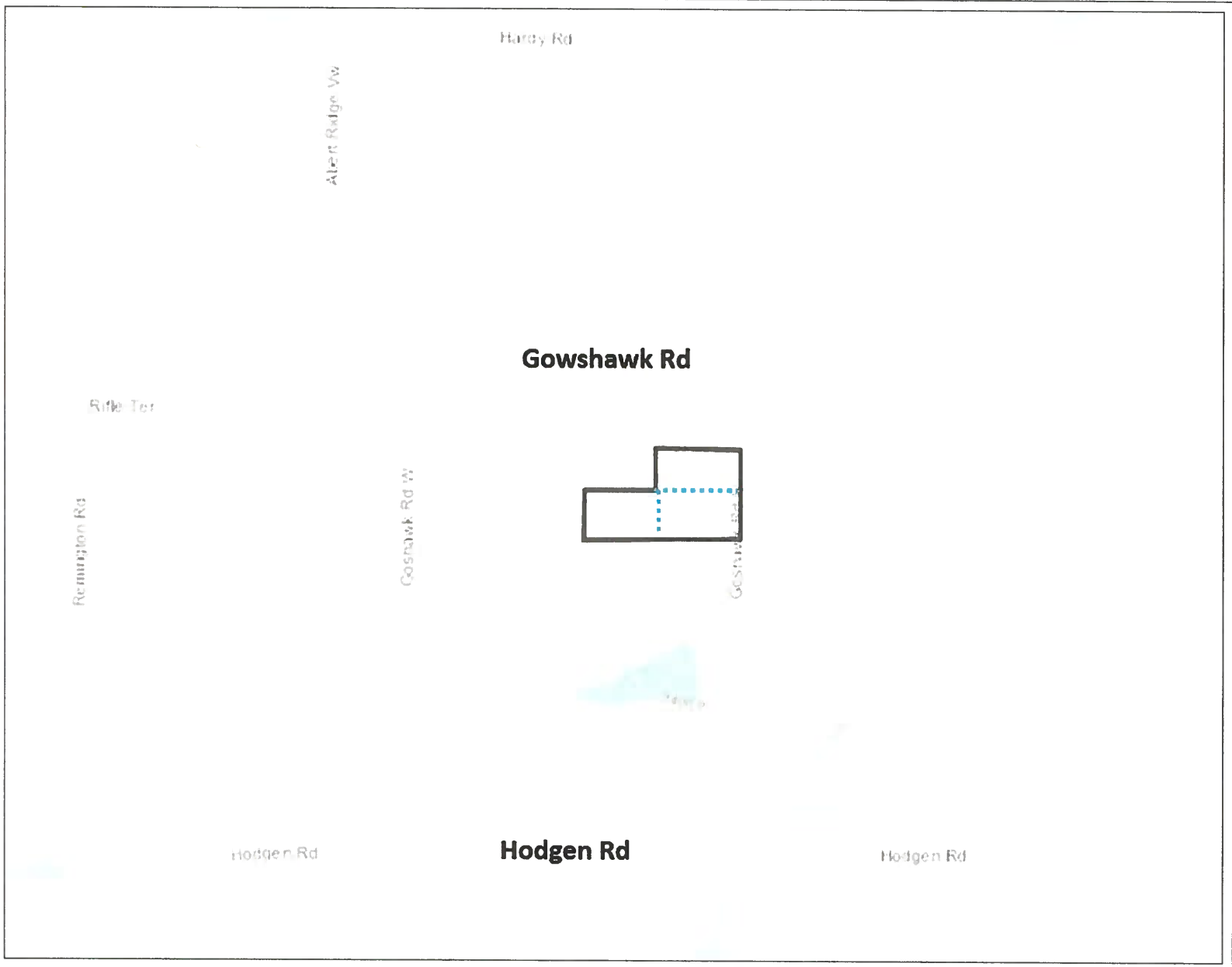
TABLE 2
PROFILE PITS FOR OWTS LOT 3

Depth (ft.)	Sample Interval	Site 2, 17110 East Goshawk Road, 80908						
		USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	10YR 5/3 (Moist)
4		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatmemt Level 1**	<35%	2.5Y 6/2 (Moist)
6		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	2.5Y 6/1 (Moist)
8		**Total Depth= 7'-6"**						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

Depth (ft.)	Sample Interval	Site 2, 17110 East Goshawk Road, 80908						
		USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = .60)**	<35%	10 YR 5/3 (Moist)
4		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	2.5Y 6/2 (Moist)
6		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = .60) Treatment Level 1**	<35%	2.5Y 6/1 (Moist)
8		**Total Depth= 7'-6"**						
Evidence of Groundwater:		**Not Reached**						
Depth to Bedrock:		**Not Reached**						

CDSS
Colorado's Decision Support Systems

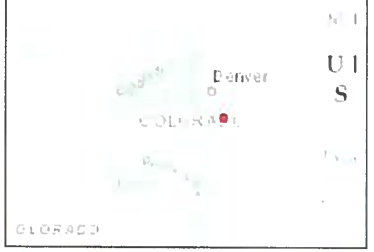
Location Circle A Subdivision



Legend

County

Location



Notes

CIRCLE A SUBDIVISION
SW1/4 NE1/4 SEC 23 T11S R65W

FIGURE 1

2,339 0 1,169 2,339 Feet

1: 14,032

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Date Prepared: 8/16/2019 2:22:14 PM

CIRCLE A SUBDIVISION FILING NO. 1

A SUBDIVISION OF THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23 AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23. ALL IN TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO

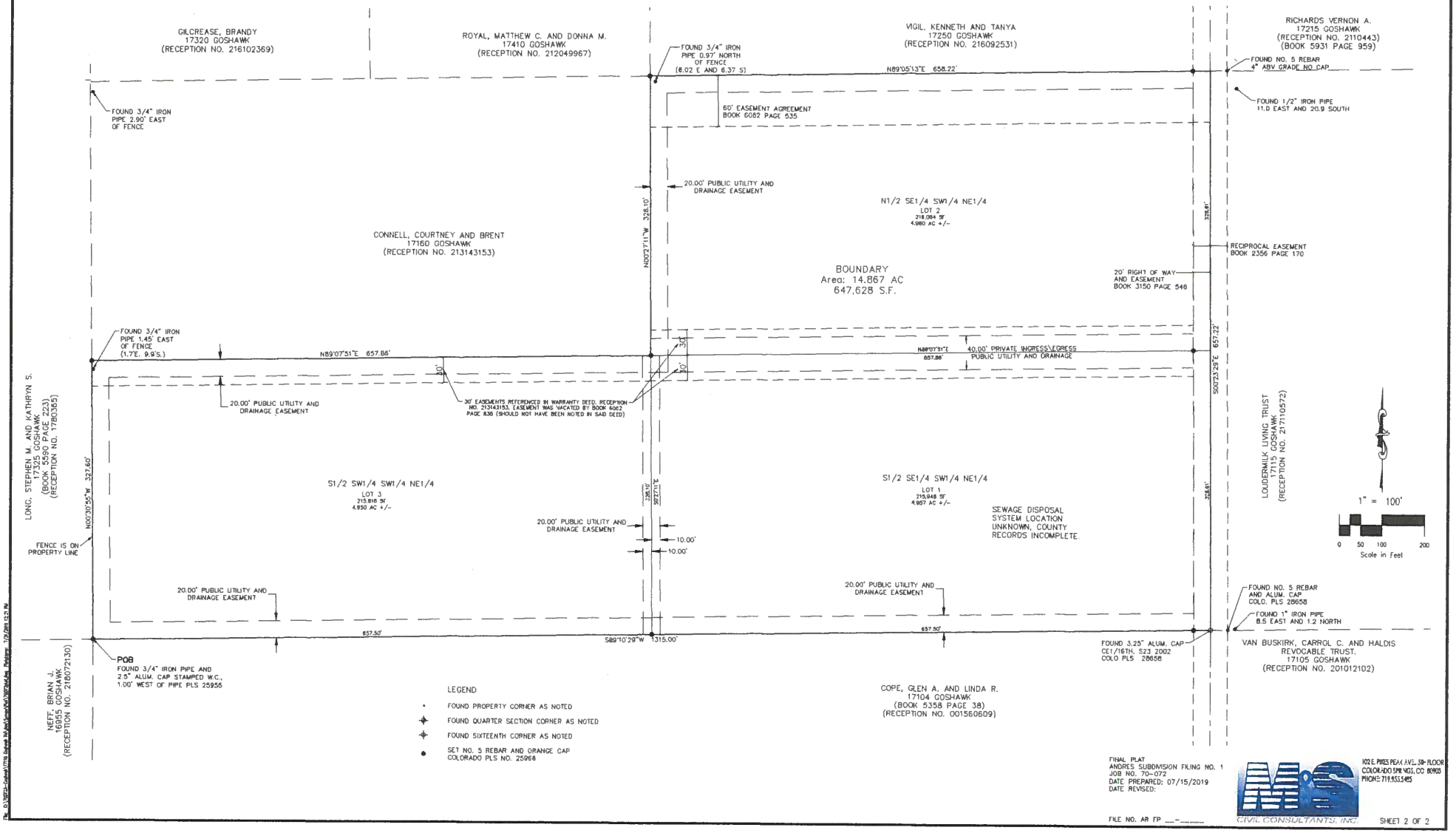
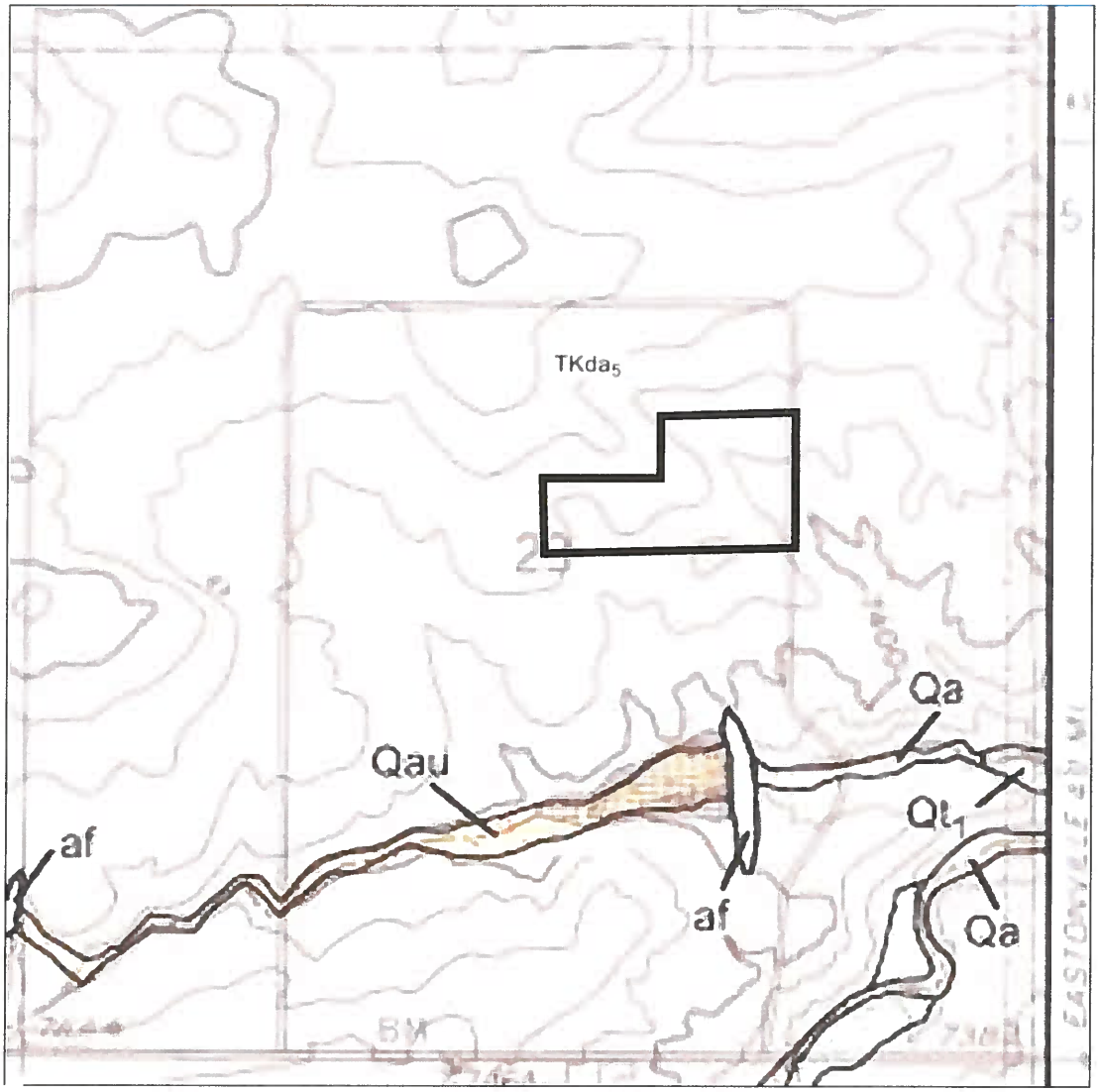


FIGURE 2
CIRCLE A SUBDIVISION LOTS



BEDROCK DEPOSITS

$TKda_5$	Facies unit five (early to middle? Eocene)

ALLUVIAL DEPOSITS

Qa	Channel and flood-plain alluvium (late Holocene)
Qt_1	Terrace alluvium one (Holocene and late Pleistocene)
Qau	Alluvium, undivided (Holocene and Pleistocene)

