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**WASTEWATER STUDY
CALM BREEZE SUBDIVISION FILING NO. 1
PARCEL NO. 52110-00-013
EL PASO COUNTY, COLORADO**



Prepared for:

M&S Civil Consultants
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May 29, 2026

Respectfully Submitted,

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1 SUMMARY

Project Location

The project site is located within the SE¼ of Section 11, Township 12 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 4 miles northeast of the Colorado Springs city limits at the eastern end of Shoup Road. The location of the site is as shown in the Vicinity Map (Figure 1).

Project Description

A four-lot rural residential subdivision is proposed for the 42.22-acre parcel. The new lots will be approximately 10 acres and will be serviced by individual water wells and on-site wastewater treatment systems (OWTS). The lots will be accessed by an existing private roadway, Calm Breeze Place.

Scope of Report

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study with respect to OWTS proposed for the subdivision.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development; however, geologic conditions in certain areas will impose some constraints on development and land use. These include areas of artificial fill, potentially expansive soils, downslope creep, potentially unstable slopes, potentially shallow and seasonally shallow groundwater areas, and the potential for elevated radon levels. These conditions are discussed in greater detail in this report.

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

2 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The topography of the site is generally gradually to moderately sloping to the southwest, with moderate to steep slopes along the drainages in the western and southeast portions of the site. Minor drainages were observed on the site, generally sloping to the southwest towards Black Squirrel Creek. The site boundaries are indicated in the USGS Map (Figure 2). Previous land uses have included rural residential. Vegetation observed on the site includes field grasses,

weeds, and Ponderosa Pines. A portion of the site is located within the Black Forest burn scar. Site photographs are included in Appendix A.

The project consists of the subdividing of 42.22 acres into a 4-lot rural residential subdivision. The new lots will be approximately 10 acres and will be serviced by individual water wells and OTWS. The proposed lot configuration is shown in the Site and Exploration Plan (Figure 3).

3 SCOPE OF THE REPORT

The scope of this report includes a general geologic analysis utilizing published geologic data. Detailed site-specific mapping was conducted to obtain general information with respect to major geographic and geologic features, geologic descriptions, and their effects on the development of the property in accordance with the El Paso Land Development Code.

4 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The site was also evaluated using the Web Soil Survey from the Natural Resource Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS). The position of mappable units within the subject property is 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 Geology/Engineering Geology Map, which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech on April 29, 2026. Site photographs are included in Appendix A.

Four (4) test borings were drilled and four (4) tactile test pits were excavated on the site to determine the classification and engineering characteristics of the soils. The borings were drilled to depths of 20 feet using a truck-mounted, continuous flight auger drilling rig supplied and operated by Entech, and the test pits were excavated to depths of 5.5 to 8 feet.

The locations of the test boring and test pits are indicated on the Site and Exploration Plan (Figure 3). The Test Boring and Test Pit Logs are included in Appendix B, and Laboratory Test Results are included in Appendix C. The results of the testing will be discussed later in this report.

Laboratory testing was performed to classify and determine the engineering characteristics of the soils. Laboratory tests included moisture content testing (ASTM D2216) and grain-size analysis (ASTM D6913). Results of the laboratory testing are included in Appendix C.

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 General Geology

The site lies in the western portion of the Great Plains Physiographic Province just south of the Palmer Divide. A major structural feature known as the Rampart Range Fault lies approximately 15 miles to the west. 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 Tertiary to Cretaceous in age. The bedrock underlying the site consists of the Dawson Arkose Formation of Tertiary to Cretaceous Age. Overlying this formation are unconsolidated deposits of alluvium, colluvium, sheetwash, residual soils, and man-placed fill of Quaternary Age. The residual soils are produced by the in-situ action of weathering of the bedrock on site. Some colluvial soils deposited by gravity and sheetwash exist. The alluvial soils were deposited by water along Black Squirrel Creek and the minor drainages on the 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 two soil types on the site (Figure 4). In general, they are loamy sands. The soils are described in Exhibit 1 below.

Exhibit 1: Soil Survey Description

Type	Description
41	Kettle gravelly loamy sand, 8 to 40% slopes
26	Elbeth sandy loam, 8 to 15% slopes

Exhibit 2: Soil Map



Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described as having moderately high to high permeabilities. Limitations on development include limited ability to support a load, shrink-swell potential, slopes, and frost action potential. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The soils have been described to have moderate erosion hazards.

