ENTECH
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WASTEWATER STUDY
RETREAT AT TIMBERRIDGE FILING NO. 4
PARCEL NO. 52220-00-023
EL PASO COUNTY, COLORADO

Prepared for:
TimberRidge Development Group, LLC
2138 Flying Horse Club Drive
Colorado Springs, CO 80921

Attn: Loren Moreland

A titled Soils and Geology Report was not submitted; Please provide a report titled Geology and Soils Report is provided to verify meeting the requirements of Section 8.4.9. (constraints identified mitigation measures provided). A wastewater study was provided for this line item.

December 21, 2023

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Reviewed by:

COLORADO REGISTERED JOSEPH COLLIN GOODE JR. 23725 PROFESSIONAL ENGINEER

Joseph C Goode Jr.
Digitally signed by Joseph C Goode Jr.
Date: 2023.12.21 14:19:34 -07'00'

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

LLL

Table of Contents

1 SUMMARY

Project Location

The project lies in portions of the SW¼ of Section 22 and the NE¼ of Section 28, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 3 miles northeast of Colorado Springs, Colorado.

Project Description

Ten rural residential 2.5+ acre lots are proposed on the 34.92-acre site. The proposed rural residential lots will be serviced by individual on-site wastewater treatment systems and individual water wells.

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of expansive soils, shallow bedrock, and seasonal shallow groundwater and potentially seasonally shallow groundwater areas. Based on the proposed development plan, it appears that these areas will have some impact on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

2 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in portions of the SW¼ of Section 22 and the NE¼ of Section 28, Township 15 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 3 miles northeast of Colorado Springs, Colorado, at Vollmer Road and Arroya Lane. The location of the site is as shown on the Vicinity Map, Figure 1.

Generally, the topography of the site is gradually to moderately sloping to the southwest towards Sand Creek. Minor drainage swales are located across the site that flow in a westerly direction. Water was not observed in the drainages on-site at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included equipment storage, a fill borrow area, and grazing and pasture land. The site contains primarily field grasses, weeds, cacti, and yuccas, mountain mahogany, and ponderosa pine. Site photographs, taken September 13, 2023, are included in Appendix A.

Ten rural residential 2.5+ acre lots are proposed on the 34.92-acre site. Preliminary grading plans indicate the site grading will be limited to the proposed roadway and detention pond in the southwestern corner of the site. The proposed grading is shown on Exploration and Site Plan presented in Figure 3.

3 SCOPE OF THE REPORT

The scope of the report includes a general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

4 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the

Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on August 9, 2023.

A Geologic Hazard Study was previously performed by Entech Engineering, Inc. for the Retreat at TimberRidge, April 17, 2017 (Reference 1). Test borings and test pits from the previous investigation were utilized for this report. The location of the test borings and test pits are indicated on Figures 3 and 6. Information from the report was used in evaluating the site. The Test Boring and Test Pit Logs are presented in Appendix B, and Summarized on Table B-1. Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis ASTM D-422, Atterberg Limits ASTM D-4318, volume change testing using Swell/Consolidation test. Sulfate testing was performed on select samples to evaluate potential for below grade concrete degradation due to sulfate attack. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table C-1.

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 12 miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northeasterly direction (Reference 1). The rocks in the area of the site are sedimentary in nature and typically Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of man-made, and alluvial soils of Quaternary Age. The alluvial soils were deposited by water on site and as stream deposits along the drainages on-site. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has mapped three soil types on the site (Figure 4). In general, the soils classify as gravelly loamy sand and coarse sandy loam. The soils are described as follows:

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

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to have moderate to moderately rapid permeabilities. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have slight to moderate erosion hazards.

5.3 Site Stratigraphy

The Geologic Map of the Falcon NW Quadrangle showing the site is presented in Figure 5 (Reference 5). The Geology Map prepared for the site is presented in Figure 6. Two mappable units were identified on this site which are described as follows:

Qal **Recent alluvium of Holocene Age:** These are recent deposits that have been deposited along the drainages on-site.

Tkd **Dawson Formation of Tertiary to Cretaceous Age:** The Dawson formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual and/or colluvial soils. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. The colluvial soils have been transported by the action of sheetwash and gravity. These soils consisted of silty to clayey sands and sandy clays

The bedrock underlying the site consists of the Dawson Formation of Tertiary to Cretaceous Age. The Dawson Formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation are variable layers of alluvial deposits, and residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to clayey sands and sandy clays.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon NW Quadrangle* distributed by the Colorado Geological Survey in 2003 (Reference 5), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 6), and the *Geologic Map of the Pueblo 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 7). The test borings and test pits were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

The soils encountered in the Test Borings can be grouped into three general soil types. The soils were classified using the Unified Soil Classification System (USCS).

Soil Type 1 clayey to very clayey sand and silty to slightly silty sand (SC, SM, SM-SW), encountered in both of Test Borings and all of the test pits at the existing ground surface and extending to depths ranging from 1 foot to 14 feet bgs. These soils were encountered at loose to dense states and at moist conditions. The majority of the soils were encountered and medium dense states. Samples tested had 11 to 34 percent passing the No. 200 Sieve.

Soil Type 2 silty sandstone and clayey to very clayey sandstone (SM, SC), encountered in both of Test Borings and all of the Test Pits at depths ranging from 1 foot to 14 feet bgs and extending to the termination of the test borings (15 to 20 feet). The sandstone was encountered at dense to very dense states and at moist conditions. Samples tested had 48 percent passing the No. 200 Sieve. Swell/Consolidation Testing on a sample of the very clayey sandstone resulted in a swell of 0.2 percent, which is in the low expansion range.

Soil Type 3 sandy claystone and siltstone (CL, MH), encountered in Test Pit No. 2 at depths ranging from 5 feet and extended to the termination test pit (8 feet). The claystone and siltstone were encountered at hard consistencies and at moist conditions. Samples tested had 60 to 77 percent passing the No. 200 Sieve. FHA Swell Testing resulted in an expansion pressure of 1280 psf, which is in the moderate expansion range.

The Test Boring Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C, and a Summary of Laboratory Test Results is presented in Table C-1.

There is a strip of potentially seasonally shallow groundwater located along the pond embankment, how will this be mitigated? See excerpts from MHFD's DCM Volume 2 and 3 for potential concerns with groundwater in an EDB and the recommended mitigation options (like a clay or geomembrane liner). Please discuss this potential shallow groundwater in the report text. If you decide not to design for mitigation now and shallow groundwater is encountered during or after construction (or at PA/FA), proper mitigation and permitting will need to be implemented at that time

5.5 Groundwater

Groundwater was encountered in test borings which were drilled to depths of 15 to 20 feet. Signs of seasonally occurring groundwater were observed in TP-2 at a depth of 5 feet. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time. It should be noted that in the sandy materials on-site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

6 ON-SITE WASTEWATER TREATMENT

The site was evaluated for individual on-site wastewater treatment systems in accordance with the El Paso Land Development Code. Four (4) tactile test pits were previously excavated on the site. The test pits were placed in potential locations of future systems. The approximate locations of the Test Pits are indicated in Figure 3, and on the Septic Suitability Map, Figure 8. Test Pit Logs and La

The Natural
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Appendix D
the soils hav

5.12 Linings

Sometimes an impermeable clay or synthetic liner is necessary. Stormwater detention and retention facilities have the potential to raise the groundwater level in the vicinity of the basin. Where there is concern for damage to adjacent structures due to rising ground water, consider lining the basin with an impermeable liner. An impermeable liner may also be warranted for a retention pond where the designer seeks to limit seepage from the permanent pool. Note that if left uncovered, synthetic lining on side slopes creates a serious impediment to egress and a potential drowning hazard. See the Retention Pond Fact Sheet in Volume 3 of the USDCM for guidance and benefits associated with the constructing a safety wetland bench.

Drainage areas mapped with potential seasonally and seasonally shallow groundwater are located on the proposed lots. In these areas a 25-foot setback for the soil treatment area will be required. This will limit the potential buildable areas on the lots depending on the final size of the anticipated OWTS. Signs of seasonally occurring groundwater were observed in the Test Pit No. 2 at 5 feet. Weathered bedrock was encountered at approximately 1 to 3.5 feet in the test pits.

- **Groundwater**: Shallow groundwater on a site presents challenges for BMPs that rely on infiltration and for BMPs that are intended to be dry between storm events. Shallow groundwater may limit the ability to infiltrate runoff or result in unwanted groundwater storage in areas intended for storage of the WQCV (e.g., porous sub-base of a permeable pavement system or in the bottom of an otherwise dry facility such as an extended detention basin). Conversely, for some types of BMPs such as wetland channels or constructed wetland basins, groundwater can be beneficial by providing saturation of the root zone and/or a source of baseflow. Groundwater quality protection is an issue that should be considered for infiltration-based BMPs. Infiltration BMPs may not be appropriate for land uses that involve storage or use of materials that have the potential to contaminate groundwater underlying a site (i.e., "hot spot" runoff from fueling stations, materials storage areas, etc.). If groundwater or soil contamination exists on a site and it will not be remediated or removed as a part of construction, it may be necessary to avoid infiltration-based BMPs or use a durable liner to prevent infiltration into contaminated areas.