HUMAN-MADE DEPOSITS

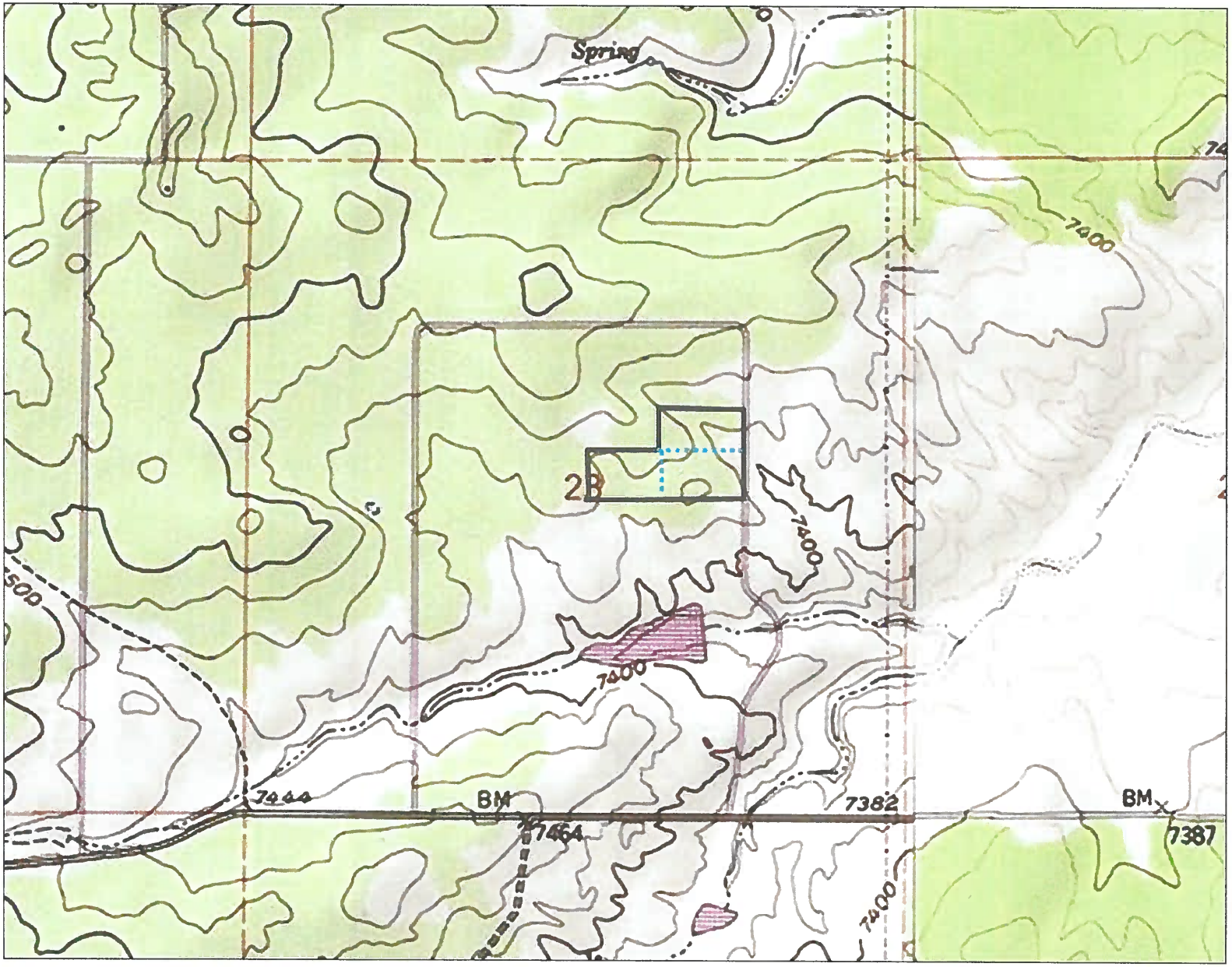
af	Artificial fill (late Holocene)

Black Forest Quadrangle
Sec 23 Township 12S Range 65W
Circle A Subdivision

FIGURE 3
GEOLOGY

CDSS
Colorado's Decision Support Systems

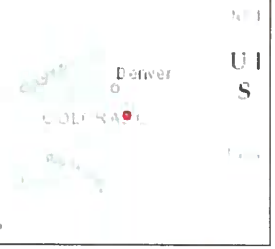
Topographic Map



Legend

County

Location



Notes

CIRCLE A SUBDIVISION
SW1/4 NE1/4 SEC 23 T11S R65W

FIGURE 4

2,339 0 1,169 2,339 Feet

1: 14,032

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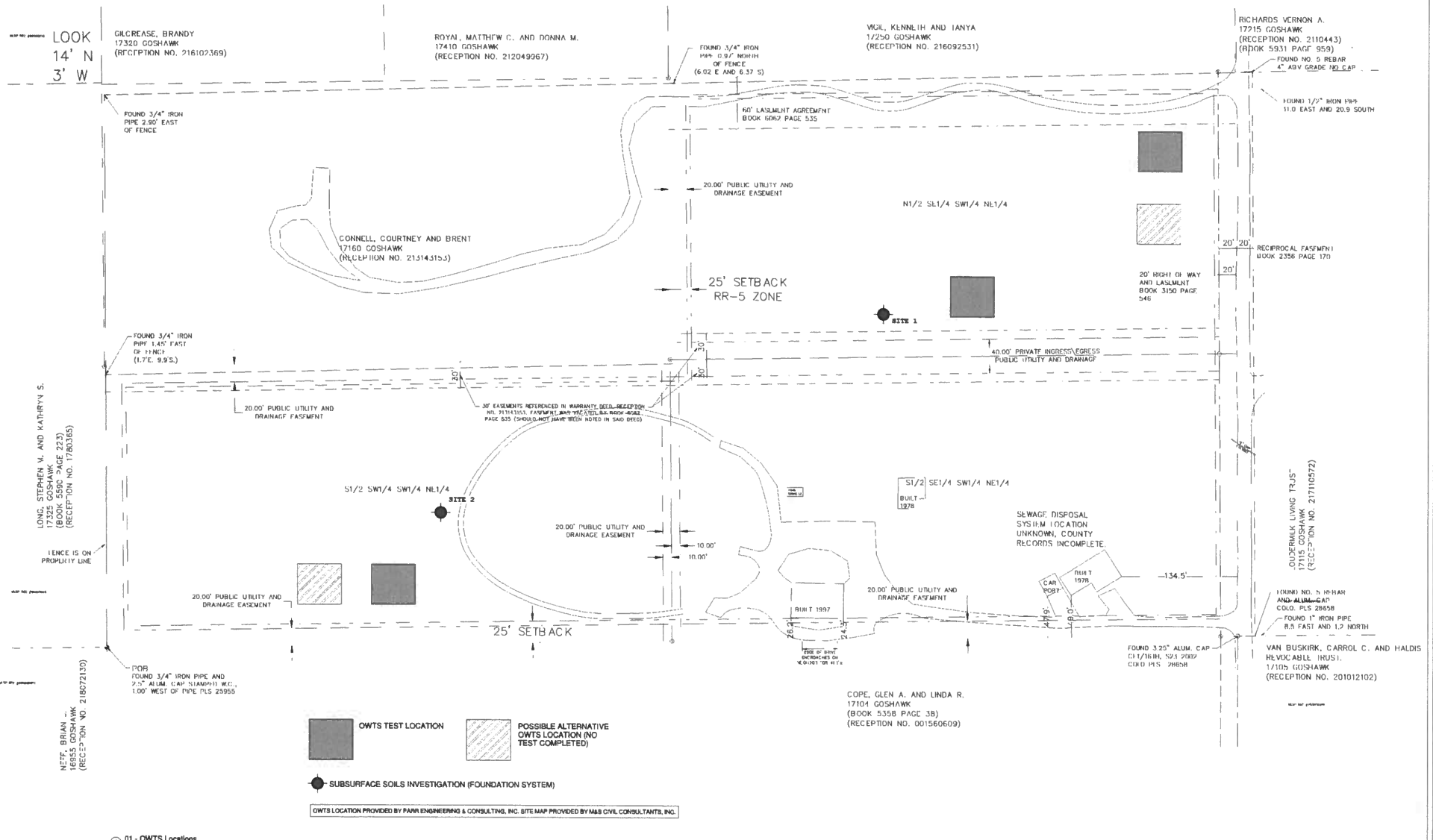

FIGURE 5

CIRCLE A - OWTS LOCATIONS

AND FOUNDATION SAMPLE LOCATIONS

Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

OWTS SITE MAP

LEGAL DESCRIPTION: THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23 AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 23, ALL IN TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO.

J.N:	18203
SCALE:	1" = 50'-0"
ISSUE DATE:	08/04/18
DES. BY:	DMR/CAD
CHK BY:	DMR/CAD
REVISION:	
DATE:	
DRN BY:	
CHK BY:	
REVISION:	
DATE:	
DRN BY:	
CHK BY:	

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/17/2019 at 6:15:16 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 6

ATTACHMENT 1

SOILS

NCRS

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
25	Elbeth sandy loam, 3 to 8 percent slopes	14.4	96.4%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	0.5	3.6%
Totals for Area of Interest		**15.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association is made up of two or more geographically associated soils or* miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

25—Elbeth sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367x
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Elbeth

Setting

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

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural 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 storage in profile: Moderate (about 7.1 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

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 36b9
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Tomah and similar soils: 50 percent
Crowfoot and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand
E - 10 to 22 inches: coarse sand
C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Divide (R049BY216CO)
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Alluvial fans, hills

Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand
E - 12 to 23 inches: sand
Bt - 23 to 36 inches: sandy clay loam
C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Divide (R049BY216CO)
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

ATTACHMENT 2

LOTS 2 and 3

PROFILE PIT EVALUATION

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

PROFILE PIT EVALUATION

Date: June 12, 2019 **Job:** JN: 19.203A

Site Location: Site 1, 17110 East Goshawk Road, Colorado Springs, CO 80908

Purpose of Investigation: To determine general subsurface soil conditions at the site location & to formulate design criteria for the proposed On-Site Wastewater Treatment system (OWTS)

Field Procedure: The materials in the various strata of the soil profile pit were visually classified in accordance with the U.S. Department of Agriculture (USDA) standards.

COLORADO LICENSED DANIEL J. MIZICKO 52484 06-12-19 PROFESSIONAL ENGINEER

Profile Pit	Yes
Perc Test	-

Date: (Profile Eval) May 29, 2019
Excavator Parr Engineering
Evaluator R.Jaquet

Depth to Groundwater (permanent or seasonal) Pit #1: Not Reached
Depth to Groundwater (permanent or seasonal) Pit #2: Not Reached

Depth to Bedrock - Pit #1: Not Reached
Depth to Bedrock - Pit #2: Not Reached

Other Terrain Features or Soil Conditions: See Attached Site Map

Endorsement: Daniel J. Mizicko P.E.

Profile Pit 1	
Latitude:	**39° 4'46.21"N**
Longitude:	**104°37'53.71"W**
Layer	Soil Type & LTAR
0 - 1'-0"	Topsoil
1'-0" - 6'-0"	Type 4A (LTAR=0.15)
-	-
-	-

Profile Pit 2	
Latitude:	**39° 4'46.13"N**
Longitude:	**104°37'53.13"W**
Layer	Soil Type & LTAR
0 - 1'-0"	Topsoil
1'-0" - 6'-0"	Type 4A (LTAR=0.15)
-	-
-	-

			Location	
			Latitude:	Longitude:
Perc #1	N/A	Min./In.	-	-
Perc #2	N/A	Min./In.	-	-
Perc #3	N/A	Min./In.	-	-
	Average: N/A	Min./In.		

Recommendations: (1) An Engineered On-Site Wastewater Treatment system (OWTS) is required for this location due to: (a) Soil Type 4A identified in the treatment zone of Profile Pit #1 & Profile Pit #2.

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
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Office: 719-494-0404 Cell: 719-659-1313

Google Site Map

Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log	
Job Number:	19.203A
Date Evaluated:	05/29/19
Profile Pit#:	Pit #1

Excavator:	Parr Engineering	Total Depth:	6'-0"
Logged By:	R.Jaquet	STA Slope & Direction:	N @ 5%
Method:	Profile Pit	Latitude:	39° 4'46.21"N
Equipment:	Mini Excavator	Longitude:	104°37'53.71"W

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Clay	Massive	Structure-less	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	2.5Y 4/6 (Moist)
4								
6								
		Total Depth= 6'-0"						
8								
10								

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log

Job Number:	19.203A
Date Evaluated:	05/29/19
Profile Pit#:	Pit #2

Excavator:	Parr Engineering	Total Depth:	6'-0"
Logged By:	R.Jaquet	STA Slope & Direction:	N @ 5%
Method:	Profile Pit	Latitude:	39° 4'46.13"N
Equipment:	Mini Excavator	Longitude:	104°37'53.13"W

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Clay	Massive	Structure-less	No	Type 4A (LTAR = 0.15) Treatment Level 1	<35%	2.5Y 4/6 (Moist)
4								
6								
		Total Depth= 6'-0"						
8								
10								

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

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& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
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PROFILE PIT EVALUATION REPORT - General Notes, Regulations & Limitations

General Notes:

This report presents the data obtained pertaining to a Profile Pit Evaluation conducted at the locations indicated on the included Site Map. The purpose of this investigation was to evaluate subsurface soil-profile(s) in the area of the proposed Soil Treatment Area (STA) and to establish design criteria for an On-Site Wastewater Treatment system (OWTS).

Board of Health Regulations & Regulation No. 43 - Engineered Systems:

At proposed soil treatment area locations where any of the following conditions are present, the system shall be designed by a professional engineer and approved by the Health Department:

1. For soil types 3A, 4, 4A, 5, R-0, R-1 and R-2, and Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10-1 and 10-1A of this regulation;

2.The maximum seasonal ground water surface is less that four feet below the bottom of the proposed absorption system.

3. A restrictive layer exists less that four feet below the bottom of the proposed absorption system

4. The ground slope is in excess of thirty percent

5. Pressure distribution is used.

Limitations:

The data presented in this report is specific to the locations of the Profile Pit locations evaluated. It must be understood and accepted that subsurface conditions can, and often do vary across any given area. These variations may not become evident until the time of system installation. If the subsurface conditions are discovered to vary anywhere across the system footprint, Parr Engineering AND the Design Engineer must be notified immediately for further evaluation. If another individual or party relies on this report, they shall indemnify and hold Parr Engineering & Consulting, Inc. harmless for any damages, losses, or expenses that may incur as a result of its use, except as allowed by law.

PARR ENGINEERING & CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

PROFILE PIT EVALUATION

Date: August 2, 2019 **Job:** JN: 19.203A

Site Location: Site 1, 17110 East Goshawk Road, Colorado Springs, CO 80908

Purpose of Investigation: To determine general subsurface soil conditions at the site location & to formulate design criteria for the proposed On-Site Wastewater Treatment system (OWTS)

Field Procedure: The materials in the various strata of the soil profile pit were visually classified in accordance with the U.S. Department of Agriculture (USDA) standards.

Profile Pit	Yes
Perc Test	-

Date: (Profile Eval) July 30, 2019
Excavator Parr Engineering
Evaluator R.Jaquet

Depth to Groundwater (permanent or seasonal) Pit #1: Previous Report
Depth to Groundwater (permanent or seasonal) Pit #2: Previous Report
Depth to Groundwater (permanent or seasonal) Pit #3: Not Reached
Depth to Groundwater (permanent or seasonal) Pit #4: Not Reached
Depth to Groundwater (permanent or seasonal) Pit #5: Not Reached

Depth to Bedrock - Pit #1: Previous Report
Depth to Bedrock - Pit #2: Previous Report
Depth to Bedrock - Pit #3: Not Reached
Depth to Bedrock - Pit #4: Not Reached
Depth to Bedrock - Pit #5: Not Reached

Other Terrain Features or Soil Conditions: See Attached Site Map

Endorsement: Daniel J. Mizicko P.E.