5.3 Site Stratigraphy

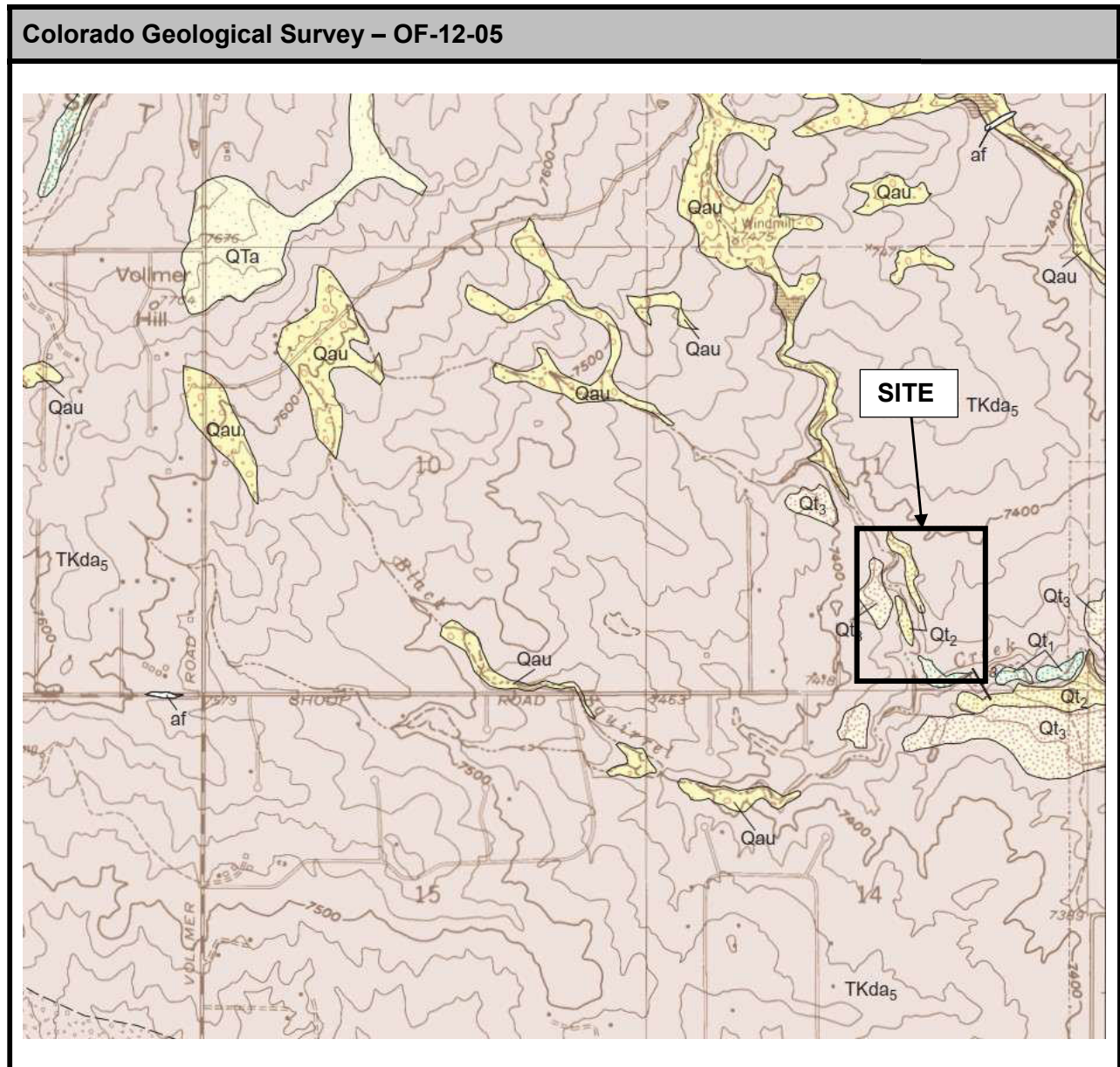
The Geologic Map of the Black Forest Quadrangle showing the site is presented in Figure 5 (Reference 4). The Geology/Engineering Geology Map prepared for the site is presented in Figure 6. Six mappable units were identified on this site that are described as follows:

- Qaf Artificial Fill of Holocene Age:** These are recent man-place fill associated with the existing private roadway and an earthen embankment on Lot 1.
- Qal Alluvium of Quaternary Age:** These are recent water-deposited materials associated with Black Squirrel Creek. These materials generally consist of silty to clayey sands with lenses of clays and gravels. These materials tend to have relatively high permeabilities and moderate densities
- Qt₁ Terrace Alluvium one of Quaternary Age:** These terrace deposited alluvium along the Black Squirrel Creek. The upper surface of the deposit is approximately 5 to 25 feet above current stream elevation. The materials typically consist of light-brown to gray-brown sand, silty fine sand, sandy silt, and clayey silt and gravel.
- Qt₂ Terrace Alluvium two of Quaternary Age:** These terrace deposited alluvium along the Black Squirrel Creek. The upper surface of the deposit is approximately 20 to 20 feet above current stream elevation. The materials typically consist of light-brown to light grayish-brown poorly sorted sand and gravel.
- Qt₃ Terrace Alluvium three of Quaternary Age:** These terrace deposited alluvium along the Black Squirrel Creek. The upper surface of the deposit is approximately 20 to 50 feet above current stream elevation. The materials typically consist of light-brown extremely poorly sorted sand and gravel.
- Qc/Tkd Colluvium of Quaternary Age overlying 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 colluvium and residual soils. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consist of clayey sands and sandy clays. The colluvial materials are derived from the bedrock materials and have been re-deposited by the action of sheetwash and gravity.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Black Forest Quadrangle* distributed by the Colorado Geological Survey in 2003 (Reference 4), the

Geologic Map of the Colorado Springs-Castle Rock Area, distributed by the US Geological Survey in 1979 (Reference 5), and the Geologic Map of the Denver 1⁰ x 2⁰ Quadrangle, distributed by the US Geological Survey in 1981 (Reference 6). The Test Borings and Test Pit Logs used in evaluating the site are included in Appendix B. The Geology/Engineering Geology Map prepared for the site is presented in Figure 6.