Soils encountered in the tactile test pits consisted of sandy loam, gravelly sandy loam, and sandy clay loam overlying highly weathered to weathered clayey to silty sandstone and claystone. The limiting layers encountered in the test pits are gravelly sandy loam (2A – R-1), sandy clay loam (Soil Type 3A), sandstone (gravelly sandy clay when classified as a soil, Soil Type 4A), and claystone (sandy clay when classified as a soil, Soil Type 4A and 5). The soil types correspond to LTAR values ranging from 0.80 to 0.10 gallons per day per square foot. **Additional investigation may identify areas where suitable conventional systems could be used on the lots.**

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County and State Guidelines and properly maintained. Based on the testing performed as part of this investigation designed systems should be anticipated for new the lots. A Septic Suitability Map is presented in Figure 8. OWTS sites should not be located within defined drainages. Individual soil testing is required on the lots prior to construction. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any drainages, floodplains or ponded areas and 25 feet from dry gulches.

7 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. Most of these conditions can be mitigated through proper engineering design and construction practices. The proposed development and use are consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc.

soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

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

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

8 REFERENCES

1. Entech Engineering, Inc. April 12, 202017. *Soil, Geology, and Geologic Hazard Study, The Retreat at TimberRidge 2.5+ Acre Lots, Vollmer Road and Arroya Lane, El Paso County, Colorado.* Entech Job No. 170209.

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5. Madole, Richard F., 2003. *Geologic Map of the Falcon NW Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-8.

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

7. Scott, Glen R., Taylor, Richard B., Epis, Rudy C., and Wobus, Reinhard A. 1978. *Geologic Map of the Denver 1^{o} x 2^{o} Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1022.

8. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas.* Map Number 08041CO535G.

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

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

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

FIGURES

N

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VICINITY MAP

RETREAT AT TIMBERRIDGE FIL. NO. 4
EL PASO COUNTY, CO
TIMBERRIDGE DEVELOPMENT GROUP, LLC

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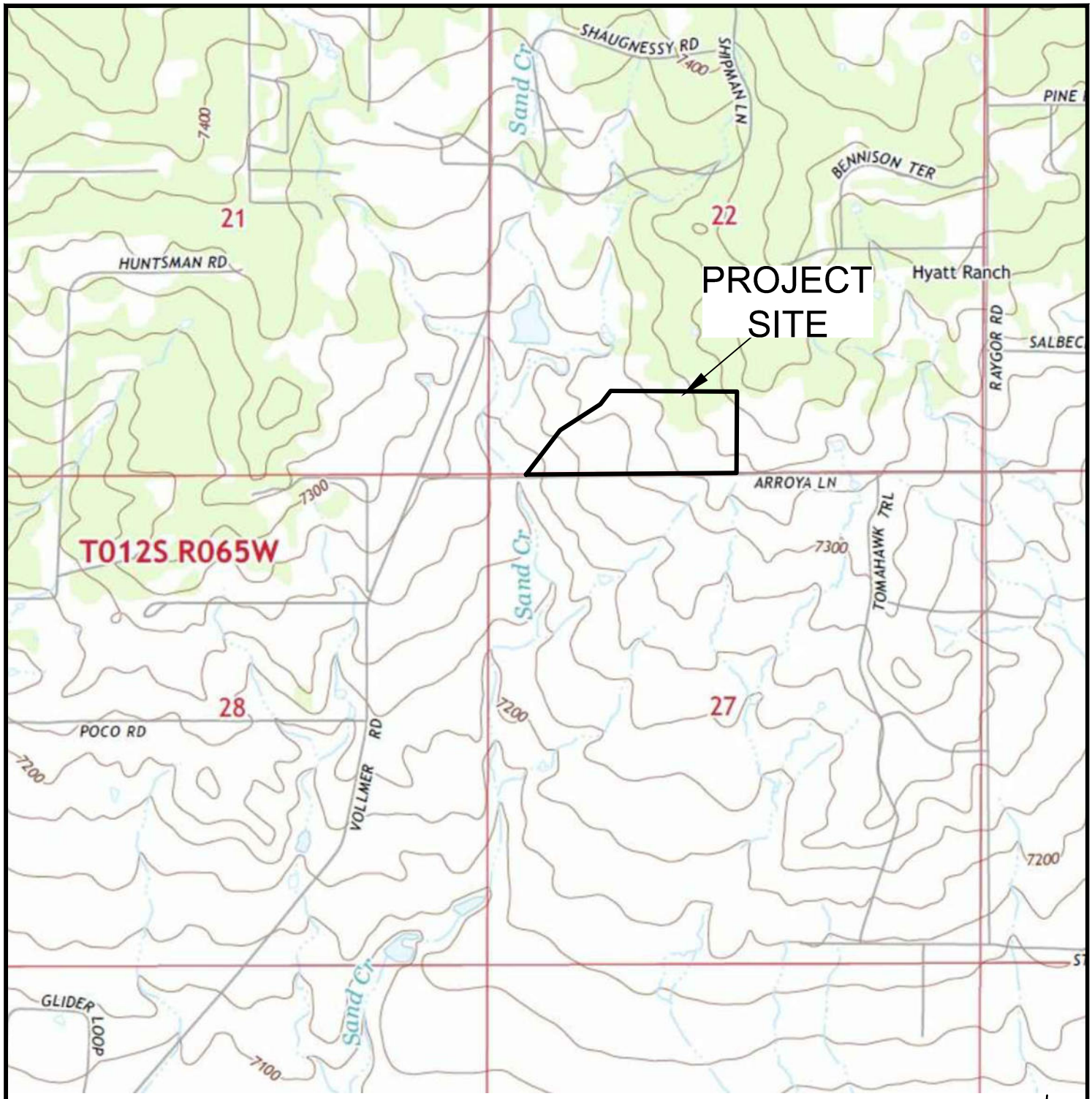
FIG. 1



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USGS TOPOGRAPHY MAP

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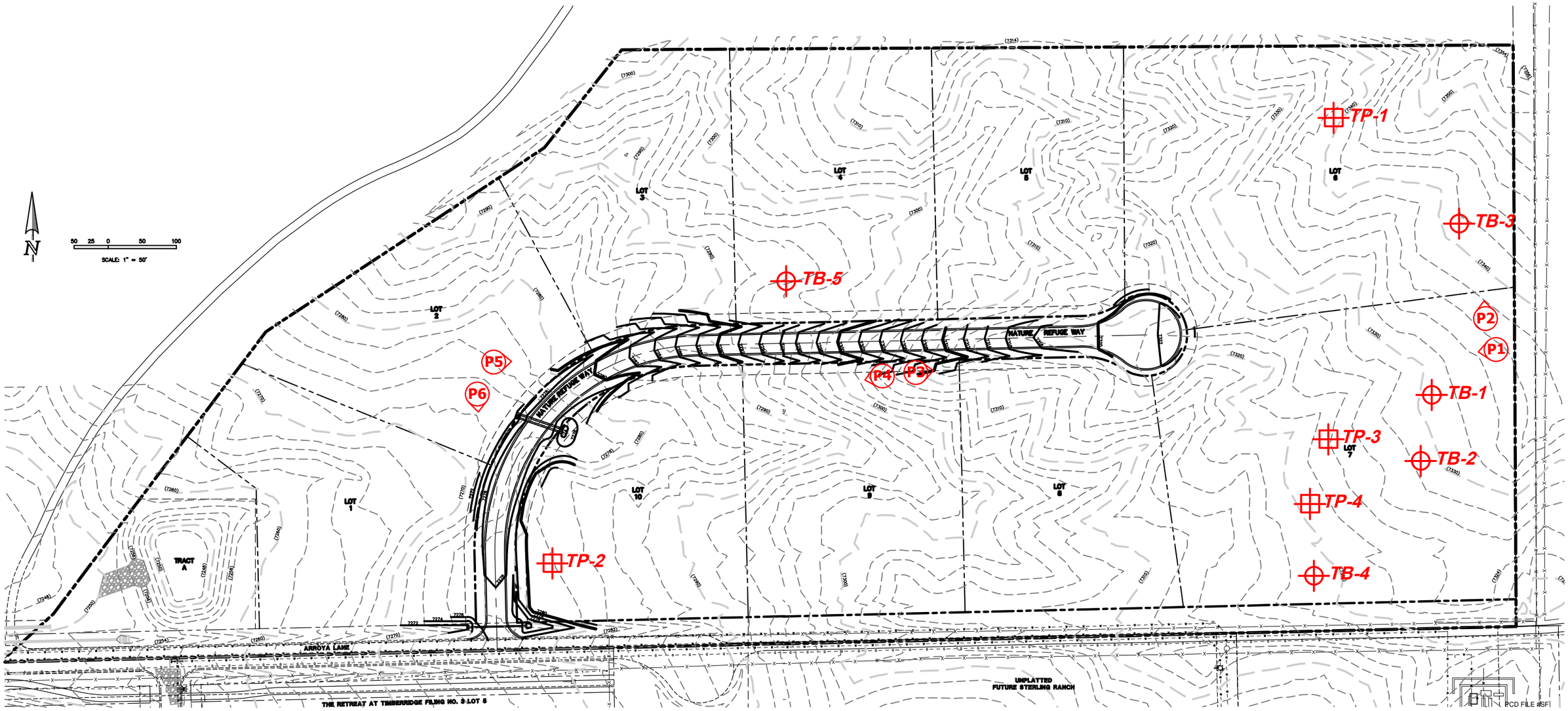
FIG. 2



TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

TP- APPROXIMATE TEST PIT LOCATION AND NUMBER

P2 - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

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EXPLORATION AND SITE PLAN

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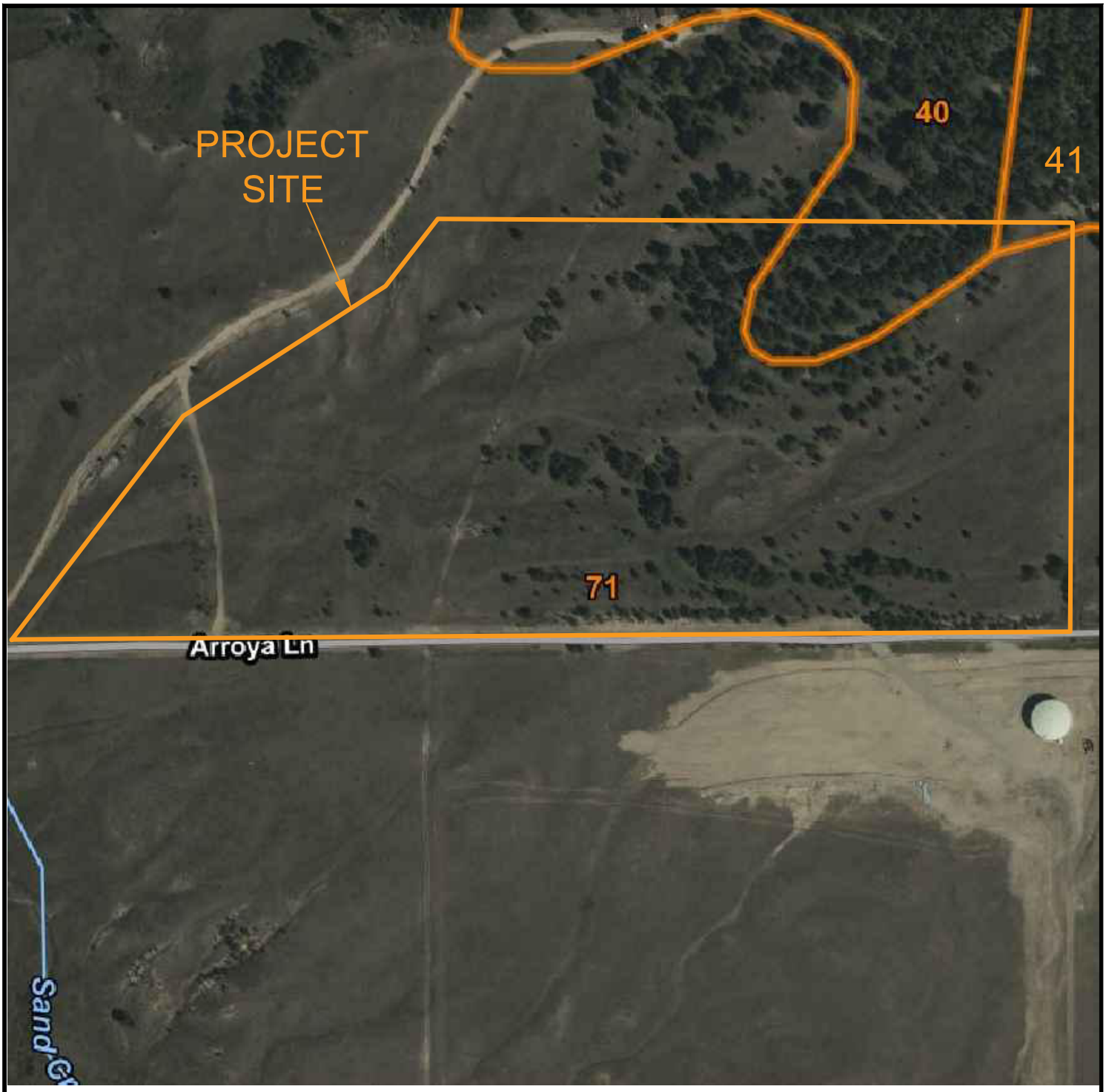
FIG. 3



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SOIL SURVEY MAP

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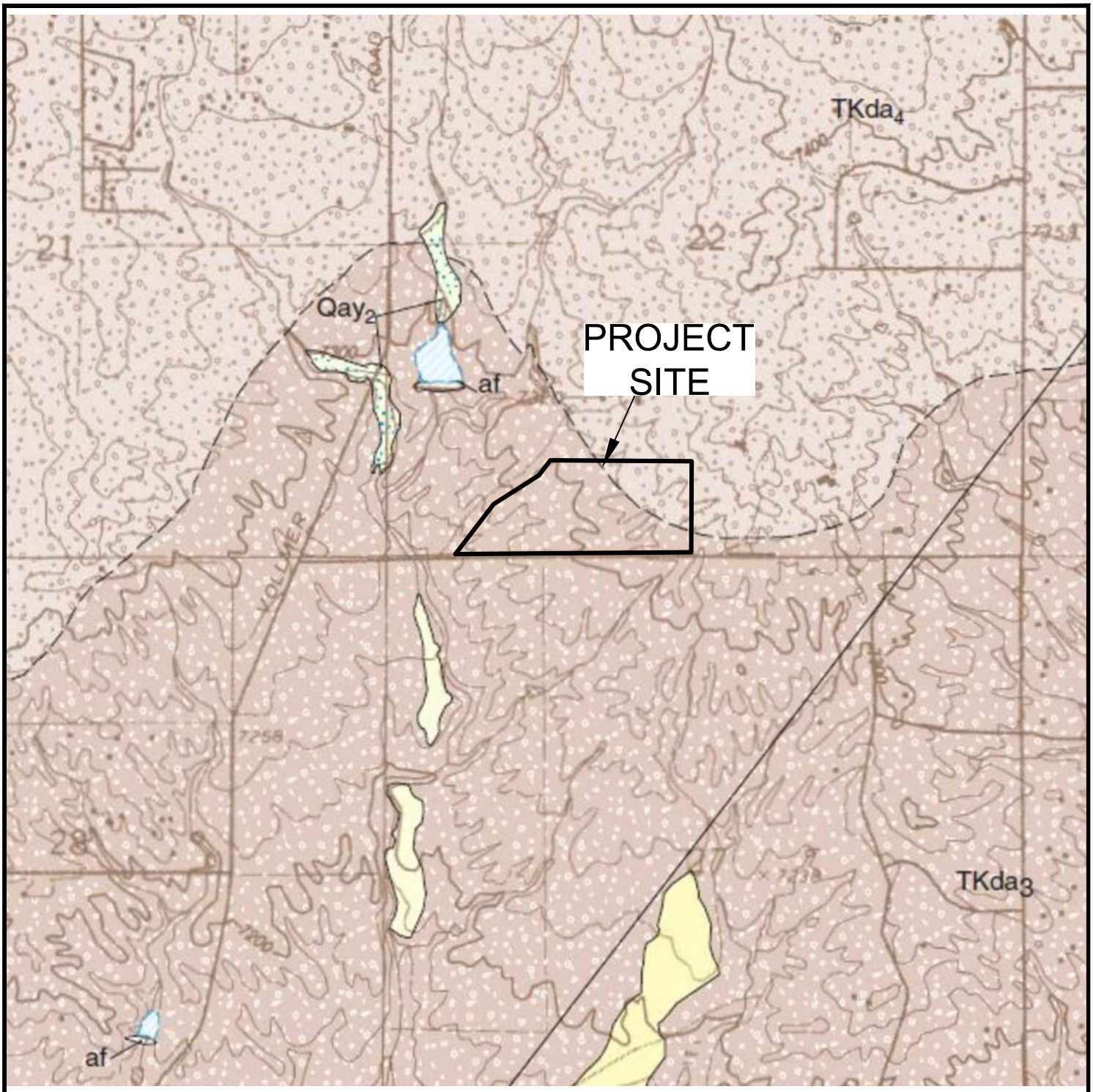
FIG. 4