Profile Pit 3	
Latitude:	**39° 4'47.42"N**
Longitude:	**104°37'50.41"W**
Layer	Soil Type & LTAR
0 - 0'-6"	Topsoil
0'-6" - 3'-0"	**Type 4A (LTAR=0.15)**
3'-0" - 7'-0"	**Type 2 (LTAR=0.60)**

Profile Pit 4	
Latitude:	**39° 4'48.20"N**
Longitude:	**104°37'50.34"W**
Layer	Soil Type & LTAR
0 - 1'-0"	Topsoil
1'-0" - 3'-0"	**Type 3 (LTAR=0.35)**
3'-0" - 4'-0"	**Type 3 (LTAR=0.35)**
4'-0" - 8'-0"	**Type 2 (LTAR=0.60)**

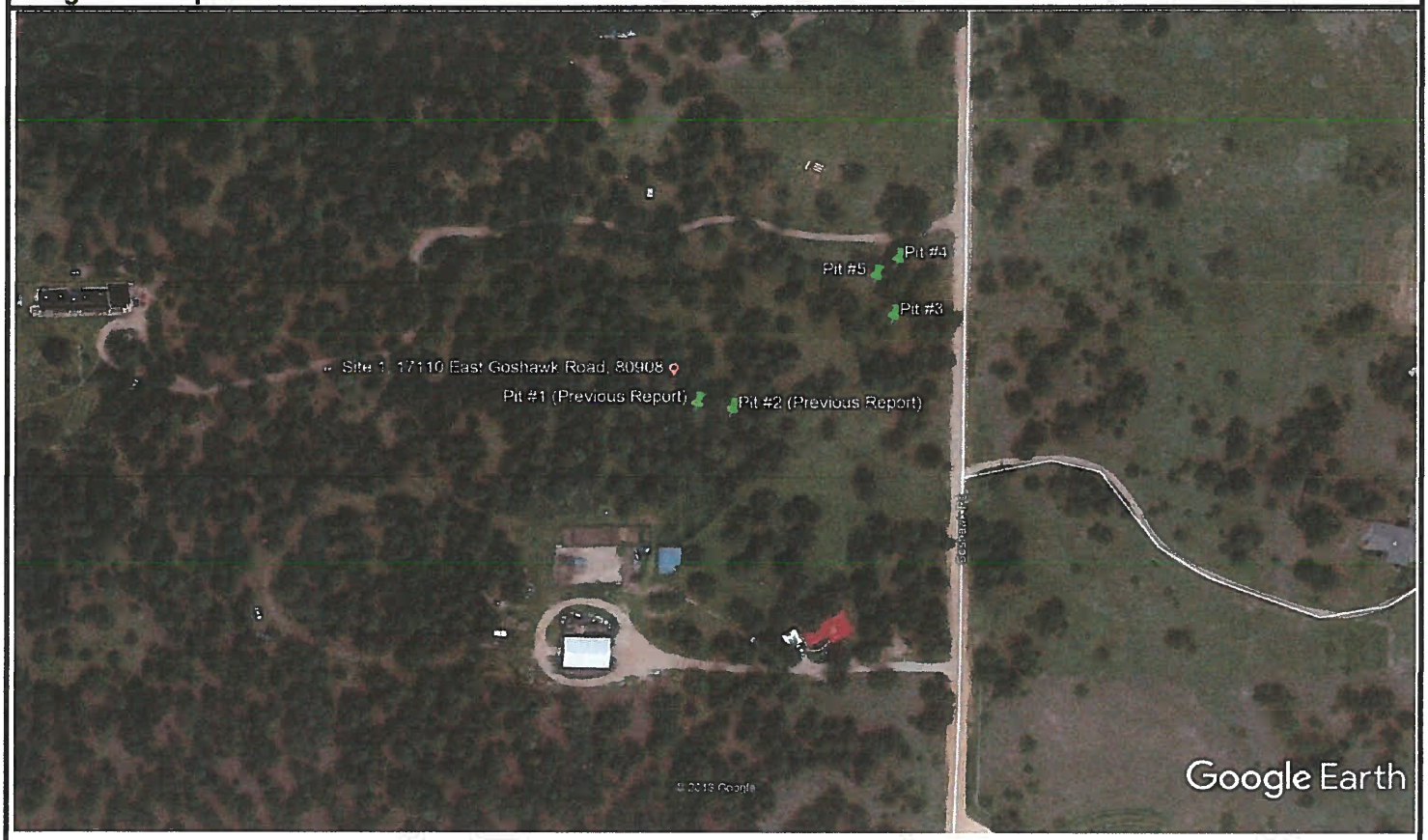
Profile Pit 5	
Latitude:	**39° 4'47.97"N**
Longitude:	**104°37'50.71"W**
Layer	Soil Type & LTAR
0 - 1'-0"	Topsoil
1'-0" - 4'-0"	**Type 4A (LTAR=0.15)**
4'-0" - 8'-6"	**Type 3 (LTAR=0.35)**

Recommendations: **(1) An Engineered On-Site Wastewater Treatment system (OWTS) is required for this location due to: (a) Soil Type 4A identified in the treatment zone of Profile Pit #3 & Profile Pit #5.**

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

Google Site Map



Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log

Job Number:	19.203A
Date Evaluated:	07/12/19
Profile Pit#:	Pit #3

Excavator:	Contractor	Total Depth:	7'-0"
Logged By:	R.Jaquet	STA Slope & Direction:	S @ 4%
Method:	Profile Pit	Latitude:	39° 4'47.42"N
Equipment:	Mini Excavator	Longitude:	104°37'50.41"W

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Clay	Massive	Structure-less	No	**Type 4A (LTAR = 0.15) Treatment Level 1**	<35%	10YR 4/6 (Moist)
4		Sandy Loam	Granular	Strong	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	10YR 5/4 (Moist)
6								
		Total Depth= 7'-0"						
8								
10								

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

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Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log	
Job Number:	19.203A
Date Evaluated:	07/30/19
Profile Pit#:	Pit #4

Excavator:	Contractor	Total Depth:	8'-0"
Logged By:	R.Jaquet	STA Slope & Direction:	Generally Flat
Method:	Profile Pit	Latitude:	39° 4'48.20"N
Equipment:	Mini Excavator	Longitude:	104°37'50.34"W

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	5YR 4/6 (Moist)
4		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35)**	<35%	10YR 6/4 (Moist)
6		Sandy Loam	Granular	Strong	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	2.5Y 6/3 (Moist)
8								
10		**Total Depth= 8'-0"**						

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

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Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log	
Job Number:	19.203A
Date Evaluated:	07/30/19
Profile Pit#:	Pit #5

Excavator:	Contractor	Total Depth:	8'-6"
Logged By:	R.Jaquet	STA Slope & Direction:	S @ 3%
Method:	Profile Pit	Latitude:	39° 4'47.97"N
Equipment:	Mini Excavator	Longitude:	104°37'50.71"W

Site 1, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Clay	Massive	Structure-less	No	**Type 4A (LTAR = 0.15) Treatment Level 1**	<35%	10YR 5/4 (Moist)
4								
6		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	10YR 6/2 (Moist)
8								
10		**Total Depth= 8'-6"**						

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

PROFILE PIT EVALUATION REPORT - General Notes, Regulations & Limitations

General Notes:

This report presents the data obtained pertaining to a Profile Pit Evaluation conducted at the locations indicated on the included Site Map. The purpose of this investigation was to evaluate subsurface soil-profile(s) in the area of the proposed Soil Treatment Area (STA) and to establish design criteria for an On-Site Wastewater Treatment system (OWTS).

Board of Health Regulations & Regulation No. 43 - Engineered Systems:

At proposed soil treatment area locations where any of the following conditions are present, the system shall be designed by a professional engineer and approved by the Health Department:

1. For soil types 3A, 4, 4A, 5, R-0, R-1 and R-2, and Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10-1 and 10-1A of this regulation;

2. The maximum seasonal ground water surface is less that four feet below the bottom of the proposed absorption system.

3. A restrictive layer exists less that four feet below the bottom of the proposed absorption system

4. The ground slope is in excess of thirty percent

5. Pressure distribution is used.

Limitations:

The data presented in this report is specific to the locations of the Profile Pit locations evaluated. It must be understood and accepted that subsurface conditions can, and often do vary across any given area. These variations may not become evident until the time of system installation. If the subsurface conditions are discovered to vary anywhere across the system footprint, Parr Engineering AND the Design Engineer must be notified immediately for further evaluation. If another individual or party relies on this report, they shall indemnify and hold Parr Engineering & Consulting, Inc. harmless for any damages, losses, or expenses that may incur as a result of its use, except as allowed by law.

ATTACHMENT 3

LOTS 2 and 3

SOIL BORINGS FOR FOUNDATION DESIGN

PARR ENGINEERING & CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

PROFILE PIT EVALUATION

Date: June 12, 2019 **Job:** JN: 19.203B

Site Location: Site 2, 17110 East Goshawk Road, Colorado Springs, CO 80908

Purpose of Investigation: To determine general subsurface soil conditions at the site location & to formulate design criteria for the proposed On-Site Wastewater Treatment system (OWTS)

Field Procedure: The materials in the various strata of the soil profile pit were visually classified in accordance with the U.S. Department of Agriculture (USDA) standards.

COLORADO LICENSED DANIEL J. MIZICKO 52484 06-12-19 PROFESSIONAL ENGINEER

Profile Pit	Yes
Perc Test	-

Date: (Profile Eval) May 29, 2019
Excavator S.Dunfee
Evaluator S.Dunfee

Depth to Groundwater (permanent or seasonal) Pit #1: Not Reached
Depth to Groundwater (permanent or seasonal) Pit #2: Not Reached

Depth to Bedrock - Pit #1: Not Reached
Depth to Bedrock - Pit #2: Not Reached

Other Terrain Features or Soil Conditions: See Attached Site Map

Endorsement: Daniel J. Mizicko P.E.

Profile Pit 1	
Latitude:	**39° 4'43.47"N**
Longitude:	**104°38'2.82"W**
Layer	**Soil Type & LTAR**
0 - 1'-0"	Topsoil
1'-0" - 3'-0"	**Type 2 (LTAR=0.60)**
3'-0" - 5'-0"	**Type 3 (LTAR=0.35)**
5'-0" - 7'-6"	**Type 2 (LTAR=0.60)**

Profile Pit 2	
Latitude:	**39° 4'42.98"N**
Longitude:	**104°38'1.64"W**
Layer	**Soil Type & LTAR**
0 - 1'-0"	Topsoil
1'-0" - 2'-0"	**Type 2 (LTAR=0.60)**
2'-0" - 5'-0"	**Type 3 (LTAR=0.35)**
5'-0" - 7'-6"	**Type 2 (LTAR=0.60)**

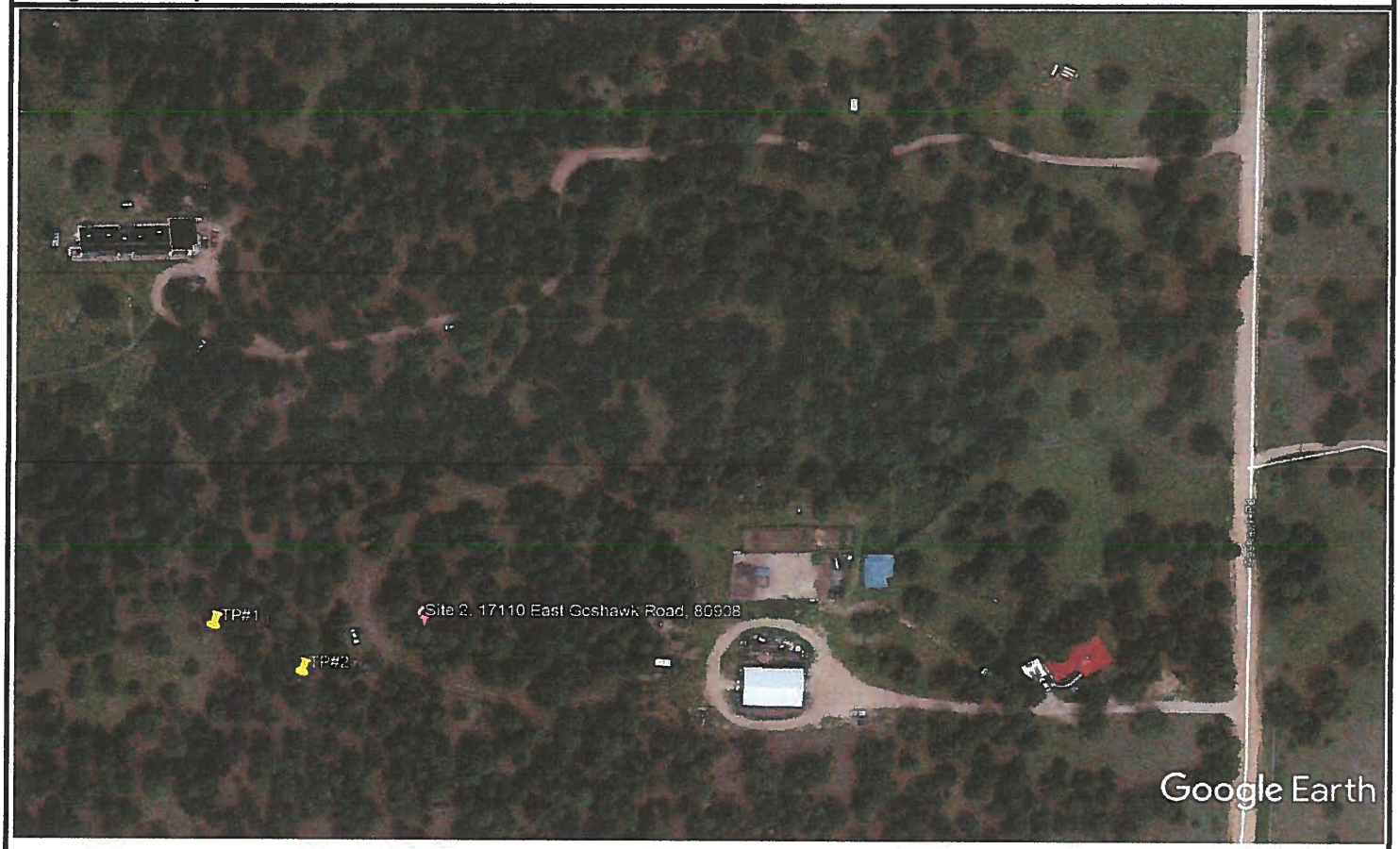
			Location	
			Latitude:	**Longitude:**
Perc #1	N/A	Min./In.	-	-
Perc #2	N/A	Min./In.	-	-
Perc #3	N/A	Min./In.	-	-
	Average: N/A	Min./In.		