Exhibit 3: Geologic Map of the Black Forest Quadrangle



5.4 Soil Conditions

The test pit soils were classified using the USDA textural classification. The soils encountered in the test pits generally consisted of sandy loam with gravel (2A/R1), loamy sand with gravel (1/R1), and sandy clay loam with gravel (3/R1) overlying shallow weathered Dawson Formation sandstone in two of the test pits. The sandstone was encountered at depths of 5.5 to 6 feet.

The test boring and test pit logs pertaining to this investigation are included in Appendix B, and laboratory testing results included in Appendix C.

5.5 Groundwater

Groundwater was not encountered in the borings. Redoximorphic features were encountered in TP-3 at a depth of 4 feet during excavation. Areas of potentially shallow and seasonally shallow groundwater have been mapped in the drainages and some low-lying areas on the site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors including development of the site and surrounding areas.

For the sandy materials on site, it should be noted that some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock or clays. Builders and planners should monitor potential occurrences of such subsurface water features during construction on-site and mitigate as necessary at the time of construction.

Drainage and Floodplain Areas – Constraint

Part of the southeastern portion of the site is located within a 100-year floodplain associated with Black Squirrel Creek according to FEMA Map No. 08041C0320G (Reference 8) and is shown in Exhibit 5 below. In addition to the mapped floodplain, the unnamed tributary of Black Squirrel Creek in the western and northwestern portions of the site have been mapped as a physiographic floodplain on the Geology and Engineering Geology Map, Figure 4. Construction is not anticipated within floodplain areas. Finished floor elevations should be at least one foot above the floodplain. Specific drainage studies and floodplain locations are beyond the scope of this report.

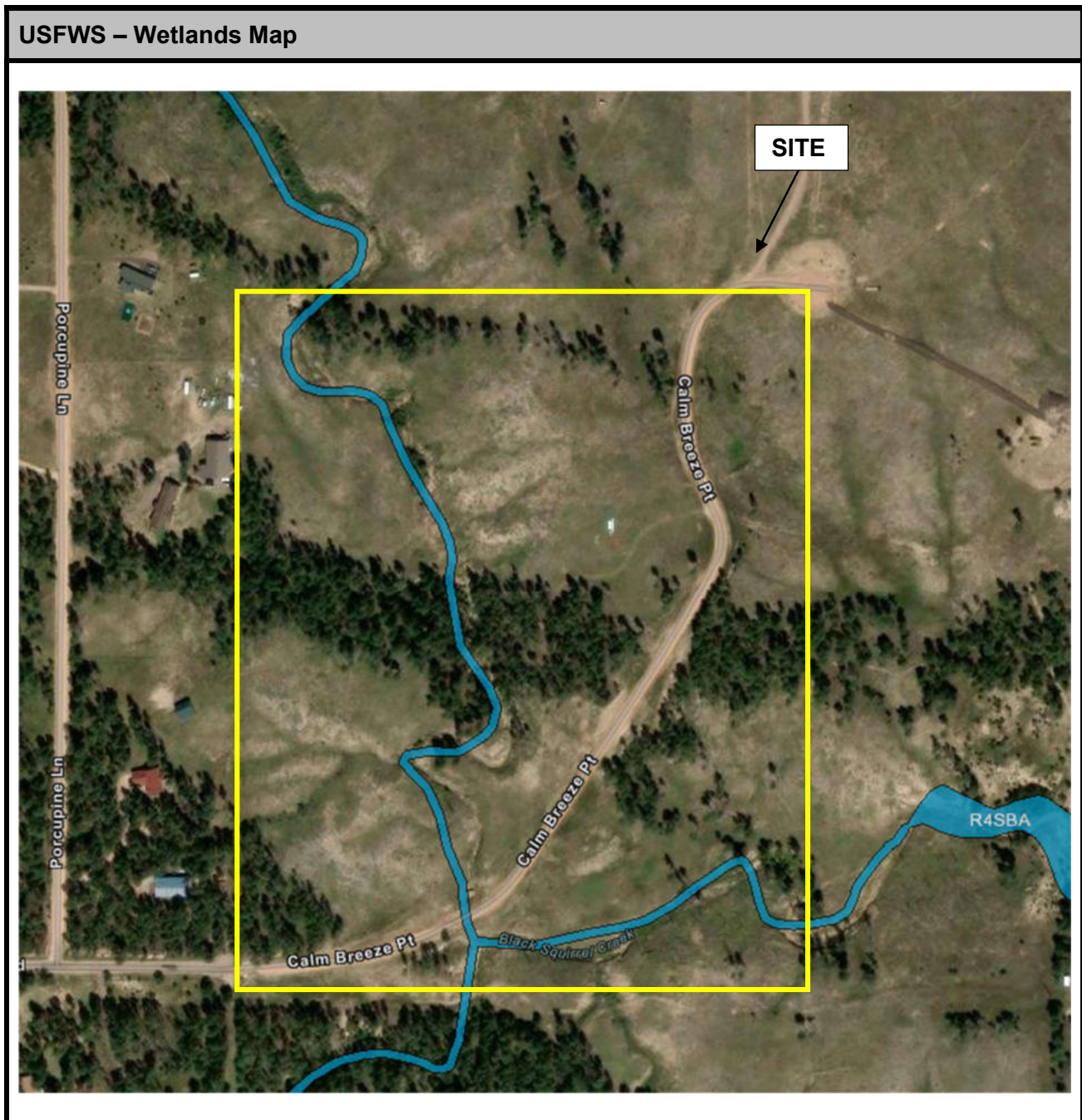
Exhibit 4: FEMA Flood Map

FEMA Map No. 08041C0320G, eff. 12/7/2018



Black Squirrel Creek and the unnamed tributary of Black Squirrel Creek located on the site have been included in the National Wetlands Inventory as a Freshwater Wetland habitat classified as R4SBA (R – Riverine, 4 – Intermittent, SB – Streambed, A – Temporary Flooded) (Reference 9) and is shown in Exhibit 6 below. These areas should be avoided by construction.