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GEOLOGIC MAP OF THE FALCON NW QUADRANGLE

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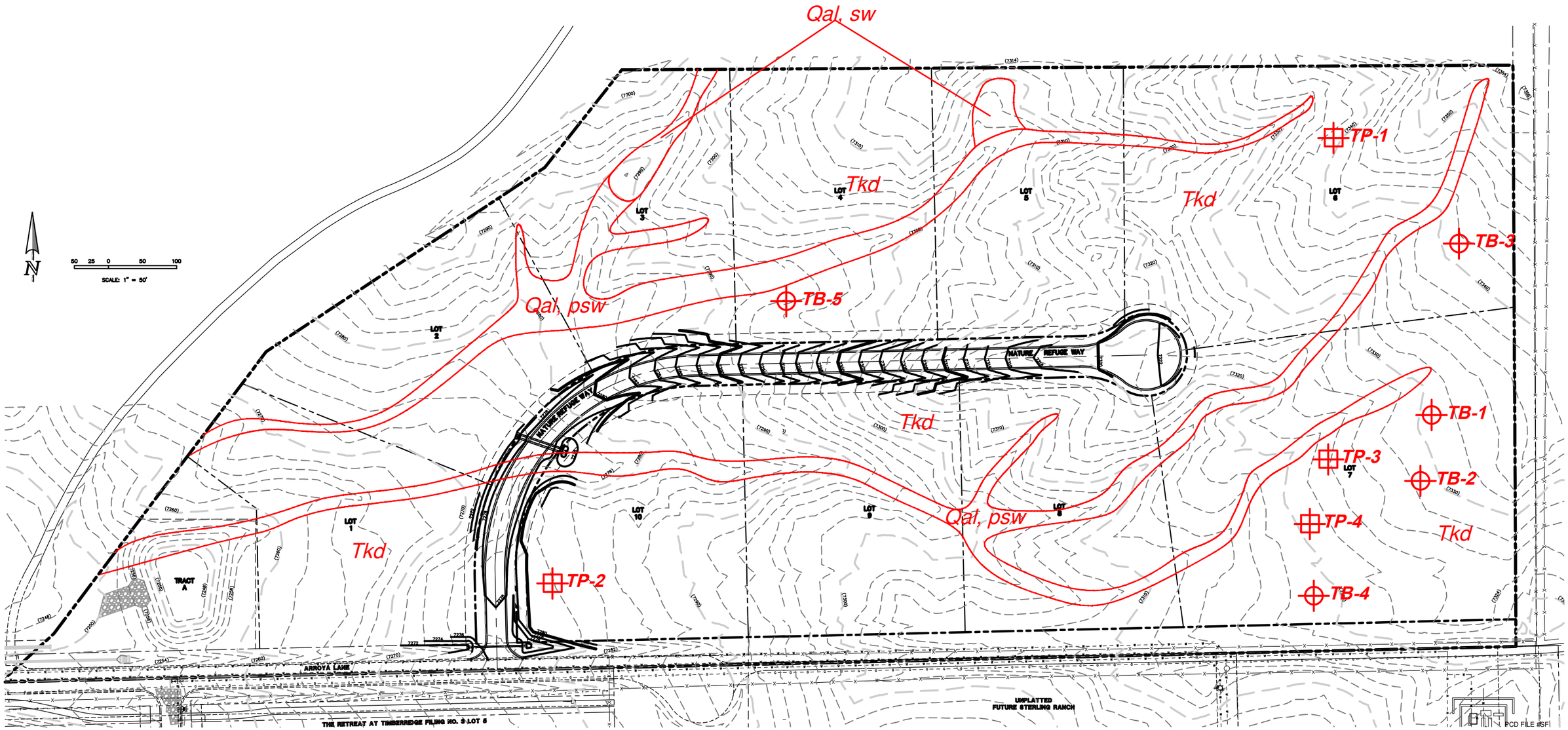
FIG. 5



Legend:

Qal - Recent Alluvium of Holocene Age:
recent water deposited materials

Tkd - Dawson Formation of Tertiary to Cretaceous Age:
arkosic sandstone with interbedded claystone and siltstone

psw - potential seasonally shallow groundwater area

sw - seasonally shallow groundwater area

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GEOLOGY / ENGINEERING MAP

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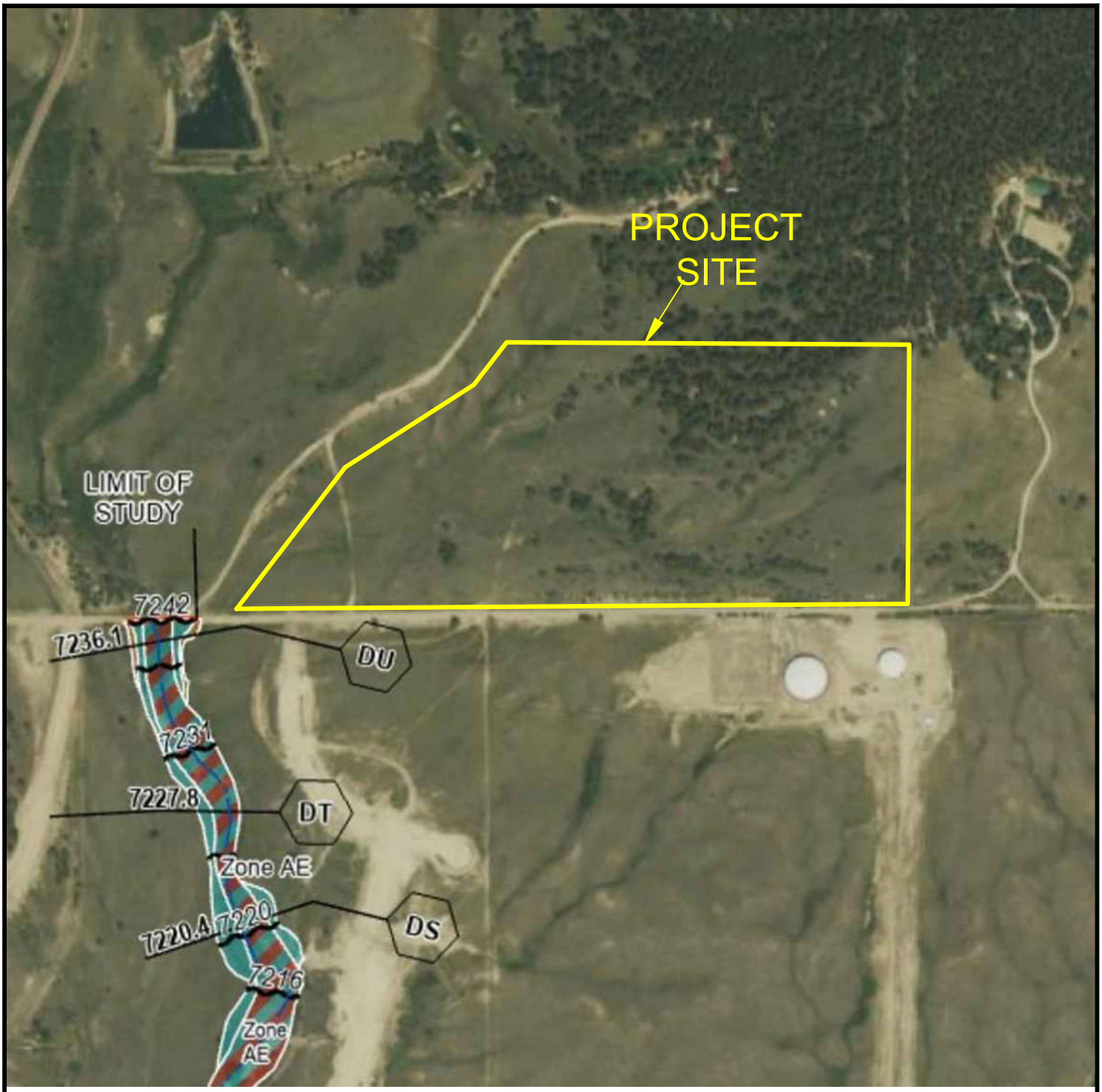
FIG. 6