Recommendations: **(1) A conventional, non-engineered On-Site Wastewater Treatment system (OWTS) is acceptable for this site.**

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

Google Site Map



Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log	
Job Number:	19.203B
Date Evaluated:	05/29/19
Profile Pit#:	Pit #1

Excavator:	S.Dunfee	Total Depth:	7'-6"
Logged By:	S.Dunfee	STA Slope & Direction:	Generally Flat
Method:	Profile Pit	Latitude:	39° 4'43.47"N
Equipment:	Mini Excavator	Longitude:	104°38'2.82"W

Site 2, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	10YR 5/3 (Moist)
4		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatmemt Level 1**	<35%	2.5Y 6/2 (Moist)
6		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = 0.60) Treatment Level 1**	<35%	2.5Y 6/1 (Moist)
8		**Total Depth= 7'-6"**						
10								

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

Profile Pit - Log

Job Number:	19.203B
Date Evaluated:	05/29/19
Profile Pit#:	Pit #2

Excavator:	S.Dunfee	Total Depth:	7'-6"
Logged By:	S.Dunfee	STA Slope & Direction:	Generally Flat
Method:	Profile Pit	Latitude:	39° 4'42.98"N
Equipment:	Mini Excavator	Longitude:	104°38'1.64"W

Site 2, 17110 East Goshawk Road, 80908

Depth (ft.)	Sample Interval	USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	% Rock Frag.	Color
		Topsoil						
2		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = .60)**	<35%	10 YR 5/3 (Moist)
4		Sandy Clay Loam	Granular	Strong	No	**Type 3 (LTAR = 0.35) Treatment Level 1**	<35%	2.5Y 6/2 (Moist)
6		Sandy Loam	Granular	Moderate	No	**Type 2 (LTAR = .60) Treatment Level 1**	<35%	2.5Y 6/1 (Moist)
8		**Total Depth= 7'-6"**						
10								

Evidence of Groundwater:	**Not Reached**
Depth to Bedrock:	**Not Reached**

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10, Colorado Springs, CO 80908
Office: 719-494-0404 Cell: 719-659-1313

PROFILE PIT EVALUATION REPORT - General Notes, Regulations & Limitations

General Notes:

This report presents the data obtained pertaining to a Profile Pit Evaluation conducted at the locations indicated on the included Site Map. The purpose of this investigation was to evaluate subsurface soil-profile(s) in the area of the proposed Soil Treatment Area (STA) and to establish design criteria for an On-Site Wastewater Treatment system (OWTS).

Board of Health Regulations & Regulation No. 43 - Engineered Systems:

At proposed soil treatment area locations where any of the following conditions are present, the system shall be designed by a professional engineer and approved by the Health Department:

1. For soil types 3A, 4, 4A, 5, R-0, R-1 and R-2, and Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10-1 and 10-1A of this regulation;

2.The maximum seasonal ground water surface is less that four feet below the bottom of the proposed absorption system.

3. A restrictive layer exists less that four feet below the bottom of the proposed absorption system

4. The ground slope is in excess of thirty percent

5. Pressure distribution is used.

Limitations:

The data presented in this report is specific to the locations of the Profile Pit locations evaluated. It must be understood and accepted that subsurface conditions can, and often do vary across any given area. These variations may not become evident until the time of system installation. If the subsurface conditions are discovered to vary anywhere across the system footprint, Parr Engineering AND the Design Engineer must be notified immediately for further evaluation. If another individual or party relies on this report, they shall indemnify and hold Parr Engineering & Consulting, Inc. harmless for any damages, losses, or expenses that may incur as a result of its use, except as allowed by law.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–El Paso County Area, Colorado

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
25—Elbeth sandy loam, 3 to 8 percent slopes														
Elbeth	85	B	0-3	Sandy loam	SC, SC-SM	A-2-4, A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	50-60-70	25-33-40	25-28-30	5-8 -10
			3-23	Loamy sand	SM	A-2-4, A-1	0- 0- 0	0- 0- 0	85-93-100	80-90-100	40-58-75	15-23-30	20-23-25	NP-3 -5
			23-68	Sandy clay loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0- 0- 0	0- 0- 0	85-93-100	80-90-100	65-78-90	30-43-55	25-30-35	5-10-15
			68-74	Sandy clay loam	CL, SC	A-2, A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	50-70-90	25-40-55	25-28-30	5-8 -10

Engineering Properties–El Paso County Area, Colorado														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes														
Tomah	50	B	0-10	Loamy sand	SM	A-2-4	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	50-60- 70	15-23- 30	20-23 -25	NP-3 -5
			10-22	Coarse sand	SP-SM, SW-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	100-100 -100	100-100 -100	45-55- 65	5- 8- 10	—	NP
			22-48	Stratified coarse sand to sandy clay loam	SC, SM, SP-SM, SC-SM	A-2-4, A-1, A-4	0- 0- 0	0- 0- 0	85-93-1 00	80-90-1 00	35-63- 90	5-28- 50	20-25 -30	NP-5 -10
			48-60	Coarse sand, loamy coarse sand	SC-SM, SM, SP-SM	A-2-4, A-1, A-3	0- 0- 0	0- 0- 0	85-93-1 00	80-90-1 00	35-53- 70	5-15- 25	20-23 -25	NP-3 -5
Crowfoot	30	B	0-12	Loamy sand	SM	A-2-4, A-1	0- 0- 0	0- 5- 10	85-93-1 00	80-90-1 00	40-58- 75	15-23- 30	20-23 -25	NP-3 -5
			12-23	Sand	SM, SP-SM	A-1, A-2, A-3	0- 0- 0	0- 5- 10	85-93-1 00	80-90-1 00	40-55- 70	5-10- 15	—	NP
			23-36	Sandy clay loam	CL-ML, SC, SC-SM	A-2-4, A-4, A-6	0- 0- 0	0- 5- 10	85-93-1 00	80-90-1 00	65-78- 90	30-43- 55	25-30 -35	5-10-15
			36-60	Coarse sand, loamy coarse sand	SM, SP-SM	A-1, A-2	0- 0- 0	0- 5- 10	85-93-1 00	80-90-1 00	35-53- 70	5-15- 25	—	NP

Data Source Information

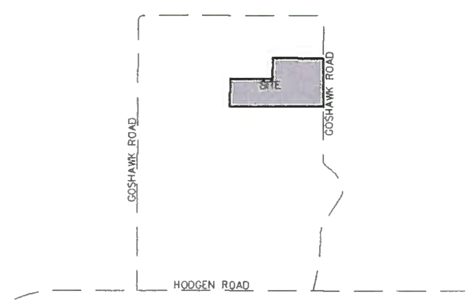
Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

SUBSURFACE SOIL INVESTIGATIONS

SITES 1 AND 2

CIRCLE A SUBDIVISION FILING NO. 1

A SUBDIVISION OF THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23 AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23. ALL IN TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO



VICINITY MAP
NOT TO SCALE

KNOW ALL MEN BY THESE PRESENTS:

THAT THE DANIEL B. ANDRES TRUST BEING THE OWNER OF THE FOLLOWING DESCRIBED TRACT OF LAND:

TO WIT:

THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23 AND

THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23.

ALL IN TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO

CONTAINING 15 ACRES MORE OR LESS (14.87 ACRES ACTUAL)

OWNERS CERTIFICATE:

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGEES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED, AND PLATTED SAID LANDS INTO LOTS AS SHOWN HEREON TO BE KNOWN AS "CIRCLE A SUBDIVISION FILING NO. 1", EL PASO COUNTY, COLORADO. SAID SUBDIVISION IS DRAWN TO A FIXED SCALE AS INDICATED HEREON AND ACCURATELY SETS FORTH THE BOUNDARIES AND DIMENSIONS OF SAID TRACT AND THE LOCATIONS OF SAID LOTS.

____
BY: DANIEL B. ANDRES, TRUSTEE, DANIEL B. ANDRES TRUST

NOTARIAL

STATE OF COLORADO } ss
COUNTY OF EL PASO }

ACKNOWLEDGED BEFORE ME THIS ____ DAY OF ______________, 2019, A.D. BY DANIEL B. ANDRES, TRUSTEE, DANIEL B. ANDRES TRUST

WITNESS MY HAND AND OFFICIAL SEAL:

MY COMMISSION EXPIRES: ________________

NOTARY PUBLIC: ________________________

NOTES:

1. THE BASIS OF BEARINGS USED FOR THIS SURVEY IS THE SOUTH LINE OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER (SW 1/4, NE 1/4) OF SECTION 23, T11S, R65W OF THE SIXTH P.M., EL PASO COUNTY, COLORADO. THE EAST 1/16TH CORNER OF SAID SECTION IS MONUMENTED WITH A 3.25" ALUMINUM CAP STAMPED "CE 1/16TH, SEC 23, T11S, R65W, LS 28650", THE CENTER OF SAID SECTION IS MONUMENTED WITH A 0.75" IRON PIPE AND A 2.5" ALUMINUM CAP WITNESS CORNER STAMPED "LWA, C1/4, T11S, R65W, W.C., LS 25966", 1.00' WEST OF SAID PIPE, SAID LINE **IS ASSUMED TO BEAR S89°10'28"W, 1318.00 US SURVEY FEET (GROUND) BASED ON** STATIC GPS OBSERVATIONS.

2. THE FLOOD INSURANCE RATE MAP FOR EL PASO COUNTY, COLORADO PANEL NO 08041C0310 G WITH AN EFFECTIVE DATE OF 12/7/2018 SHOWS THE PROPERTY TO BE LOCATED IN ZONE X (AREA OF MINIMAL FLOOD HAZARD).

3. A TITLE REPORT ISSUED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY TITLE REPORT NO. H0562780-710-CTO-SSC, WITH AN EFFECTIVE DATE OF JULY 22, 2019 HAS BEEN REVIEWED AS IT RELATES TO THE SUBJECT PROPERTY. THE FOLLOWING EXCEPTIONS IN SCHEDULE B ARE NOTED AND SHOWN IF APPLICABLE HEREON.

- NON-EXCLUSIVE EASEMENT FOR ROADWAY PURPOSES OVER THE EASTERLY 20 FEET AS CONTAINED IN INSTRUMENTS RECORDED IN BOOK 2422 AT PAGE 44 AND IN BOOK 2358 AT PAGE 170. (GOSHAWK ROAD)
- RIGHT OF WAY AND EASEMENT 20 FEET IN WIDTH FOR UTILITY PURPOSES GRANTED TO MOUNTAIN VIEW ELECTRIC ASSOCIATION, INC. BY INSTRUMENT RECORDED IN BOOK 3150 AT PAGE 548, IN WHICH THE SPECIFIC LOCATION IS UNDEFINED (ASSUMED TO BE CENTERED ON THE OVERHEAD LINES ALONG GOSHAWK ROAD, AS SHOWN)
- TERMS, CONDITIONS, PROVISIONS AND OBLIGATIONS AS CONTAINED IN GOSHAWK ROAD MAINTENANCE AGREEMENT RECORDED IN BOOK 5145 AT PAGE 888. (NOTHING TO SHOW)
- TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS CONTAINED IN THE EASEMENT AGREEMENT RECORDED IN BOOK 8082 AT PAGE 635.

4. SEWAGE TREATMENT IS THE RESPONSIBILITY OF EACH PROPERTY OWNER. THE EL PASO COUNTY HEALTH DEPARTMENT MUST APPROVE EACH SYSTEM AND, IN SOME CASES, THE DEPARTMENT MAY REQUIRE A SPECIALLY DESIGNED SYSTEM PRIOR TO APPROVAL.

5. INDIVIDUAL WELLS ARE THE RESPONSIBILITY OF EACH PROPERTY OWNER. PERMITS FOR INDIVIDUAL WELLS MUST BE OBTAINED FROM THE STATE WATER ENGINEER WHO BY LAW HAS THE AUTHORITY TO SET CONDITIONS FOR THE ISSUANCE OF THESE PERMITS

6. ALL STRUCTURAL FOUNDATIONS AND SEPTIC SYSTEMS SHALL BE LOCATED AND DESIGNED BY A PROFESSIONAL ENGINEER CURRENTLY REGISTERED IN THE STATE OF COLORADO.

7. ACCESS TO HODGEN ROAD, A PUBLIC RIGHT-OF-WAY, IS VIA GOSHAWK ROAD, A 40 FOOT (40') WIDE PRIVATE ROADWAY. THE 40 FOOT (40') EASEMENT SHOWN HEREON FOR ACCESS TO GOSHAWK ROAD SHALL BE PRIVATELY OWNED AND MAINTAINED BY THE OWNERS OF THE THREE LOTS EQUALLY. MAINTENANCE SHALL BE PROVIDED EQUALLY BETWEEN THE THREE LOTS.

8. THE FOLLOWING REPORTS ASSOCIATED WITH THIS SUBDIVISION HAVE BEEN SUBMITTED AND ARE ON FILE AT THE COUNTY LAND USE DEPARTMENT:

- WATER AVAILABILITY STUDY
- OWTS - ON-SITE WASTEWATER TREATMENT REPORT

EASEMENTS:

UNLESS OTHERWISE SHOWN, ALL INTERIOR LOT LINES ARE HEREBY PLATTED WITH A TEN FOOT (10') PUBLIC UTILITY AND DRAINAGE EASEMENT. THE PERIPHERY OF THE SUBDIVISION IS HEREBY PLATTED WITH A TWENTY FOOT (20') PUBLIC UTILITY AND DRAINAGE EASEMENT, FOR THE INSTALLATION AND MAINTENANCE OF PUBLIC UTILITIES AND DRAINAGE STRUCTURES BY PRIVATE AND PUBLIC COMPANIES, WITH THE SOLE RESPONSIBILITY OF MAINTENANCE BEING VESTED IN THE ADJACENT PROPERTY OWNERS.

BOARD OF COUNTY COMMISSIONERS CERTIFICATE:

THIS PLAT FOR "CIRCLE A SUBDIVISION FILING NO. 1" WAS APPROVED FOR FILING BY THE EL PASO COUNTY, COLORADO BOARD OF COUNTY COMMISSIONERS ON THE ________ DAY OF ______________, 2019, A.D., SUBJECT TO ANY NOTES SPECIFIED HEREON AND ANY CONDITIONS INCLUDED IN THE RESOLUTION OF APPROVAL. THE DEDICATIONS OF LAND TO THE PUBLIC INCLUDING STREETS AND EASEMENTS ARE ACCEPTED, BUT PUBLIC IMPROVEMENTS THEREON WILL NOT BECOME THE MAINTENANCE RESPONSIBILITY OF EL PASO COUNTY UNTIL PRELIMINARY ACCEPTANCE OF THE PUBLIC IMPROVEMENTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE AND ENGINEERING CRITERIA MANUAL, AND THE SUBDIVISION IMPROVEMENTS AGREEMENT

______________________________ ______________
PRESIDENT, BOARD OF COUNTY COMMISSIONERS DATE

COUNTY APPROVAL:

APPROVAL IS GRANTED FOR THIS PLAT OF "CIRCLE A SUBDIVISION FILING NO. 1" ON THIS ________ DAY OF ____________________________, 2019, A.D.

____
EL PASO COUNTY DIRECTOR OF PLANNING AND COMMUNITY DEVELOPMENT

____
EL PASO COUNTY ASSESSOR

RECORDING:

STATE OF COLORADO } ss
COUNTY OF EL PASO }

I HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD AT MY OFFICE AT _____ O'CLOCK ___.M., THIS ________ DAY OF ________________, 2019, A.D., AND IS DULY RECORDED UNDER RECEPTION NUMBER ______________ OF THE RECORDS OF EL PASO COUNTY, COLORADO.