Exhibit 6: National Wetlands Inventory Map



Potentially Shallow and Seasonally Shallow Groundwater Areas – Constraint

In these areas, we would anticipate periodic high subsurface moisture conditions and frost heave potential on a seasonal basis. Redoximorphic features were observed in TP-3 at a depth of 4 feet. Any structures in or adjacent to potentially shallow groundwater areas should follow the mitigation discussed below.

Mitigation: Construction is not anticipated in these areas. Foundations on this site must have a minimum 30-inch depth for frost protection. Buildings should be a minimum of 3 feet above groundwater levels. Subsurface perimeter drains are recommended for any usable below-grade areas including crawlspaces. Should groundwater be encountered within 3 feet of foundation grade, additional drains that could include but are not limited to interceptor drains, underslab drains (capillary break), and overexcavation drains may be needed. Typical drain details are presented in Figures 5 through 7. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Structures should not block drainages. All organic material should be completely removed prior to any fill placement. Septic fields should not be placed in areas where there is the potential for shallow groundwater.

Potentially Unstable Slope Areas - Hazard

The steep slopes along portions of the drainages on the site have been identified as potentially unstable. These slopes are considered stable in their present condition; however, considerable care must be exercised in these areas not to create a condition which would tend to activate instability. These areas are primarily located along the banks of Black Squirrel Creek and should be avoided by any future construction. A minimum setback of around 30 feet from the crest of the potentially unstable slope is recommended.

6 ON-SITE WASTEWATER TREATMENT

The site was evaluated for individual on-site wastewater treatment systems in accordance with El Paso Land Development Code. Test pits were located in potential locations of future soil treatment areas on the lots. The approximate locations of the Test Pits are indicated on the Site and Exploration Plan (Figure 3), the Geology/Engineering Geology Map (Figure 6), and the OWTS Suitability Map, Figure 9. Test Pit Logs are included in Appendix B, and Laboratory Test Results in Appendix C.

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has been mapped with two soil descriptions. The Soil Survey Map (Reference 2) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D. The soils are described as having rapid percolation rates. The majority of the soils have been described with moderate to high permeabilities.

Soils encountered in the tactile test pits consisted of sandy loam with gravel (2A/R1), loamy sand with gravel (1/R1), and sandy clay loam with gravel (3/R1) overlying shallow weathered Dawson

Formation sandstone in two of the test pits. The sandstone was encountered at depths of 5.5 to 6 feet. Signs of seasonal occurring groundwater were observed in the TP-3 at a depth of 4 feet, and were not encountered in the remaining test pits were excavated to depths of 5.5 to 8 feet. The limiting layers encountered in the test pits are the sandy loam with gravel (2A/R1), sandy clay loam with gravel, and the shallow sandstone. The soil types correspond to LTAR value of 0.50 to 0.35 gallons per day per square foot. Owing to shallow bedrock and high rock percentage engineered OWTS are anticipated for the proposed lots.

On-site Wastewater Systems are to be evaluated for the new lots prior to obtaining a building permit. The system must meet County Chapter 8 OWTS criteria and State CDPHE criteria including any required mitigation to accommodate respective leach fields and infrastructure including, but not limited to earthwork grading, berming and diversion swale implementation, installation of secondary sand filters or any other higher treatment levels and dosing as required on a per lot basis and determined by test pit results and site topography. There are no identified geologic hazards on the site that are prohibitive to future OWTS design at this time.

In summary, it is our opinion that the site is suitable for individual on-site wastewater treatment system (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. An OWTS Suitability Map is presented in Figure 9. OWTS sites should not be located within defined drainages. 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. The majority 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 OWTS sites will be required prior to construction on each lot. 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.