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FEMA FLOODPLAIN MAP

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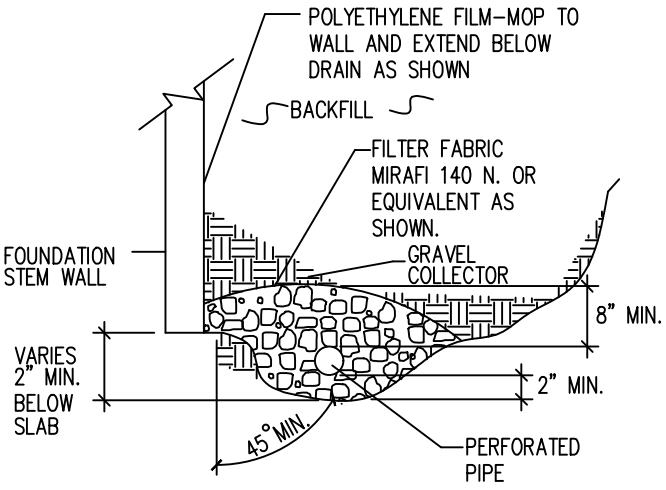
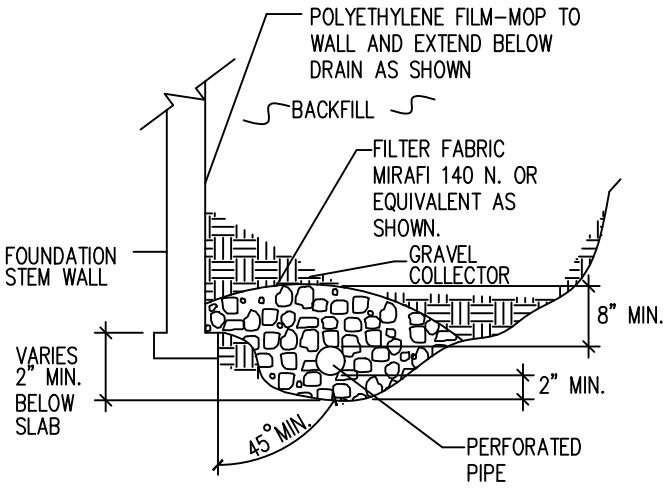
FIG. 7





NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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PERIMETER DRAIN DETAIL

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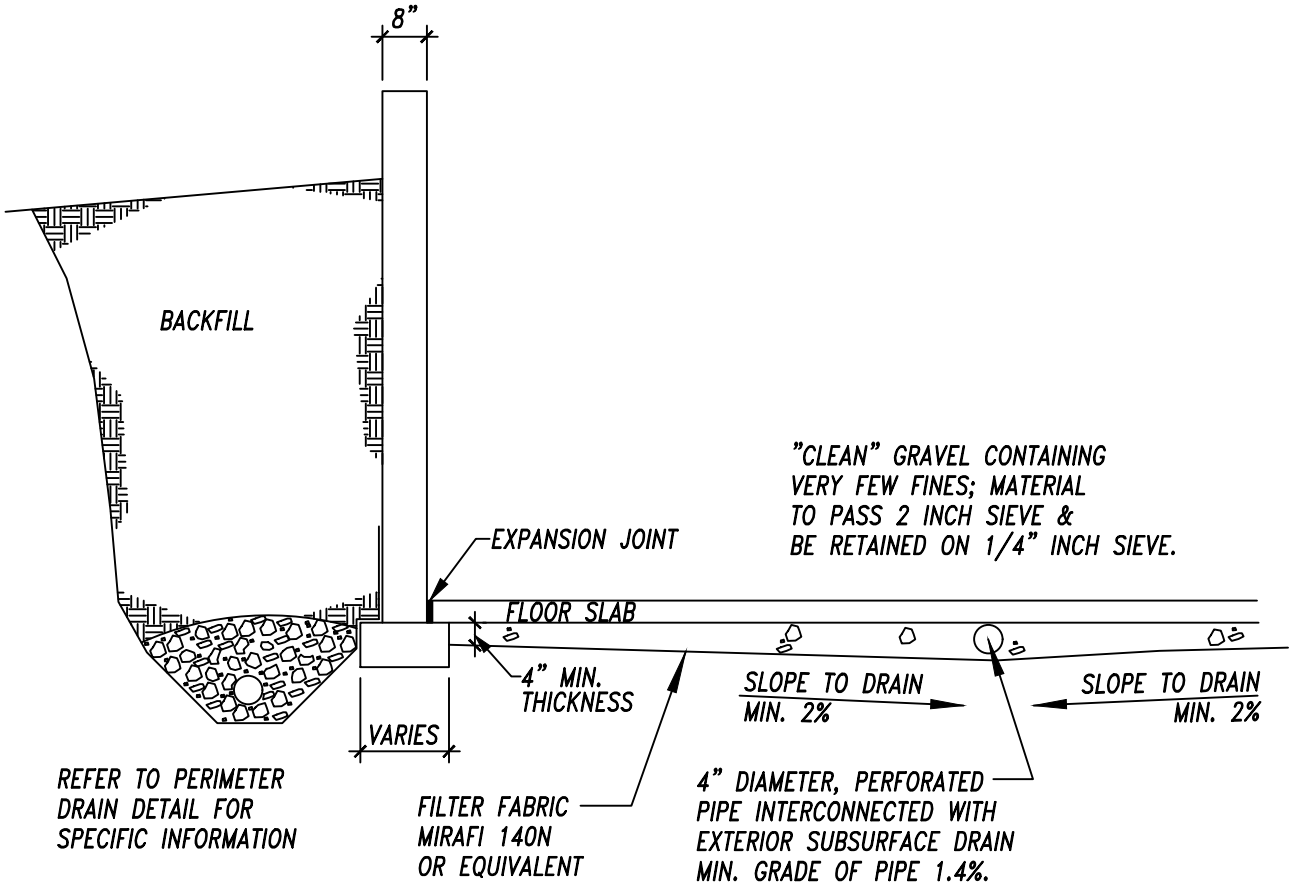
FIG. 8



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TYP. UNDERSLAB DRAINAGE LAYER (CAPILLARY BREAK)

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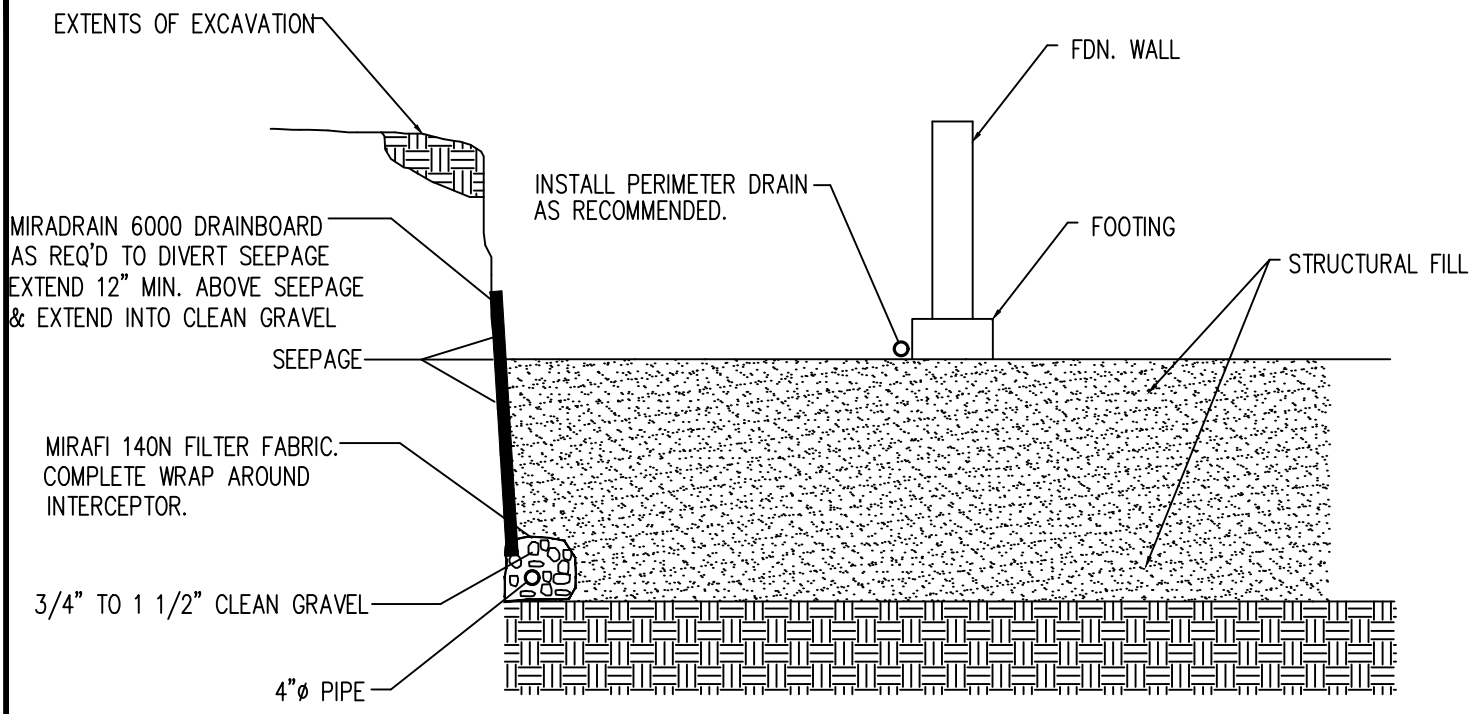
FIG. 9



NOTE:
EXTEND INTERCEPTOR DRAIN TO UNDERDRAIN OR TO SUMP.
BENCH DRAIN INTO NATIVE SOILS 12 INCHES MINIMUM.