CHUCK BROERMAN, RECORDER

FEE: ______________ BY: ______________________
DEPUTY

SURVEYORS CERTIFICATE

I VERNON P. TAYLOR, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON NOVEMBER 02, 2017 BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON, THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:10,000, AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISION, OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE.

I ATTEST THE ABOVE ON THIS ____ DAY OF ______________, 2019.

____
VERNON P. TAYLOR DATE
COLORADO PLS NO. 25966, FOR AND
ON BEHALF OF M&S CIVIL CONSULTANTS, INC
20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, COLORADO 80903

NOTICE:
ACCORDING TO COLORADO LAW, YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON

SUMMARY:

3 LOTS	15 ACRES	100%
TOTAL	15 ACRES (14.87 ACTUAL)	100.00%

FEES:

DRAINAGE FEE: ____________

BRIDGE FEE: ____________

SCHOOL FEE: ____________

PARK FEE: ____________

FINAL PLAT
CIRCLE A SUBDIVISION FILING NO. 1
JOB NO. 70-072
DATE PREPARED: 07/15/2019
DATE REVISED:

M&S CIVIL CONSULTANTS, INC.
102 E. PIKES PEAK AVE., 5th FLOOR
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

FILE NO. AR FP __-_____

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Office: 719-494-0404

Structural Engineering & Consulting
Geotechnical Engineering
On-Site Wastewater Treatment Design
Inspections & Technical Reports

June 12, 2019

JN 19.203A

Project: **Subsurface Soil Investigation**
Site 1, 17110 East Goshawk Road
Colorado Springs, 80908

Attached is a formal soils report for the project referenced above. Included in this report is a review of the soils investigation and analysis for this location. The purpose of our investigation was to evaluate the conditions of the subsurface soil in order to establish design and construction criteria for the proposed structure(s). A discussion of the results of our investigation with construction recommendations is also included. If revisions to the design of the proposed structure take place, it is advised that our firm be contacted immediately to review the changes and to determine if the revised plans are acceptable.

If you have any questions concerning this report, please feel free to contact our office at 719-494-0404.

Sincerely,

COLORADO LICENSED
DANIEL J. MIZICKO
52484
06-12-19
PROFESSIONAL ENGINEER

Daniel J. Mizicko P.E.

Table of Contents

*Purpose and Scope of Study

This report presents the results of a subsurface exploration program to provide foundation recommendations for the proposed structure to be located on the parcel of land referenced above.

The exploration program was conducted in order to obtain information regarding the subsurface conditions. Soil samples were retrieved from a soil boring(s) and analyzed to provide data on the classification and engineering characteristics of the on-site soils. The results of the field and laboratory investigation are presented herein.

This report has been prepared to summarize the data obtained and to present our conclusion and recommendations based on the proposed construction and the subsurface conditions encountered. Design criteria and a discussion of the geotechnical engineering considerations related to the construction of the proposed structure are included.

***The information presented in this report is NOT intended to be used as a design. The foundation design requirements and all inspections associated with the foundation design is the responsibility of the Structural Engineer of Record.**

Proposed Construction

Based on the information provided, the proposed construction will consist of a wood framed, single family residential structure supported on a reinforced concrete foundation system. We anticipate maximum structural loadings of 3000 pounds per lineal foot for distributive wall loads and 15 kips for concentrated column loads.

If the project features or loadings differ significantly from those above, our firm should be contacted to reevaluate the recommendations contained herein.

Field Investigation

The field investigation for this project was conducted on May 29, 2019.

A 4" diameter exploratory boring was drilled to approximately 20 feet below grade in the area of the proposed construction. Standard penetration testing (SPT) was conducted during the drilling process.

The SPT measures resistance to penetration of a standard split-spoon sampler that is driven by a 140 lbm hammer dropped from a height of 30 in. The number of blows required to drive the sampler a distance of 12 in. after an initial penetration of 6 in. is referred to as the N-value or standard penetration resistance in blows per foot.

The representative samples obtained from the SPT split-spoon sampler are saved for subsequent laboratory examination and testing.

Laboratory Investigation

The field samples obtained were analyzed and classified in the laboratory. Laboratory testing included standard property tests, natural water content, Atterberg limits and Expansion Index tests.

The laboratory testing was conducted in general accordance with ASTM specifications.

Subsurface Conditions

The following tables summarize information obtained about the subsurface conditions encountered:

Soil Classification	Sample Depth	Gravel	Sand	Fines	LL[1]	PI[2]	EI[3]	Expansive Potential
Clayey Sand (SC)	10 ft.	3.4%	60.2%	36.4%	34	20	**78**	**Medium**

LL – Liquid Limit [1] PI – Plasticity Index [2] EI – Expansion Index [3]

Soil Classification	Sample Depth	SPT N-Value	Relative Density	Moisture Content	Clay Content	Expansive Index	Expansion Potential
Clayey Sand (SC)	5 ft.	N/A	Medium Dense	9.0%	Medium	N/A	N/A
Clayey Sand (SC)	10 ft.	9/30	Medium Dense	5.2%	Medium	**78**	**Medium**
Clayey Sand (SC)	15 ft.	N/A	Dense	4.5%	Medium	N/A	N/A
Clayey Sand (SC)	20 ft.	N/A	Dense	5.6%	Medium	N/A	N/A

Ground water was not encountered during the time of our investigation. This may be due to lack of moisture received in the area and subsequently may rise due to seasonal changes, degree of irrigation and/or other factors.

Foundation Recommendations

The information obtained indicates subsurface conditions consisting of soil with a medium potential for expansion at depths at and below the proposed bearing depth. Given the nature of the native soil conditions, the following foundation recommendations have been provided to minimize the potential for foundation movement.

Option 1: Overexcavation & Compacted Fill

The native expansive soil shall be over excavated and replaced with properly compacted, offsite structural fill material to a depth of 4 feet minimum below the foundation elements. The fill material shall be compacted to minimum 95% Modified Proctor density. **All foundation elements bearing directly on structural fill material shall be designed for a maximum allowable bearing pressure of 1500 psf.**

It should be emphasized that foundation movement remains a possibility if significant moisture changes occur in the native soil below the fill material. The owner/owners representative accepts all risks associated with foundation movement if this option is selected. Otherwise, option 2 should be considered.

Option 2: Drilled Caissons

The foundation design shall consist of a reinforced concrete grade beam system with the installation of drilled, straight shaft piers (caissons) embedded into competent bedrock formation.

- All piers shall be 10" diameter minimum and shall have a minimum 25 foot shaft length.
- All piers shall be anchored a minimum of 7 feet into competent bedrock with a minimum of 3 shear rings (minimum 4"wide x 3" deep) @ 24" o.c. max. along the bottom of the pier and embedded into competent rock formation.
- All piers shall be designed for a maximum end bearing pressure of 30,000 psf, a side shear of 3,000 psf and a minimum dead load end bearing pressure of 15,000 psf. A design anchor value of 2000 psf times the surface area may be used for the portion of pier penetration into bedrock.
- Concrete shall be sulfate resistant Type II cement for all elements within 6 inches of soil
- Concrete should be placed immediately after drilling, cleaning and observing each pier hole. A representative of Parr Engineering & Consulting, Inc. should be contacted to observe drilling operations.
- All piers to be reinforced for their full length with a minimum of three No. 5 bars which shall extend into the grade beams or foundation walls a minimum of 24".
- A minimum 6-inch continuous void space below grade beam is recommended between piers.

Structural Fill Gradation & Compaction

Structural Fill shall consist of a well graded mixture of sound mineral aggregate particles void of debris containing sufficient proper quality binding materials to secure a firm, stable foundation when placed and compacted. When tested with laboratory sieves, the material shall meet the following gradation requirements:

Standard Sieve Size	% Passing (by Weight)
2 inch	100
No. 4	30-100
No. 50	10-60
No. 200	5-20

Colorado Department of Transportation approved class 4, 5, or 6 base course materials typically meet the above specifications. A report showing the gradation analysis and test results for the materials proposed for structural fill shall be provided to Parr Engineering for review and approval prior to placement.

Imported structural fill shall be placed in 8" maximum uniform lifts and compacted to a minimum 95% Modified Proctor Density (ASTM D-1557) near optimum moisture content.
Compaction testing and confirmation is required at 24" intervals max. Results of the testing must be provided to Parr Engineering & Consulting when complete.

Foundation Walls

Foundation walls which are laterally supported and can be expected to undergo a minimal amount of deflection ("at-rest condition") may be designed for a lateral earth pressure computed on the basis of an **equivalent fluid unit weight of 45 pcf for onsite material**.

All foundation walls should be designed for appropriate hydrostatic and surcharge pressures such as adjacent buildings, traffic and construction materials and equipment. The pressures recommended above assume a relatively horizontal backfill surface.

The onsite excavated materials may be used as foundation wall backfill. Backfill shall be carefully placed in uniform lifts and properly compacted near optimum moisture content. Care should be taken not to overcompact the backfill since this could cause excessive lateral pressure on the walls. Some settlement of deep foundation wall backfill will occur even if the material is placed correctly.

*Open Excavation Observation

It is assumed that the results in this report are representative of the subsurface conditions throughout the site. However, variations across the site are a possibility and will not become evident until the foundation excavation is complete.

A representative of Parr Engineering & Consulting shall be contacted to inspect the completed foundation excavation prior to the placement of any formwork. Please contact our office a minimum of 24 hours prior to the requested site visit. This report may be rendered null and void if the open excavation observation is not completed.

***The Open Excavation Observation Report will be billed additionally at the time services are complete and prior to the release of any documentation (either electronically or hard copy).**

Floor System Recommendations

The natural on-site soils were determined to have a medium potential for expansion when inundated with water. If slab crack control is highly desired, a minimum 6" layer of gravel or aggregate base course shall be placed and compacted to at least 95% Modified Proctor Density (ASTM D-1557) prior to placement of a new slab-on grade. In addition, the new slab shall be reinforced with #3 bars @ 18" o.c. each way, or 4x4-W2.9xW2.9 W.W.F. (centered).

Floor Slabs should be provided with control joints to reduce damage that may occur as a result of shrinkage cracking. We suggest the spacing of the joints to be no more than 15 feet centers. The actual joint spacing should be based on the slab reinforcing design.

Given the nature of the potentially expansive soil conditions, interior slabs supported directly on the native soil can be expected to move and crack when exposed to moisture and should be avoided if possible. If floor movement and cracking cannot be tolerated, interior floor slabs (i.e., basement floors) shall be elevated over a crawl space and designed as structural systems supported independently of the underlying soil.

Surface Drainage

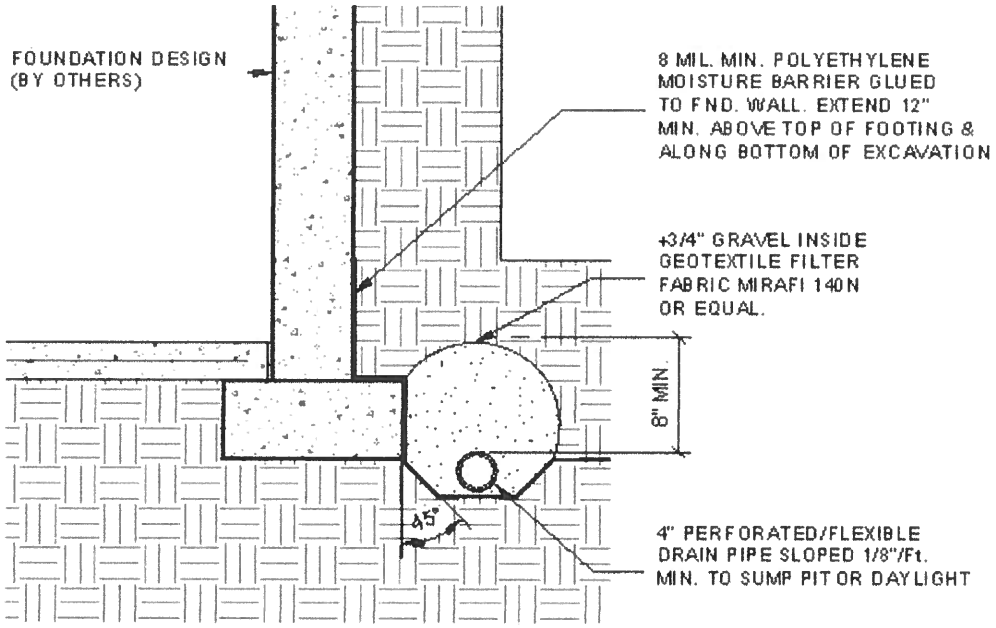
The following drainage precautions should be observed during the construction and maintained at all times after the residence has been completed.

1) Excessive wetting and drying of the foundation excavations and underslab areas should be avoided during construction.
2) The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 12 inches in the first 10 feet.
3) Roof downspouts and drains should discharge well beyond the limits of the backfill.
4) Landscaping which requires excessive watering should be located at least 10 feet from the house.
5) Plastic membranes should not be used to cover the ground surface adjacent to the foundation walls.

Subsurface Drainage

A subsurface foundation drain or equivalent protection measure is recommended around the perimeter of all habitable or storage spaces located below grade (including crawlspace areas). Actual drain requirements to be determined at the time of the open hole inspection.

A subsurface drain is designed to redirect moisture around and away from the foundation system. However, it should be noted that a properly functioning drain does not completely eliminate the potential for foundation movement if exposed to subsurface moisture.