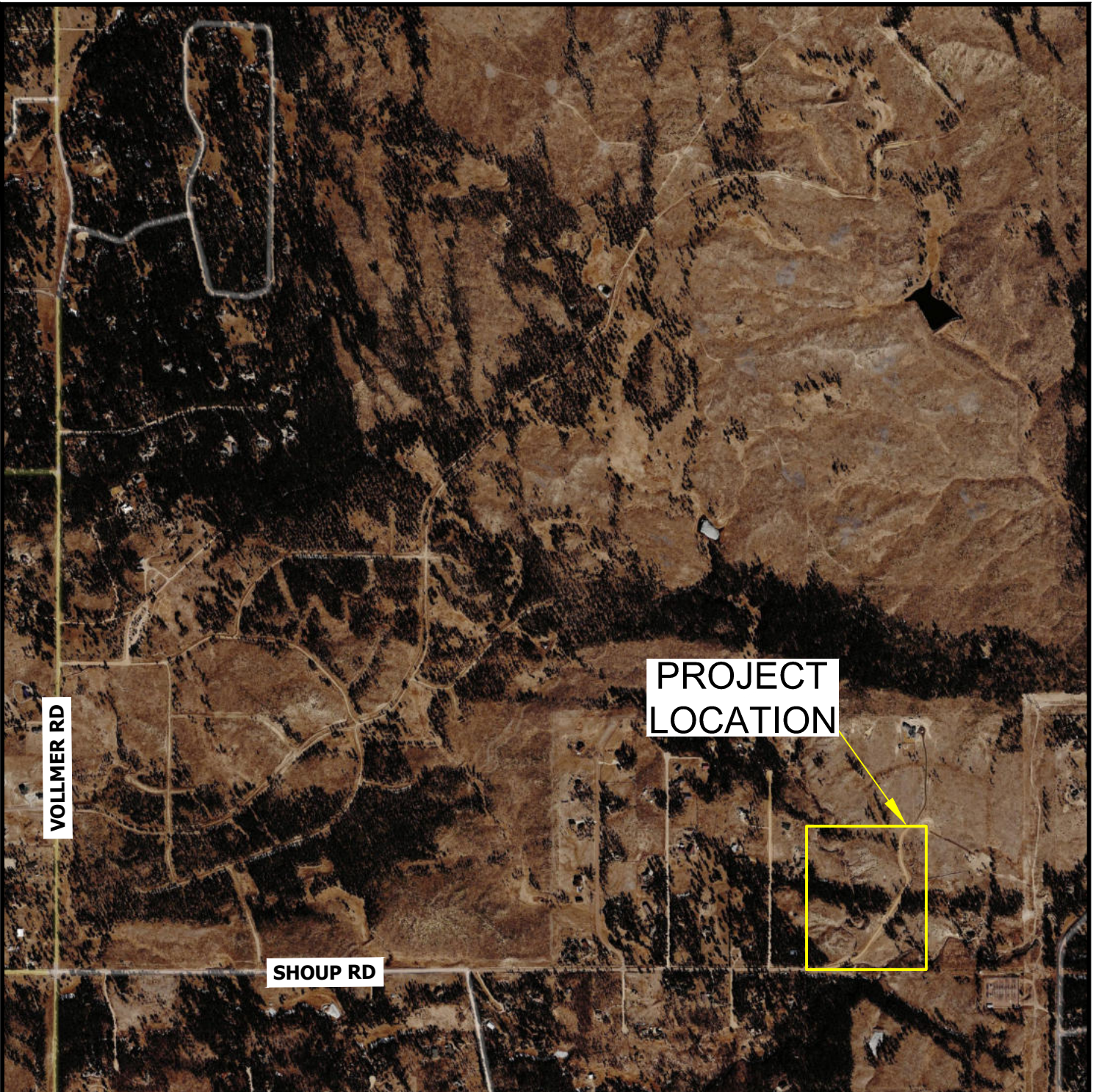
This report has been prepared for M&S Civil Consultants for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

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. Bryant, Bruce, McGrew, Laura W., and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1163.
2. Natural Resource Conservation Service, June 20, 2007. *Web Soil Survey*. United States Department Agriculture, <http://web soil survey.nrcs.usda.gov>.
3. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado*.
4. Thorson, Jon P. 2003. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey. Open-File Report 03-06.
5. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado*. USGS, Map I-857-F.
6. Bryant, Bruce, McGrew, Laura W., and Wobus, Reinhard A. 1981. *Geologic Map of the Denver 1° x 2° Quadrangle, North-Central Colorado*. U.S. Geologic Survey. Map 1-1163.
7. Hart, Stephen S. 1974. *Potentially Swelling Soil and Rock in the Front Range Urban Corridor, Colorado*. Colorado Springs-Castle Rock Map. Colorado Geological Survey. Environmental Geology 7.
8. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for the City of Colorado Springs, Colorado*. Map Number 08041C0320G.
9. U.S. Fish & Wildlife Service, May 1, 2020. *National Wetlands Inventory*. Department of the Interior, fws.gov/wetlands/data/Mapper.html.