INTERCEPTOR DRAIN DETAIL

N.T.S.

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INTERCEPTOR DRAIN DETAIL

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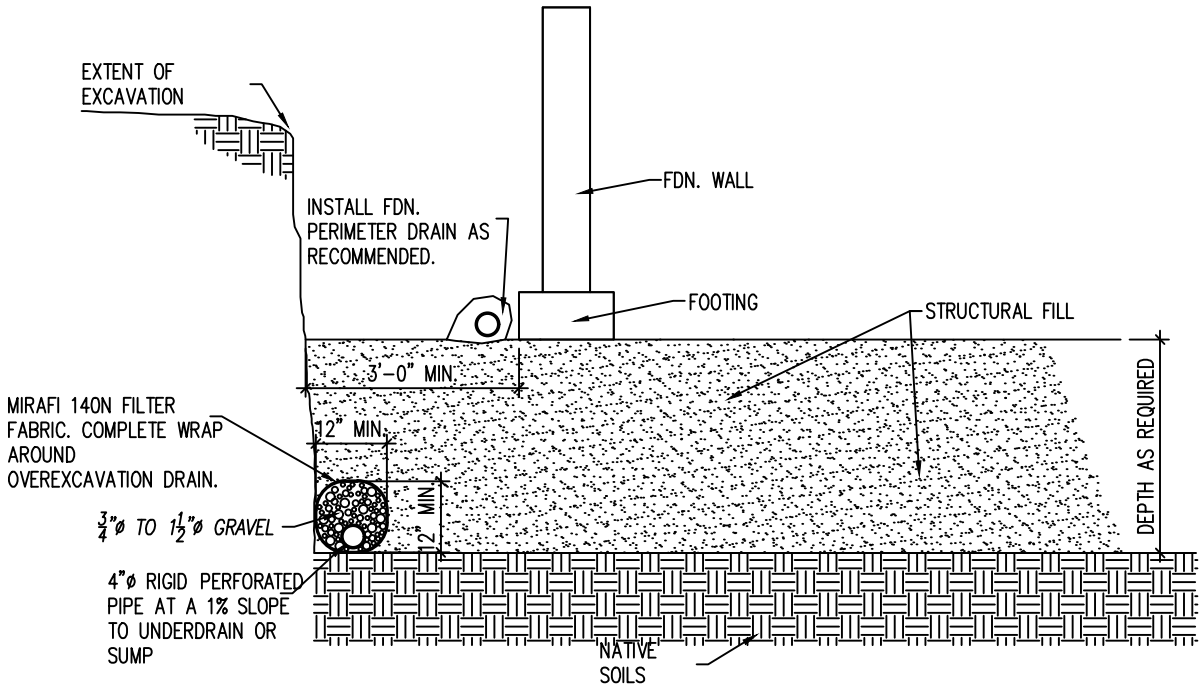
FIG. 10



OVEREXCAVATION DRAIN DETAIL

N.T.S.

NOTE:

EXTEND DRAIN TO SUMP AS REQ'D.

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OVEREXCAVATION DRAIN

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EL PASO COUNTY, CO
TIMBERRIDGE DEVELOPMENT GROUP, LLC

JOB NO. 231468

11

APPENDIX A: Site Photographs

1

Looking west from the eastern side of the site.

September 13, 2023

2

Looking north from the eastern side of the site.

September 13, 2023

Job No. 231468

3

Looking east towards erosion feature eastern side of site.

September 13, 2023

4

Looking west from the central portion of the site.

September 13, 2023

Job No. 231468

5

Looking east from the northwestern portion of the site.

September 13, 2023

6

Looking south from the northwestern portion of the site.

September 13, 2023

Job No. 231468

APPENDIX B: Test Boring and Test Pit Logs

TABLE B-1

DEPTH TO BEDROCK

TEST BORING	DEPTH TO BEDROCK (ft.)
1	4
2	4
3	9
4	3
5	14

TEST BORING 1
DATE DRILLED 6/4/2019

REMARKS

DRY TO 19', 6/5/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, BROWN, MEDIUM DENSE, MOIST			28	6.1	1
SANDSTONE, WEAK, BROWN, WEATHERED (SAND, SILTY, VERY DENSE, MOIST)			50/9"	6.2	2
5					
			50/7"	9.5	2
10					
			50/5"	8.1	2
15					
			50/6"	9.3	2
20					

TEST BORING 2
DATE DRILLED 6/4/2019

REMARKS

DRY TO 14.5', 6/5/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, BROWN, MEDIUM DENSE, MOIST			27	5.7	1
SANDSTONE, WEAK, GRAY, WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)			50/11"	7.4	2
5					
			50/8"	9.5	2
10					
			50/6"	8.2	2
15					
20					

ENTECH ENGINEERING, INC.

TEST BORING LOGS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. B-1

TEST BORING 3
DATE DRILLED 6/4/2019

REMARKS

DRY TO 19', 6/5/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, TAN, LOOSE to MEDIUM DENSE, MOIST			8	5.3	1
5			23	7.2	1
SANDSTONE, WEAK, GRAY, WEATHERED (SAND, SILTY, VERY DENSE, MOIST)					
10			50/6"	10.3	2
15			50/6"	9.8	2
20			50/5"	8.4	2

TEST BORING 4
DATE DRILLED 2/16/2017

REMARKS

DRY TI 14.5', 2/17/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, CLAYEY, GREEN-GRAY, DENSE, MOIST			30	13.0	1
SANDSTONE, WEAK, GREEN-GRAY, WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)					
5			50/11"	13.1	2
10			50/7"	13.4	2
15			50/7"	9.2	2
20					

ENTECH ENGINEERING, INC.

TEST BORING LOGS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

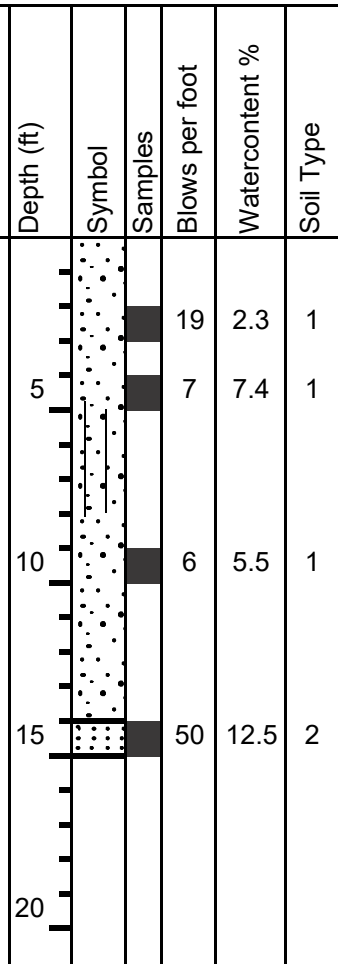
JOB NO. 231468

FIG. B-2

TEST BORING 5
DATE DRILLED 2/16/2017

REMARKS

DRY TO 14', 2/17/17



SAND, WITH SILT, TAN, MEDIUM DENSE to LOOSE, DRY to MOIST	19	2.3	1	
	7	7.4	1	
	6	5.5	1	
SANDSTONE, WEAK, TAN, WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)	50	12.5	2	

ENTECH ENGINEERING, INC.

TEST BORING LOGS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO.
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FIG. B-3

TEST PIT 1
DATE EXCAVATED 2/15/2017

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
topsoil, sandy loam, brown	1			gr	w	2A
weathered to formational silty sandstone, fine to coarse grained, reddish-tan	2			ma		4A
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT 2
DATE EXCAVATED 2/15/2017

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
topsoil, sandy loam, brown	1			gr	w	2A
gravelly loamy sand, fine to coarse grained, tan	2			sg		1
	3					
weathered silty sandstone, fine to coarse grained, reddish-tan	4			ma		4A
	5					
sandy claystone, olive-gray ▼	6			ma		4A
	7					
* - signs of seasonally occuring grounwater	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

ENTECH ENGINEERING, INC.

TEST PIT LOGS

RETREAT AT TIMBERRIDGE, F-4
TIMBERRIDGE DEVELOPMENT

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FIG. B-4

TEST PIT 3
DATE EXCAVATED 4/13/2019

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
topsoil sandy clay loam, brown	1					
	2					
gravelly sandy clay loam, fine to coarse grained, light brown	3			gr	m	3
silty sandstone, fine to coarse grained, poorly cemented, reddish-brown	4			ma		4A
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT 4
DATE EXCAVATED 4/13/2019

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
topsoil sandy clay, brown	1					
very sandy clay, light brown	2			gr	w	4A
	3					
	4					
silty sandstone, fine to coarse grained, poorly cemented, light brown	5			ma		4A
	6					
sandy claystone, olive gray	7			pl		5
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

ENTECH ENGINEERING, INC.