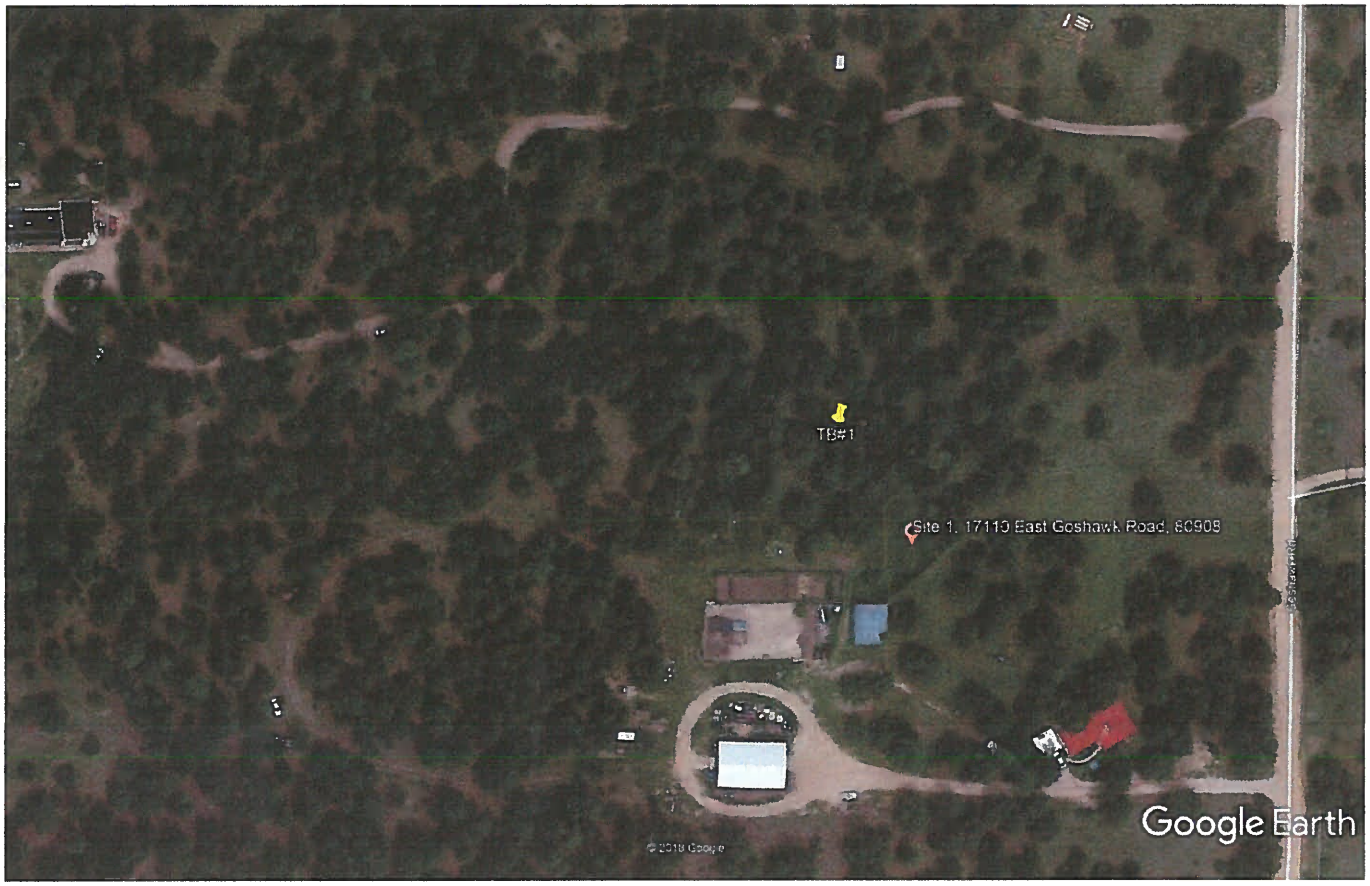
Limitations

This report has been prepared with generally accepted soil and foundation engineering practices in this area for use by the client for design purposes. The conclusions and recommendations presented are based on data obtained from the exploratory excavation. The nature and extent of variation from the exploratory boring may not become evident until excavation is performed. If during construction, soil, rock and groundwater conditions appear to be different from those described herein, our office should be advised immediately so that reevaluation of the recommendations may be made.

Although all laboratory procedures were performed under optimal conditions, it should be noted that precautions should be taken to accommodate for certain sources of failure such as inconsistencies in the properties/characteristics of the on-site soil, variations in groundwater levels due to seasonal changes, etc.

This report DOES NOT address the potential for geologic hazards or constraints (i.e., slope stability, landslides). It must be emphasized that such hazards and constraints are outside the scope of this investigation and must be investigated independently.

Site Map



Laboratory Analysis – Sieve Analysis

SOIL CLASSIFICATION

Location of Site	Site 1, 17110 East Goshawk Road, 80908	Tested By:	R.J. & T.P.
		Date Tested	06/05/19
Legal Description	N/A	Collected By	S.Dunfee
Job Number	19.203A	Date Collected	05/29/19

SITE INVESTIGATION

Test Hole Depth	20'-0"	Groundwater Table	N/A
Surface Layer Thickness	-	Volume of Soil Sample	1/2 cu.ft.
Soil System	Uniform	Visual Moisture Observation	Moist

Layer	Soil Type/Depth
Surface	-
No. 1	SC/0 - 20'-0"
No. 2	-
No. 3	-

Critical Layer	No. 1
Coloration	Tan
Gravel	Trace
Organic Content	Little-None

SIEVE ANALYSIS

Test Bore #:	TB #1
Layer	No. 1
Depth of Sample	10'-0"

Bulk	Wet Weight of Soil (g)	625.6
	Dry Weight of Soil (g)	594.5
	Natural Moisture Content	5.2%

Sieve #	Thickness (mm)	Mass Ret. (g)	% Ret.	%Pass	
4	4.750	20.4	3.4%	96.6%	Gravel
10	2.000	80.4	13.5%	83.0%	
40	0.425	149.4	25.2%	57.8%	Sand
60	0.250	40.9	6.9%	51.0%	
100	0.150	38.0	6.4%	44.5%	
200	0.075	48.3	8.1%	36.4%	
Pan	0.000	216.0	36.4%	0.0%	Fines
Pan	0.000		0.0%	0.0%	Organic
Totals		593.4	100.0%		

% Gravel	3.4%	Retained on #200
% Sand	60.2%	
% Fines	36.4%	Passes #200
% Organic	0.0%	
Check	100.0%	

$C_u = D_{60}/D_{10}$ = N/A

$C_c = D_{30}^2/(D_{10})(D_{60})$ = N/A

Laboratory Analysis – Atterberg Limits

ATTERBERG LIMITS

LIQUID LIMIT - LL

	Tin Mass(g)						
Cup #	Empty	Wet Soil	Dry Soil	# Drops	Water Mass (g)	Solids Mass (g)	Water Content
1	13.6	55.5	44.0	8	11.5	30.4	0.38
2	13.5	53.2	42.9	16	10.3	29.4	0.35
3	13.6	58.5	47.5	32	11.0	33.9	0.33

Liquid Limit (from plot)	0.34

PLASTIC LIMIT - PL

	Tin Mass(g)					
Cup #	Empty	Wet Soil	Dry Soil	Water Mass (g)	Solids Mass (g)	Plastic Limit (PL)
1	13.3	19.6	18.9	0.74	5.51	0.13
2	13.5	20.1	19.3	0.78	5.77	0.14
					Average	0.13

Plastic Limit	0.13

Note: Liquid Limit, Plastic Limit and Plasticity Index values have been rounded to nearest whole number when expressing as a percentage.

PLASTICITY INDEX - PI

Plasticity Index = Liquid Limit - Plastic Limit

Plasticity Index	0.20

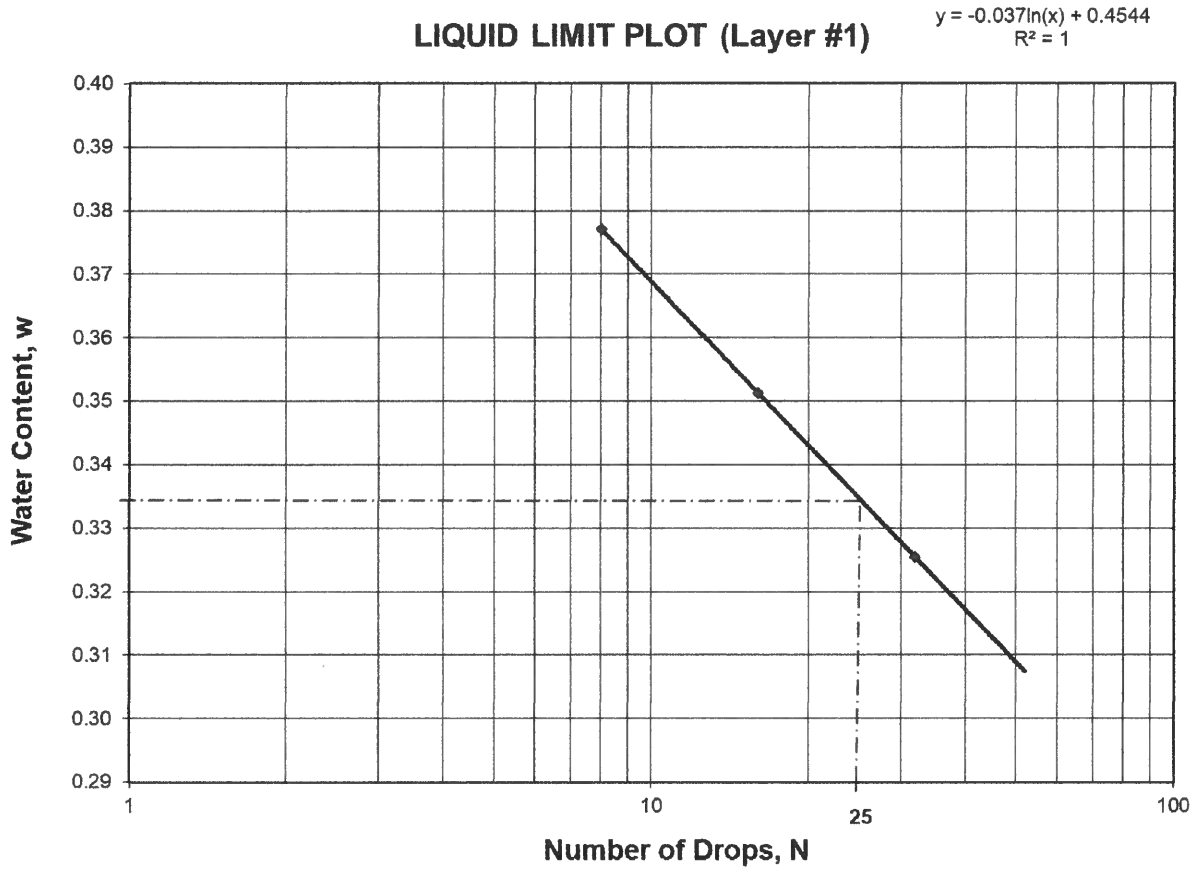
MOISTURE CONTENT

	Tin Mass(g)					
Depth	Empty	Wet Soil	Dry Soil	Water Mass (g)	Solids Mass (g)	Water Content
5'-0"	13.6	87.3	81.3	6.1	67.7	9.0%
15'-0"	13.7	108.4	104.3	4.1	90.6	4.5%
20'-0"	13.7	88.0	84.1	4.0	70.4	5.6%

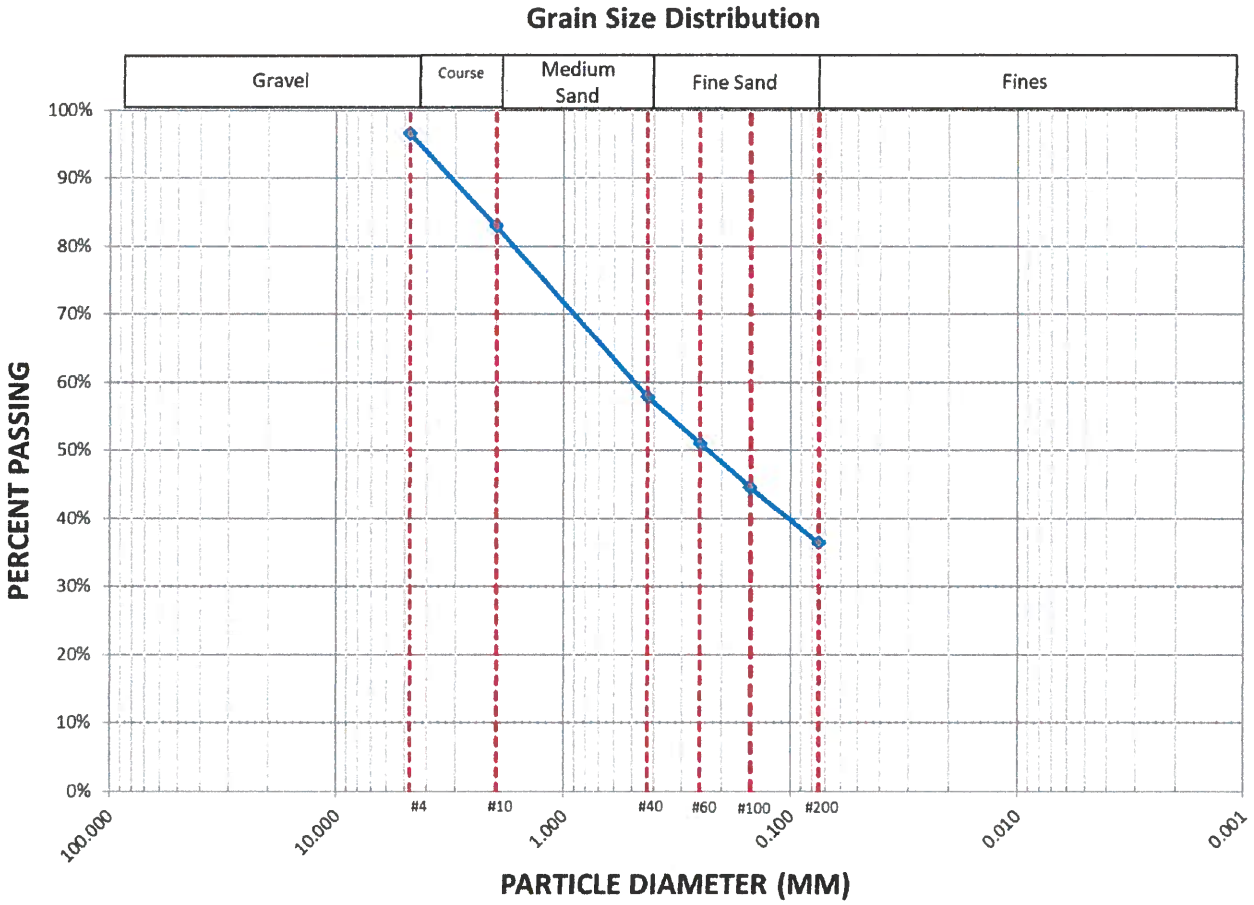
CLASSIFICATION

Plasticity	High Plasticity
Group Symbol	SC
Group Name	Clayey Sand

Laboratory Analysis – Liquid Limit Plot



Laboratory Analysis – Grain Size Distribution



Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

BORING LOG

Job Number:	19.203A
Date Drilled:	05/29/19
Boring #:	TB #1

Driller:	S.Dunfee	Total Depth:	20'-0"
Logged By:	S.Dunfee	Groundwater Elevation:	N/A
Method:	Boring	Latitude:	39° 4'45.93"N
Auger & Size:	4" Solid Stem	Longitude:	104°37'54.53"W

Depth (ft.)	Sample Interval	SPT Blows/12"	Site 1, 17110 East Goshawk Road, 80908	Additional Notes
			Sand, Coarse-Grained, Clay, Trace Gravel, Medium Dense, Tan, High Plasticity, Moist, (SC)	
5		Grab		
10		9/30		
15		Grab		
			Sand, Coarse-Grained, Clay, Trace Gravel, Dense, Grey, High Plasticity, Moist, (SC)	
20		Grab		
			Total Depth= 20'-0"	
25				

PARR ENGINEERING
& CONSULTING, INC.