FIGURES



PROJECT
LOCATION

VOLLMER RD

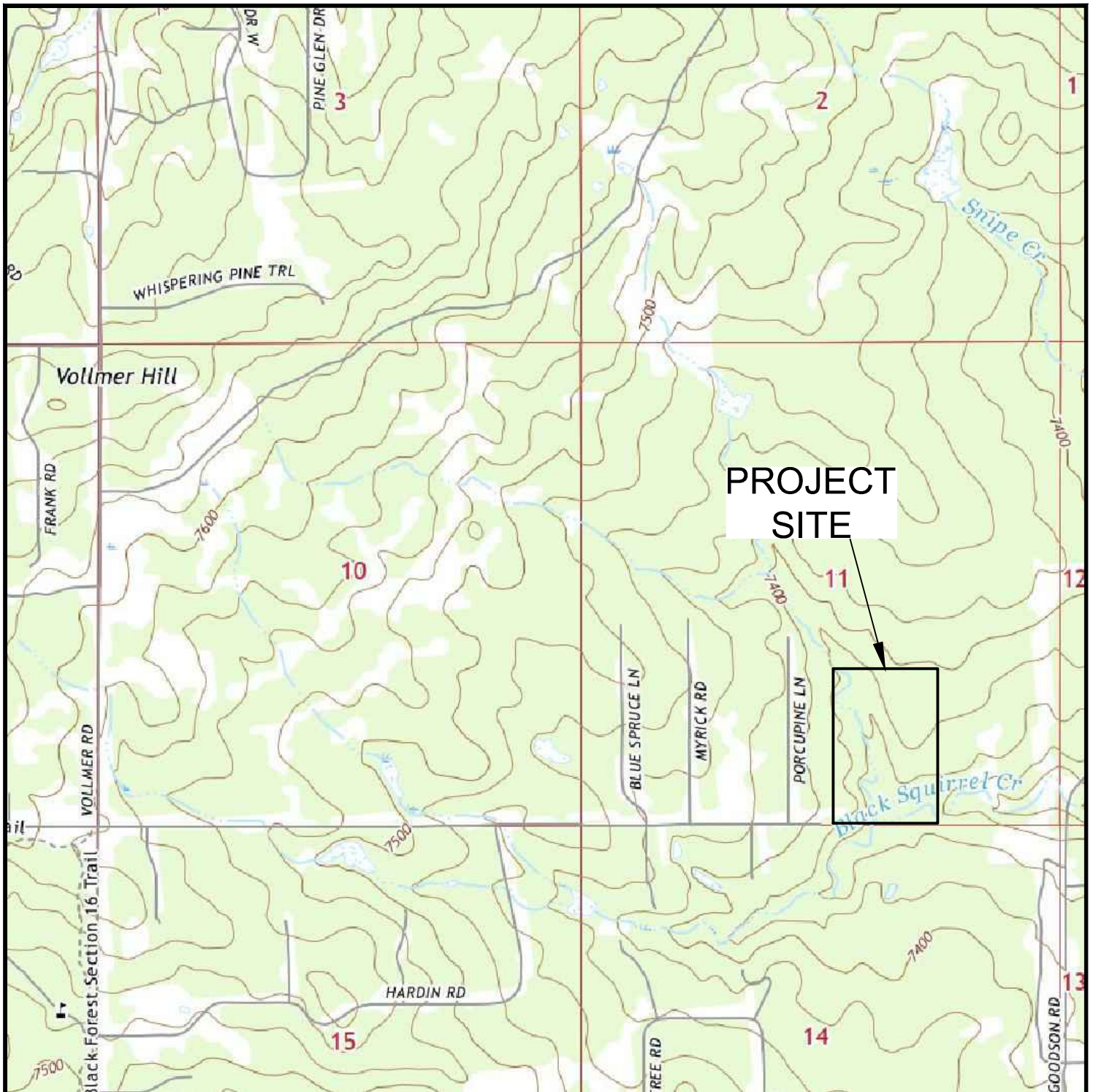
SHOUP RD



VICINITY MAP
CALM BREEZE FILING NO. 1
M&S CIVIL CONSULTANTS

JOB NO.
260651

FIG. 1



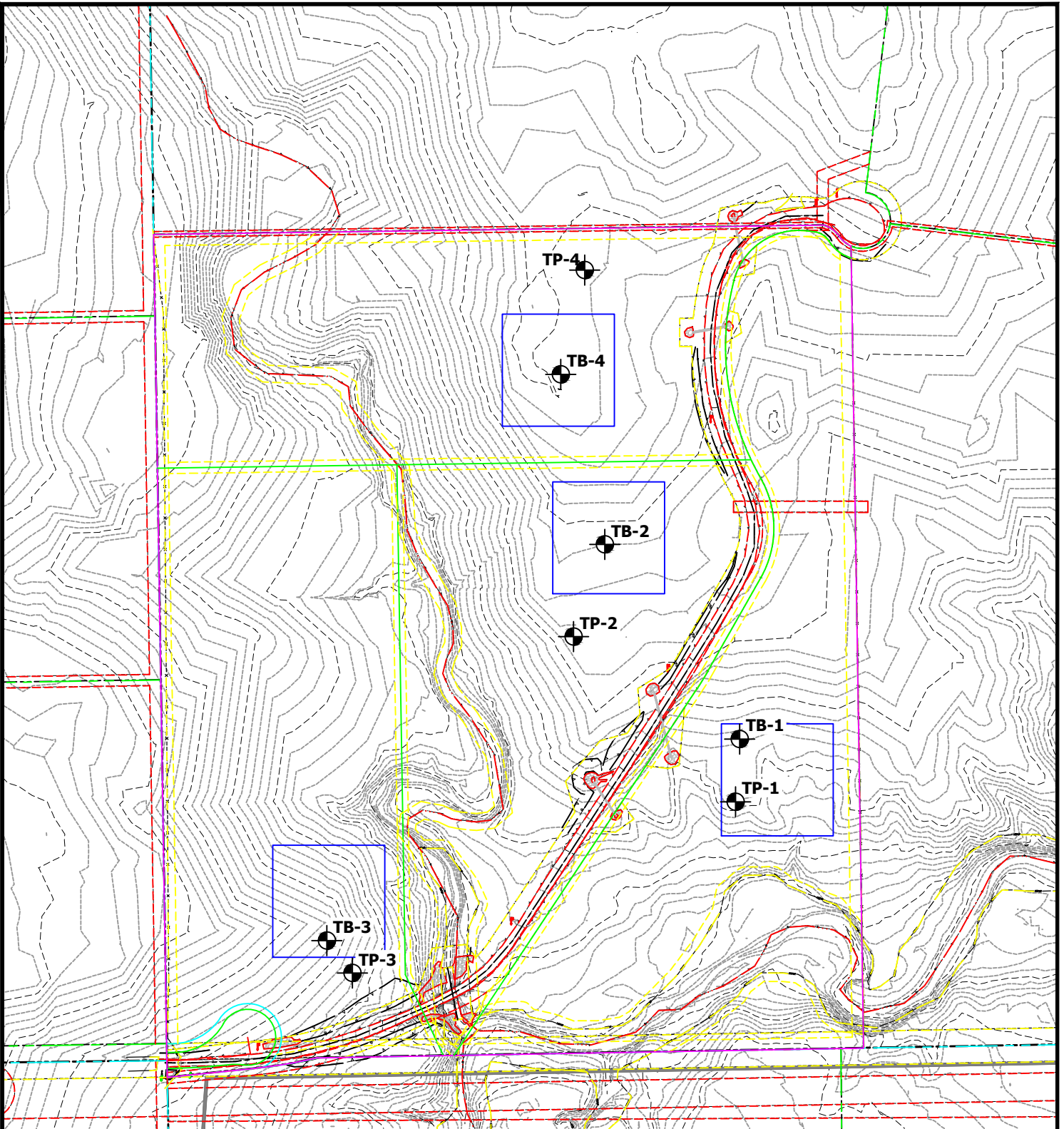
**PROJECT
SITE**



USGS TOPOGRAPHY MAP
 CALM BREEZE SUBDIVISION FILING NO. 1
 M&S CIVIL CONSULTANTS