TEST PIT LOGS

RETREAT AT TIMBERRIDGE, F-4
TIMBERRIDGE DEVELOPMENT

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FIG. B-5

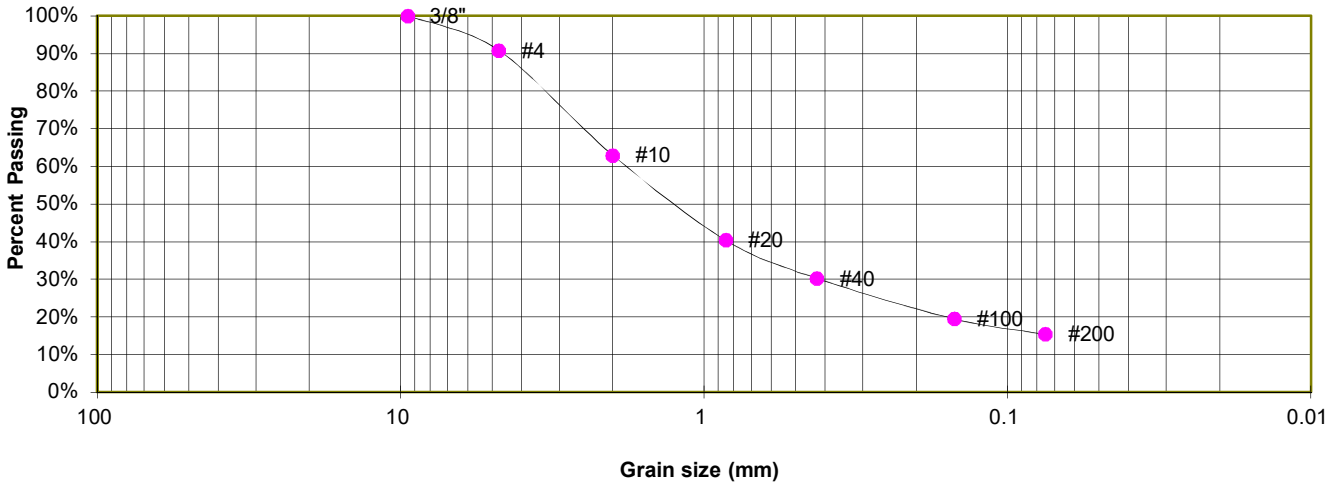
APPENDIX C: Laboratory Test Results

TABLE C-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SULFATE (WT %)	USCS	SOIL DESCRIPTION
1	1	2-3	15.4	20	17	3		SM	SAND, SILTY
1	3	5	15.3				<0.01	SM	SAND, SILTY
1	4	2-3	34.3					SC	SAND, CLAYEY
1	4	5	47.6					SC	SAND, CLAYEY
1	5	2-3	11.2					SW-SM	SAND, WITH SILT
2	2	5	17.1	26	17	9		SC	SANDSTONE (SAND, CLAYEY)
2	3	10	12.1				<0.01	SM	SANDSTONE (SAND, SILTY)

Project: Retreat at TimberRidge, Filing 4
Client: TimberRidge Development
Job No: 231468

TEST BORING	1	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	90.8%
10	63.0%
20	40.4%
40	30.3%
100	19.5%
200	15.4%

ATTERBERG LIMITS

Plastic Limit	17
Liquid Limit	20
Plastic Index	3

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

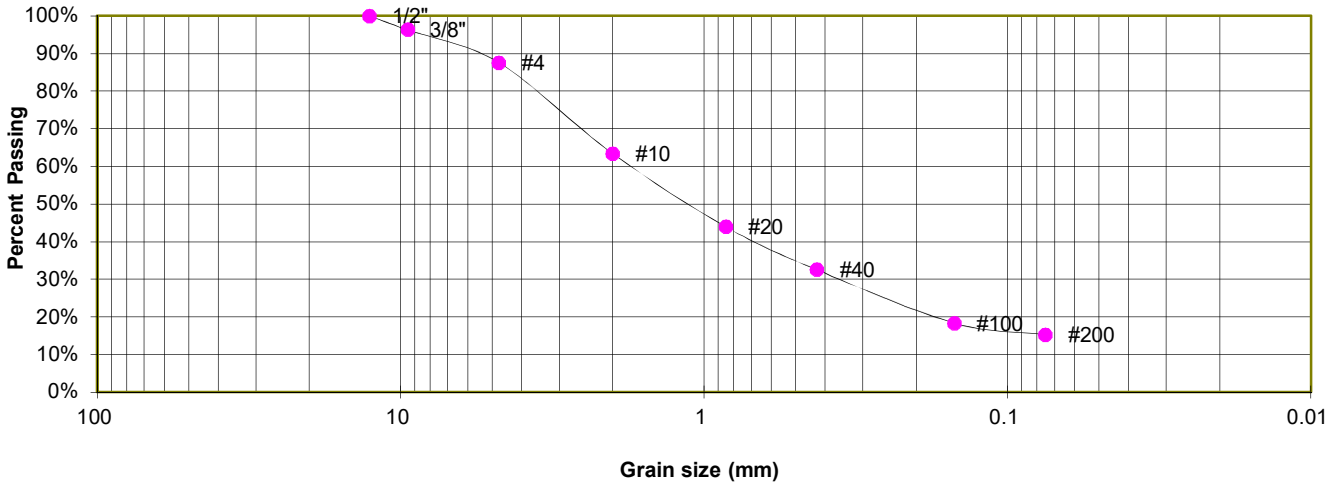
LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. C-1

TEST BORING	3	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.3%
4	87.6%
10	63.4%
20	44.0%
40	32.6%
100	18.4%
200	15.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

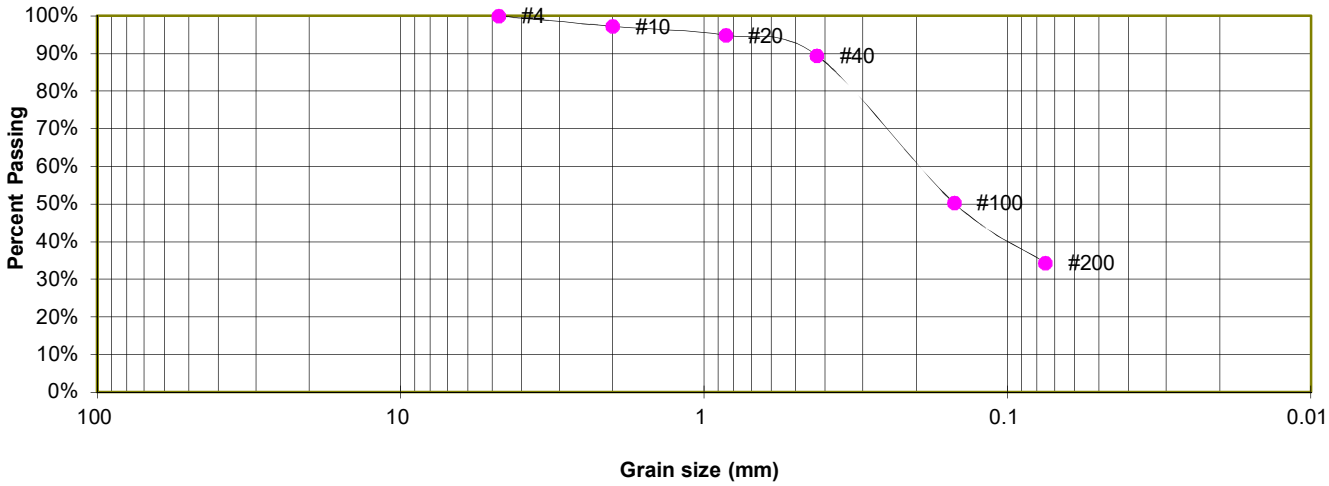
LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. C-2

TEST BORING	4	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.2%
20	94.9%
40	89.5%
100	50.3%
200	34.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