Christopher L. Parr, P.E. Principal
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Office: 719-494-0404

Structural Engineering & Consulting
Geotechnical Engineering
On-Site Wastewater Treatment Design
Inspections & Technical Reports

June 12, 2019

JN 19.203B

Project: **Subsurface Soil Investigation**
Site 2, 17110 East Goshawk Road
Colorado Springs, CO 80908

Attached is a formal soils report for the project referenced above. Included in this report is a review of the soils investigation and analysis for this location. The purpose of our investigation was to evaluate the conditions of the subsurface soil in order to establish design and construction criteria for the proposed structure(s). A discussion of the results of our investigation with construction recommendations is also included. If revisions to the design of the proposed structure take place, it is advised that our firm be contacted immediately to review the changes and to determine if the revised plans are acceptable.

If you have any questions concerning this report, please feel free to contact our office at 719-494-0404.

Sincerely,

COLORADO LICENSED DANIEL JOSEPH MIZICKO 52484 06-12-19 PROFESSIONAL ENGINEER

Daniel J. Mizicko P.E.

Table of Contents

*Purpose and Scope of Study

This report presents the results of a subsurface exploration program to provide foundation recommendations for the proposed structure to be located on the parcel of land referenced above.

The exploration program was conducted in order to obtain information regarding the subsurface conditions. Soil samples were retrieved from a soil boring(s) and analyzed to provide data on the classification and engineering characteristics of the on-site soils. The results of the field and laboratory investigation are presented herein.

This report has been prepared to summarize the data obtained and to present our conclusion and recommendations based on the proposed construction and the subsurface conditions encountered. Design criteria and a discussion of the geotechnical engineering considerations related to the construction of the proposed structure are included.

***The information presented in this report is NOT intended to be used as a design. The foundation design requirements and all inspections associated with the foundation design is the responsibility of the Structural Engineer of Record.**

Proposed Construction

Based on the information provided, the proposed construction will consist of a wood framed, single family residential structure supported on a reinforced concrete foundation system. We anticipate maximum structural loadings of 3000 pounds per lineal foot for distributive wall loads and 15 kips for concentrated column loads.

If the project features or loadings differ significantly from those above, our firm should be contacted to reevaluate the recommendations contained herein.

Field Investigation

The field investigation for this project was conducted on May 29, 2019.

A 4" diameter exploratory boring was drilled to approximately 20 feet below grade in the area of the proposed construction. Standard penetration testing (SPT) was conducted during the drilling process.

The SPT measures resistance to penetration of a standard split-spoon sampler that is driven by a 140 lbm hammer dropped from a height of 30 in. The number of blows required to drive the sampler a distance of 12 in. after an initial penetration of 6 in. is referred to as the N-value or standard penetration resistance in blows per foot.

The representative samples obtained from the SPT split-spoon sampler are saved for subsequent laboratory examination and testing.

Laboratory Investigation

The field samples obtained were analyzed and classified in the laboratory. Laboratory testing included standard property tests, natural water content, Atterberg limits and Expansion Index tests.

The laboratory testing was conducted in general accordance with ASTM specifications.

Subsurface Conditions

The following tables summarize information obtained about the subsurface conditions encountered:

Soil Classification	Sample Depth	Gravel	Sand	Fines	LL[1]	PI[2]	EI[3]	Expansive Potential
Silty, Clayey Sand (SC-SM)	10 ft.	1.0%	74.7%	24.3%	23	5	N/A	**Low**

LL – Liquid Limit [1] PI – Plasticity Index [2] EI – Expansion Index [3] NP[4] – Non Plastic

Soil Classification	Sample Depth	SPT N-Value	Relative Density	Moisture Content	Clay Content	Expansive Index	Expansion Potential
Silty, Clayey Sand (SC-SM)	5 ft.	N/A	Very Dense	5..3%	Low	N/A	N/A
Silty, Clayey Sand (SC-SM)	10 ft.	50+	Very Dense	6.1%	Low	N/A	**Low**
Silty, Clayey Sand (SC-SM)	15 ft.	N/A	Very Dense	7.0%	Low	N/A	N/A
Clayey Sand (SC)	20 ft.	N/A	Very Dense	5.3%	Medium	N/A	N/A

Ground water was not encountered during the time of our investigation. This may be due to lack of moisture received in the area and subsequently may rise due to seasonal changes, degree of irrigation and/or other factors.

Foundation Recommendations

Considering the subsurface conditions encountered on-site and the nature of the proposed construction, we recommend that the proposed structure be founded on a reinforced concrete shallow foundation system with footings placed on native undisturbed soil. **Foundation elements shall be designed for a maximum allowable bearing pressure of 3000 lb/ft^2.**

Existing topsoil, silt or deleterious materials if encountered below the foundation must be removed.

Foundation Walls

Foundation walls which are laterally supported and can be expected to undergo a minimal amount of deflection ("at-rest condition") may be designed for a lateral earth pressure computed on the basis of an **equivalent fluid unit weight of 65 pcf for onsite material**.

All foundation walls should be designed for appropriate hydrostatic and surcharge pressures such as adjacent buildings, traffic and construction materials and equipment. The pressures recommended above assume a relatively horizontal backfill surface.

The onsite excavated materials may be used as foundation wall backfill. Backfill shall be carefully placed in uniform lifts and properly compacted near optimum moisture content. Care should be taken not to over compact the backfill since this could cause excessive lateral pressure on the walls. Some settlement of deep foundation wall backfill will occur even if the material is placed correctly.

*Open Excavation Observation

It is assumed that the results in this report are representative of the subsurface conditions throughout the site. However, variations across the site are a possibility and will not become evident until the foundation excavation is complete.

A representative of Parr Engineering & Consulting shall be contacted to inspect the completed foundation excavation prior to the placement of any formwork. Please contact our office a minimum of 24 hours prior to the requested site visit. This report may be rendered null and void if the open excavation observation is not completed.

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Floor System Recommendations

Floor Slabs should be provided with control joints to reduce damage that may occur as a result of shrinkage cracking. We suggest the spacing of the joints to be no more than 15 feet centers. The actual joint spacing should be based on the slab reinforcing design.

Surface Drainage

The following drainage precautions should be observed during the construction and maintained at all times after the residence has been completed.

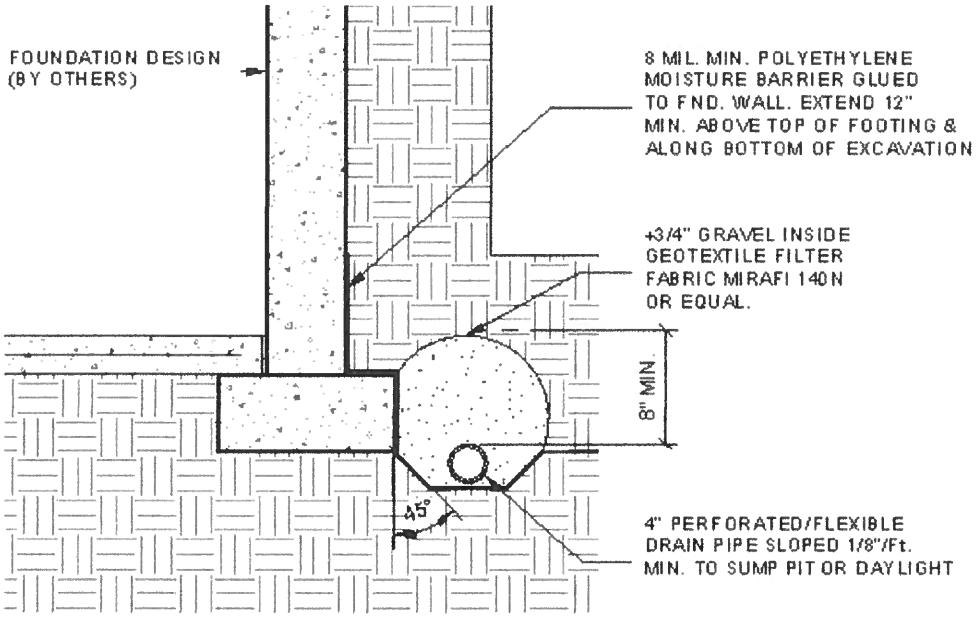
1) Excessive wetting and drying of the foundation excavations and under slab areas should be avoided during construction.
2) The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 12 inches in the first 10 feet.
3) Roof downspouts and drains should discharge well beyond the limits of the backfill.
4) Landscaping which requires excessive watering should be located at least 10 feet from the house.

5) Plastic membranes should not be used to cover the ground surface adjacent to the foundation walls.

Subsurface Drainage

A subsurface foundation drain or equivalent protection measure is required around the perimeter of all habitable or storage spaces located below grade (including crawlspace areas).

A subsurface drain is designed to redirect moisture around and away from the foundation system. However, it should be noted that a properly functioning drain does not completely eliminate the potential for foundation movement if exposed to subsurface moisture.



Limitations

This report has been prepared with generally accepted soil and foundation engineering practices in this area for use by the client for design purposes. The conclusions and recommendations presented are based on data obtained from the exploratory boring. The nature and extent of variation from the boring may not become evident until excavation is performed. If during construction, soil, rock and groundwater conditions appear to be different from those described herein, our office should be advised immediately so that reevaluation of the recommendations may be made.

Although all laboratory procedures were performed under optimal conditions, it should be noted that precautions should be taken to accommodate for certain sources of failure such as inconsistencies in the properties/characteristics of the on-site soil, variations in groundwater levels due to seasonal changes, etc.

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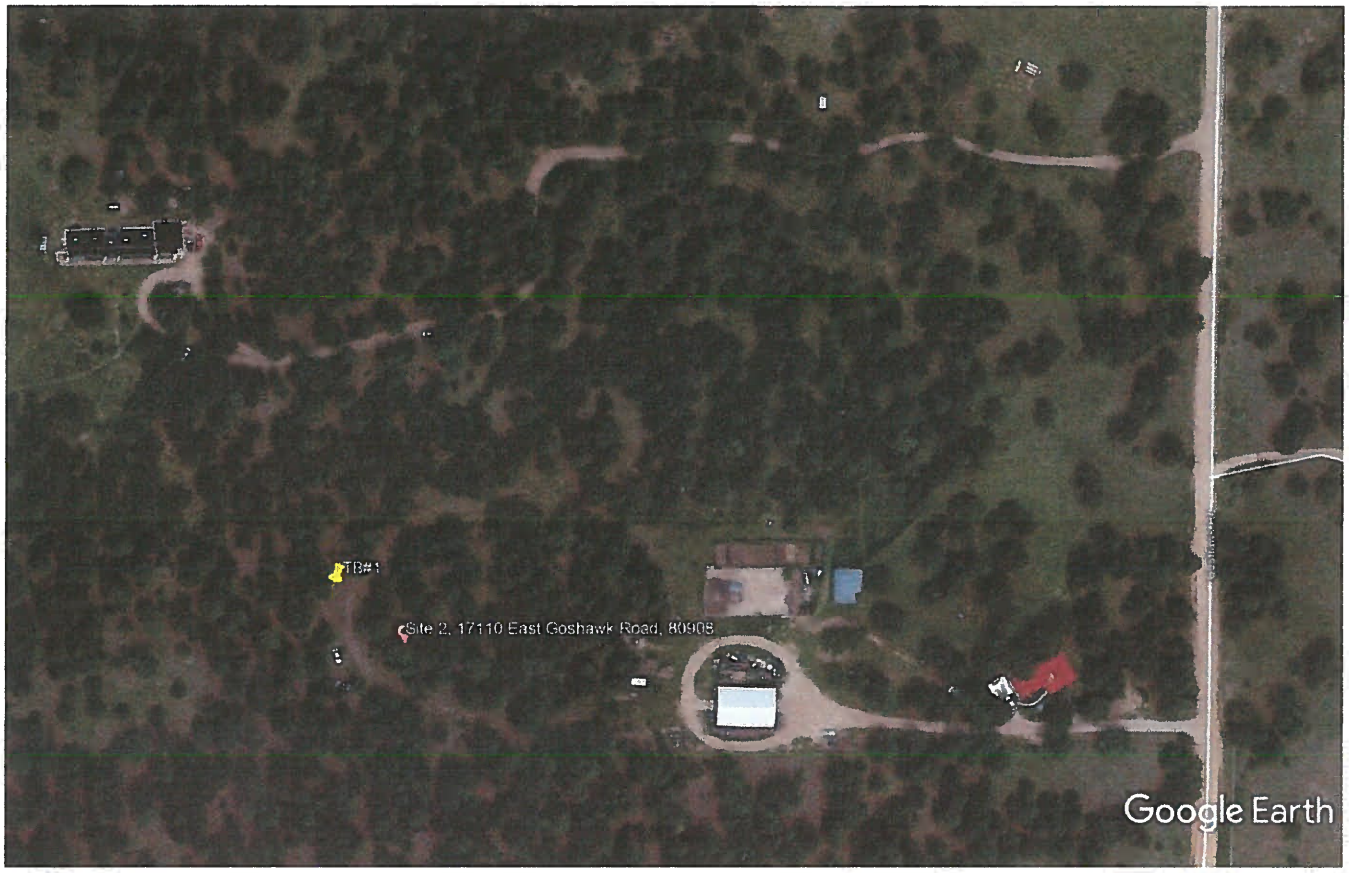
Site Map



Laboratory Analysis – Sieve Analysis

SOIL CLASSIFICATION

Location of Site	Site 2, 17110 East Goshawk Road, 80908
Legal Description	N/A
Job Number	19.203B

Tested By:	R.J. & T.P.
Date Tested	06/05/19
Collected By	S.Dunfee
Date Collected	05/29/19

SITE INVESTIGATION

Test Hole Depth	20'-0"
Surface Layer Thickness	-
Soil System	Uniform

Groundwater Table	N/A
Volume of Soil Sample	1/2 cu.ft.
Visual Moisture Observation	Moist

Layer	Soil Type/Depth
Surface	-
No. 1	SC-SM/0 - 20'-0"
No. 2	-
No. 3	-

Critical Layer	No. 1
Coloration	Tan
Gravel	Trace
Organic Content	Little-None

SIEVE ANALYSIS

Test Bore #:	TB #1
Layer	No. 1
Depth of Sample	10'-0"

Bulk	Wet Weight of Soil (g)	424.9
	Dry Weight of Soil (g)	400.6
	Natural Moisture Content	6.1%

Sieve #	Thickness (mm)	Mass Ret. (g)	% Ret.	%Pass	
4	4.750	4.1	1.0%	99.0%	Gravel
10	2.000	78.6	19.6%	79.4%	Sand
40	0.425	108.6	27.1%	52.2%	
60	0.250	26.5	6.6%	45.6%	
100	0.150	39.4	9.8%	35.8%	
200	0.075	46.2	11.5%	24.3%	
Pan	0.000	97.1	24.3%	0.0%	Fines
Pan	0.000		0.0%	0.0%	Organic

Totals	400.4	100.0%

% Gravel	1.0%	Retained on #200
% Sand	74.7%	
% Fines	24.3%	Passes #200
% Organic	0.0%	
Check	100.0%	

$C_u = D_{60}/D_{10}$ = N/A

$C_c = D_{30}^2/(D_{10})(D_{60})$ = N/A

Laboratory Analysis – Atterberg Limits

ATTERBERG LIMITS

LIQUID LIMIT - LL

	Tin Mass(g)						
Cup #	Empty	Wet Soil	Dry Soil	# Drops	Water Mass (g)	Solids Mass (g)	Water Content
1	13.6	62.0	51.2	5	10.8	37.5	0.29
2	13.6	60.6	50.9	12	9.7	37.2	0.26
3	13.6	56.3	48.3	23	8.0	34.8	0.23

Liquid Limit (from plot)	0.23

PLASTIC LIMIT - PL

	Tin Mass(g)					
Cup #	Empty	Wet Soil	Dry Soil	Water Mass (g)	Solids Mass (g)	Plastic Limit (PL)
1	13.5	17.3	16.7	0.58	3.21	0.18
2	13.5	18.4	17.7	0.75	4.16	0.18
					Average	0.18

Plastic Limit	0.18

Note: Liquid Limit, Plastic Limit and Plasticity Index values have been rounded to nearest whole number when expressing as a percentage.