JOB NO.
260651

FIG. 2



- APPROXIMATE TEST BORING LOCATION AND NUMBER



- POTENTIAL BUILDING SITES



- APPROXIMATE TEST PIT LOCATION AND NUMBER

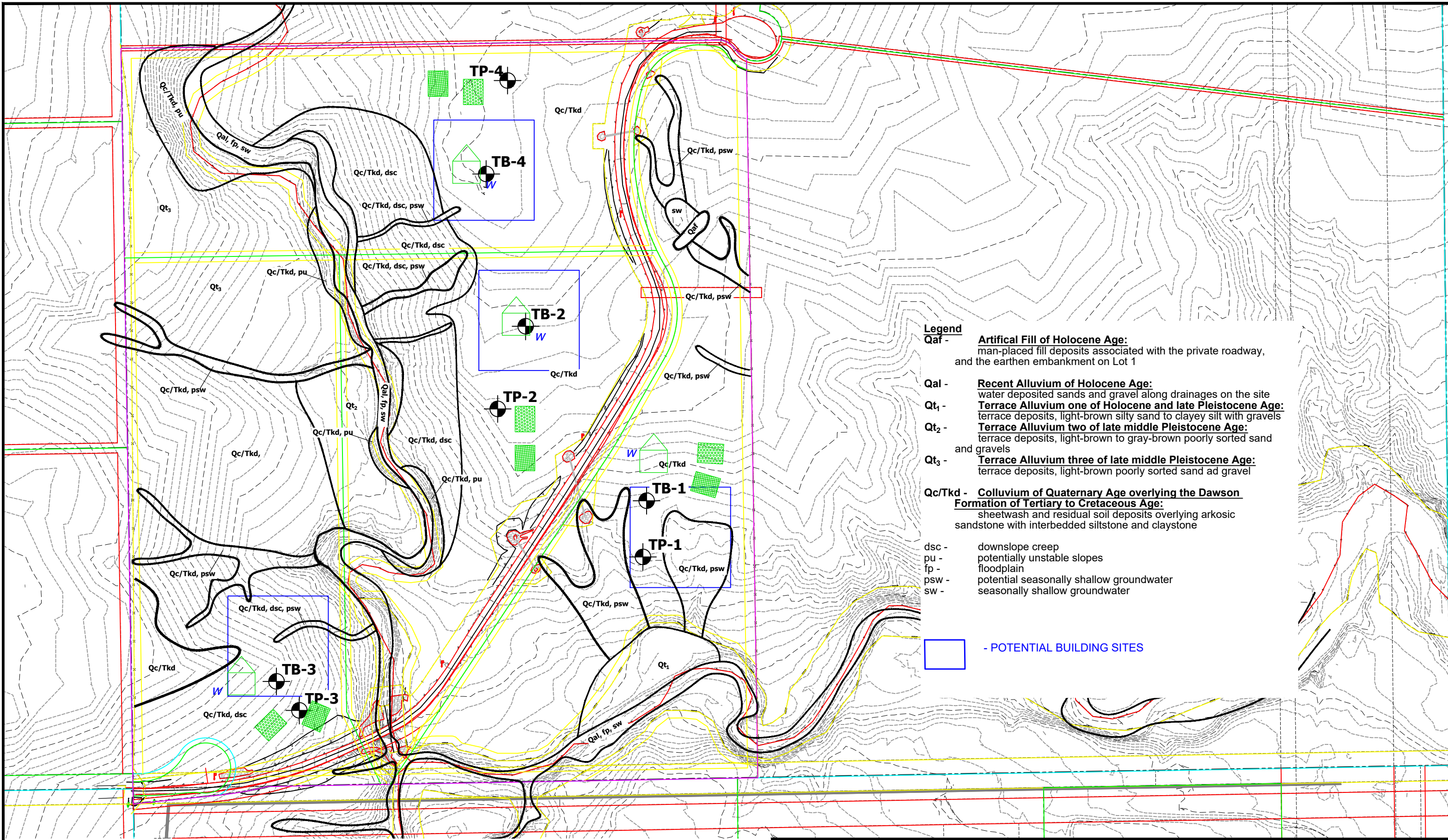


SITE AND EXPLORATION MAP

CALM BREEZE SUBDIVISION FILING NO. 1
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JOB NO.
260298