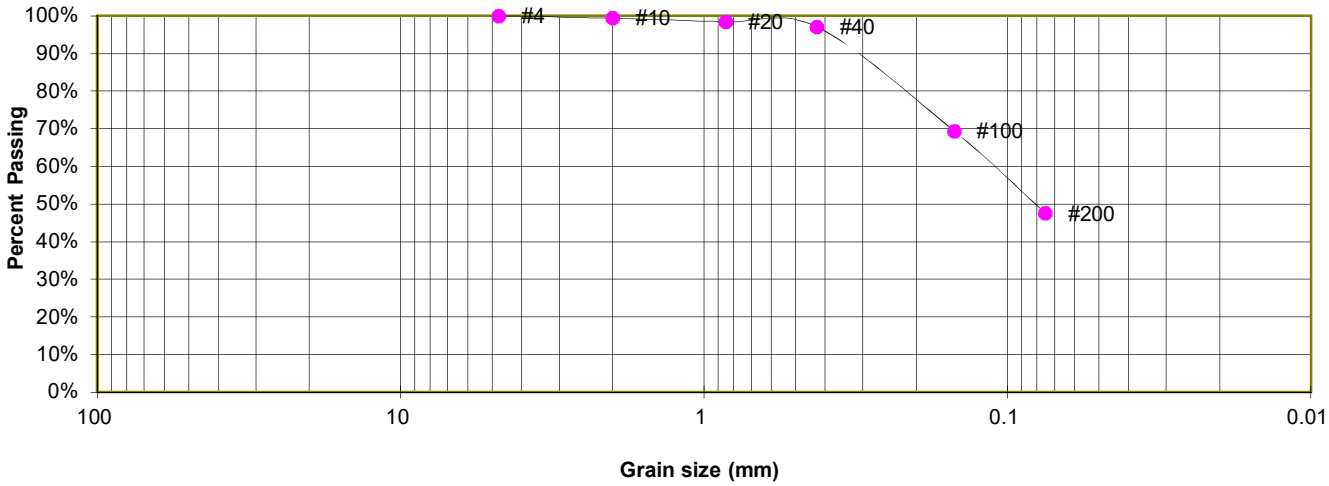
LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. C-3

TEST BORING	4	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.4%
20	98.4%
40	97.1%
100	69.4%
200	47.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

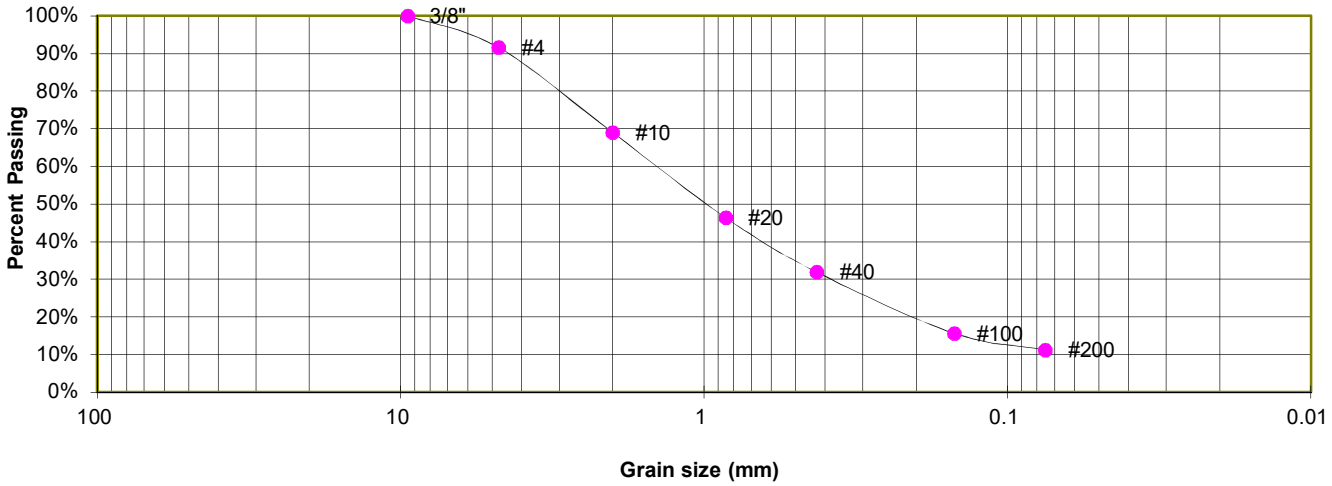
LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. C-4

TEST BORING	5	SOIL DESCRIPTION	SAND, WITH SILT
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.6%
10	69.0%
20	46.4%
40	31.9%
100	15.7%
200	11.2%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM

ENTECH ENGINEERING, INC.

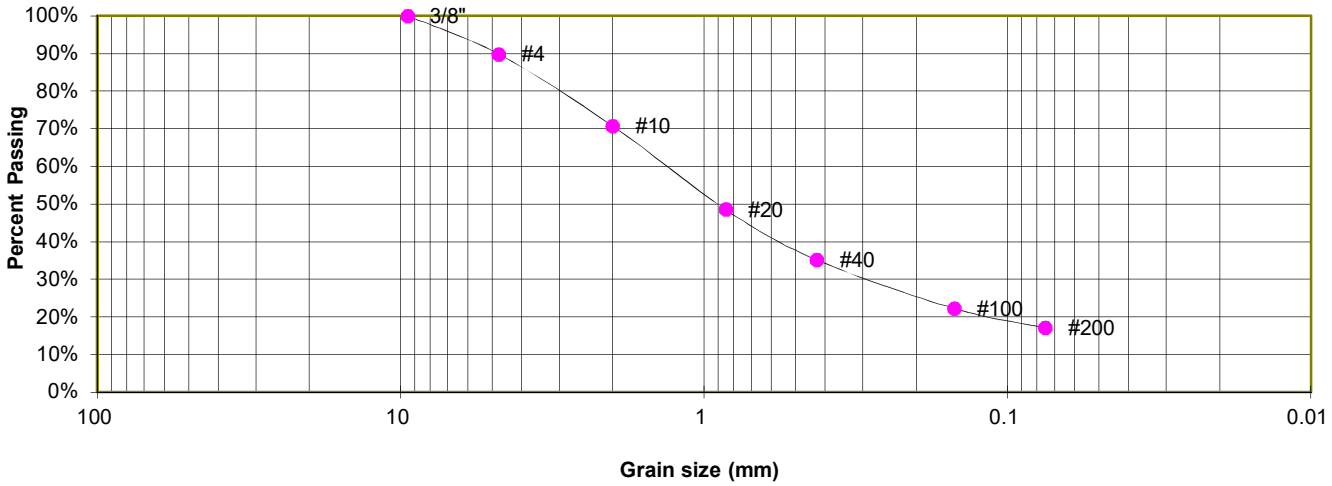
LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

JOB NO. 231468

FIG. C-5

TEST BORING	2	SOIL DESCRIPTION	SANDSTONE (SAND, CLAYEY)
DEPTH (FT)	5	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	89.9%
10	70.7%
20	48.6%
40	35.1%
100	22.3%
200	17.1%

ATTERBERG LIMITS

Plastic Limit	17
Liquid Limit	26
Plastic Index	9

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

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LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

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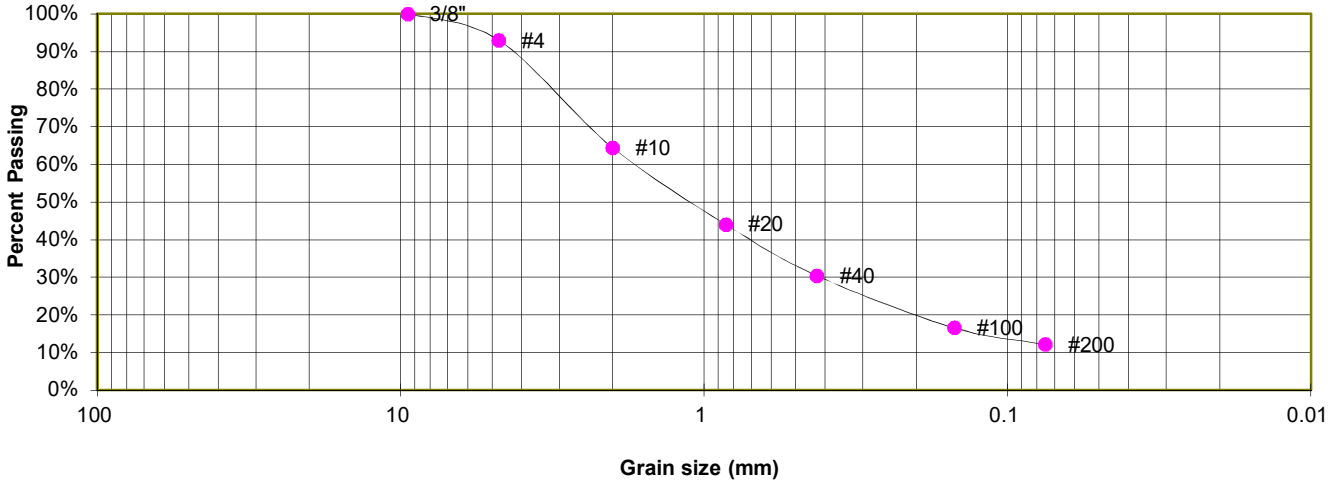
FIG. C-6

TEST BORING	3	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.0%
10	64.4%
20	44.1%
40	30.4%
100	16.6%
200	12.1%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

RETREAT AT TIMBERRIDER, F-4
TIMBERRIDGE DEVELOPMENT

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FIG. C-7

APPENDIX D: USDA Soil Survey Descriptions

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Kettle

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Kettle

Setting

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

Typical profile

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

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Pring

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

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

Minor Components

Pleasant

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

Other soils

Percent of map unit:
Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 21, Aug 24, 2023