PLASTICITY INDEX - PI

Plasticity Index = Liquid Limit - Plastic Limit

Plasticity Index	0.05

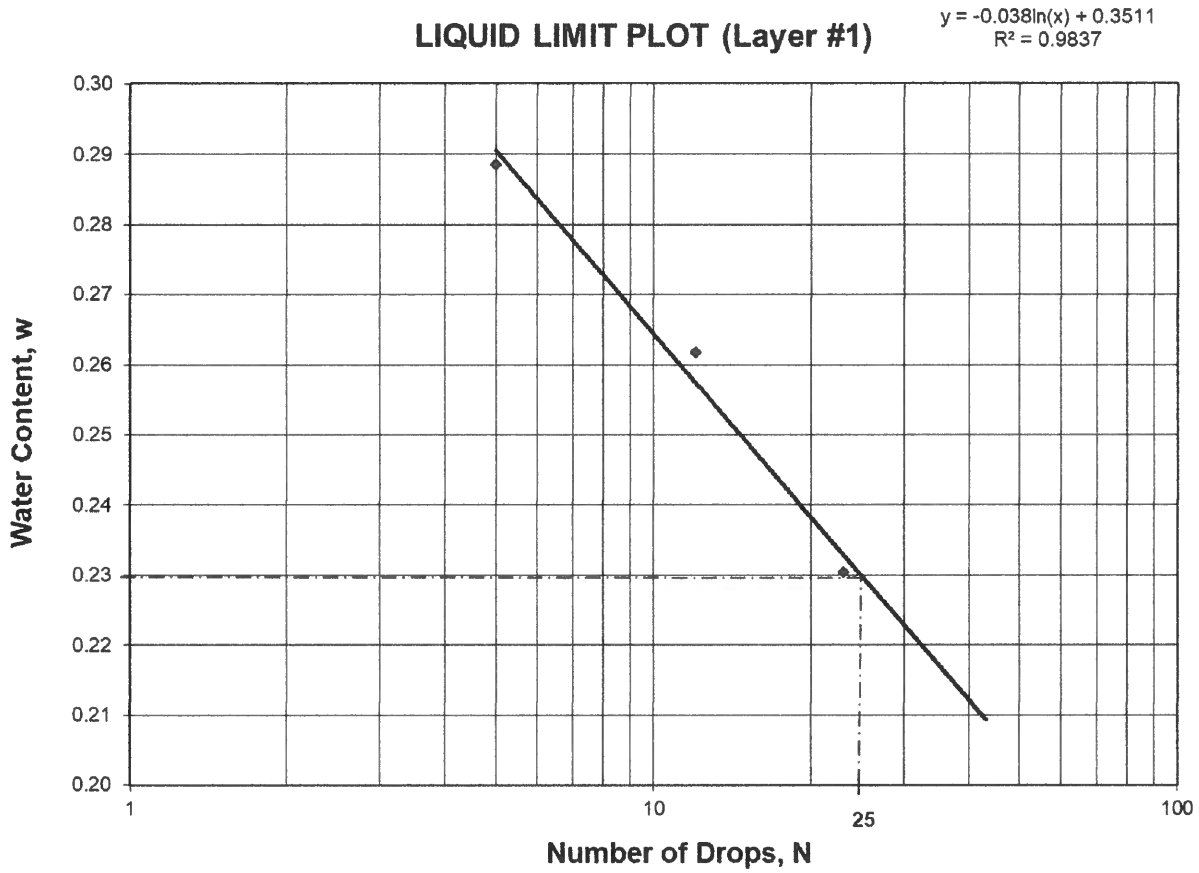
MOISTURE CONTENT

	Tin Mass(g)					
Depth	Empty	Wet Soil	Dry Soil	Water Mass (g)	Solids Mass (g)	Water Content
5'-0"	13.8	90.5	86.7	3.9	72.9	5.3%
15'-0"	13.8	91.5	86.4	5.1	72.6	7.0%
20'-0"	13.7	88.8	85.0	3.8	71.3	5.3%

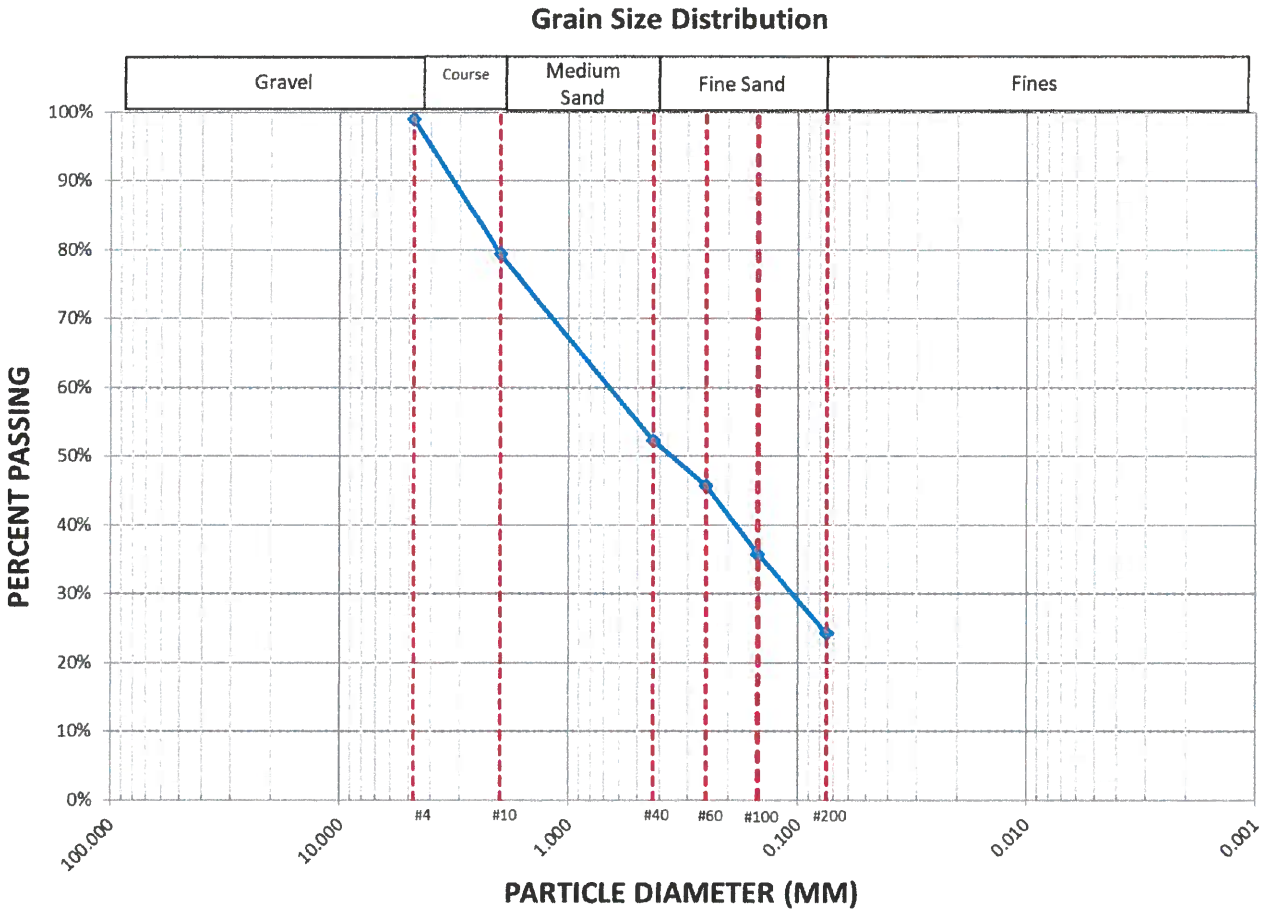
CLASSIFICATION

Plasticity	Slightly Plastic
Group Symbol	SC-SM
Group Name	Silty, Clayey Sand

Laboratory Analysis – Liquid Limit Plot



Laboratory Analysis – Grain Size Distribution



Drill Log – Test Bore #1

Parr Engineering & Consulting, Inc.
11590 Black Forest Road, Suite 10
Colorado Springs, Colorado 80908
Phone: 719-494-0404

BORING LOG

Job Number:	19.203B
Date Drilled:	05/29/19
Boring #:	TB #1

Driller:	S.Dunfee	Total Depth:	20'-0"
Logged By:	S.Dunfee	Groundwater Elevation:	N/A
Method:	Boring	Latitude:	39° 4'44.17"N
Auger & Size:	4" Solid Stem	Longitude:	104°38'0.97"W

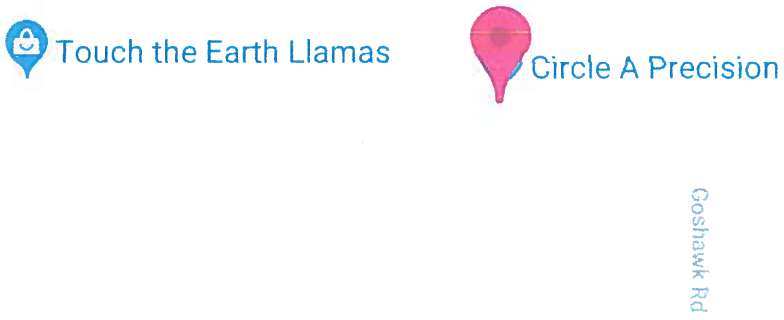
Depth (ft.)	Sample Interval	SPT Blows/12"	Site 2, 17110 East Goshawk Road, 80908	Additional Notes
			Sand, Coarse-Grained, Silt, Clay, Trace Gravel, Very Dense, Tan, Low Plasticity, Moist, (SC-SM)	
5		Grab		
10		50+		
			Sand, Fine-Grained, Silt, Clay, Trace Gravel, Very Dense, Tan, Low Plasticity, Moist, (SC-SM)	
15		Grab		
			Sand, Coarse-Grained, Clay, Silt, Trace Gravel, Very Dense, Grey, Low Plasticity, Moist, (SC)	
20		Grab		
			Total Depth= 20'-0"	
25				

ATTACHMENT 4

SEISMIC

17110 Goshawk Rd, Colorado Springs, CO 80908, USA

Latitude, Longitude: 39.079227, -104.63223900000003

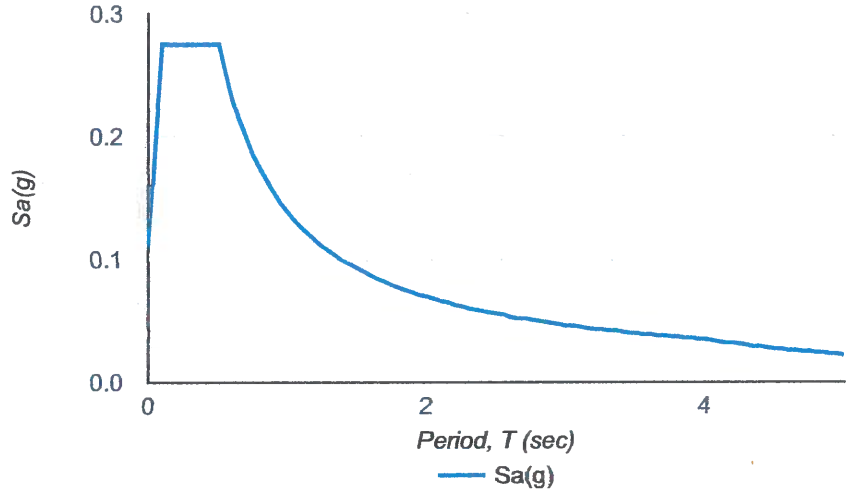


Date	9/4/2019, 10:43:40 AM
Design Code Reference Document	ASCE7-10
Risk Category	IV
Site Class	D - Stiff Soil

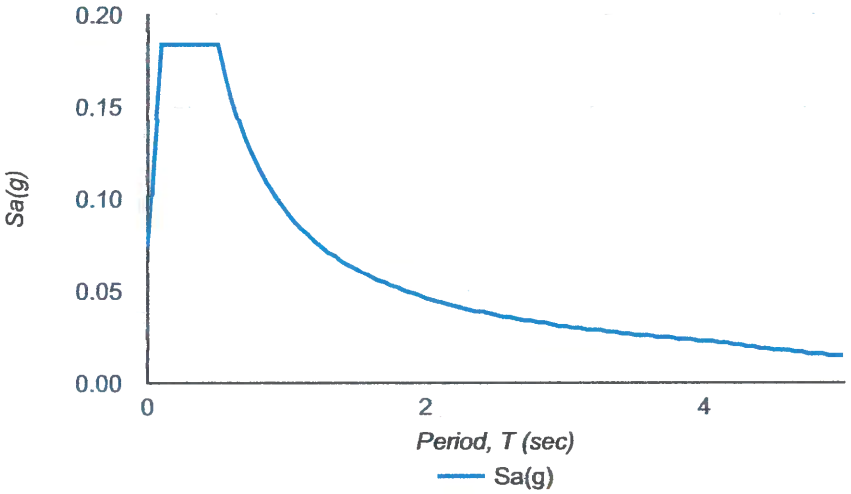
Type	Value	Description
S_S	0.172	MCE_R ground motion. (for 0.2 second period)
S_1	0.058	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.275	Site-modified spectral acceleration value
S_{M1}	0.139	Site-modified spectral acceleration value
S_{DS}	0.184	Numeric seismic design value at 0.2 second SA
S_{D1}	0.093	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	C	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.087	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.139	Site modified peak ground acceleration
T_L	4	Long-period transition period in seconds
SsRT	0.172	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.192	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.058	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.065	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.895	Mapped value of the risk coefficient at short periods
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum



Design Response Spectrum



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