FIG. 3



Legend

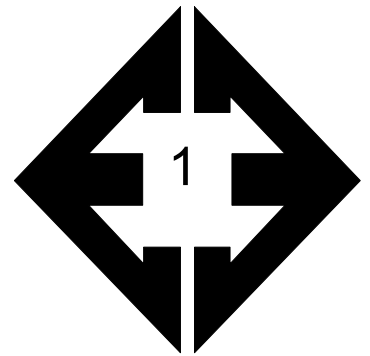
- Qaf - Artificial Fill of Holocene Age:**
man-placed fill deposits associated with the private roadway, and the earthen embankment on Lot 1
- Qal - Recent Alluvium of Holocene Age:**
water deposited sands and gravel along drainages on the site
- Qt₁ - Terrace Alluvium one of Holocene and late Pleistocene Age:**
terrace deposits, light-brown silty sand to clayey silt with gravels
- Qt₂ - Terrace Alluvium two of late middle Pleistocene Age:**
terrace deposits, light-brown to gray-brown poorly sorted sand and gravels
- Qt₃ - Terrace Alluvium three of late middle Pleistocene Age:**
terrace deposits, light-brown poorly sorted sand and gravel
- Qc/Tkd - Colluvium of Quaternary Age overlying the Dawson Formation of Tertiary to Cretaceous Age:**
sheetwash and residual soil deposits overlying arkosic sandstone with interbedded siltstone and claystone
- dsc - downslope creep
- pu - potentially unstable slopes
- fp - floodplain
- psw - potential seasonally shallow groundwater
- sw - seasonally shallow groundwater

- POTENTIAL BUILDING SITES

- APPROXIMATE TEST BORING LOCATION AND NUMBER
- APPROXIMATE TEST PIT LOCATION AND NUMBER

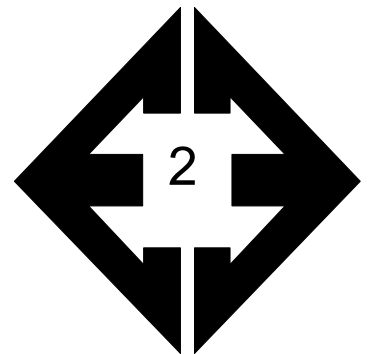


APPENDIX A: Site Photographs



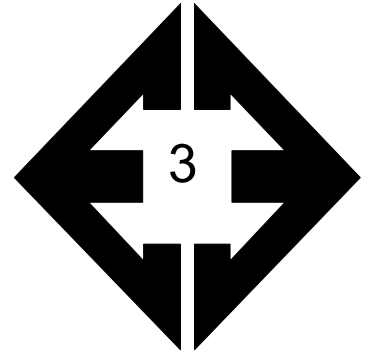
Looking north from the southern portion of proposed Lot 3.

April 29, 2026



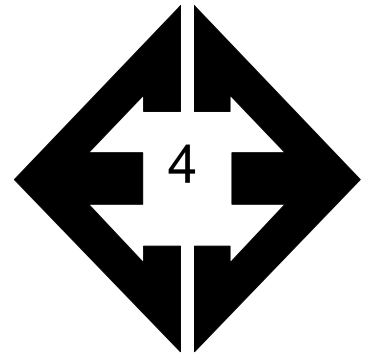
Looking east along Black Squirrel Creek from the southeastern portion of proposed lot 1.

April 29, 2026



**Looking northeast
from the northern
portion of proposed
Lot 3.**

April 29, 2026



**Looking east from the
central portion of
proposed Lot 1.**

April 29, 2026



APPENDIX B: Test Boring and Test Pit Logs

TEST BORING 1
DATE DRILLED 4/13/2026

TEST BORING 2
DATE DRILLED 4/13/2026

REMARKS

REMARKS

DRY TO 20', 4/13/26

DRY TO 20', 4/13/26

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-2	2" TOPSOIL				
2-5	SAND, CLAYEY, TAN, MEDIUM DENSE, MOIST		20	11.8	1
5-10	SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)		50	6.7	2
10-15			50 8"	6.6	2
15-20			50 7"	9.1	2
20-25			50 10"	15.0	2

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	SAND, SILTY, TAN, DENSE, MOIST		32	9.3	1
5-10	SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)		50 11"	10.6	2
10-15			50 10"	9.7	2
15-20			50 6"	13.1	2
20-25			50 8"	9.4	2



TEST BORING LOGS

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260651

FIG. B-1

TEST BORING 3
 DATE DRILLED 4/13/2026

TEST BORING 4
 DATE DRILLED 4/13/2026

REMARKS

REMARKS

DRY TO 20', 4/13/26

DRY TO 20', 4/13/26

2" TOPSOIL

2" TOPSOIL

SAND, SILTY, TAN, DENSE to VERY DENSE, MOIST

SAND, SILTY, TAN

SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED (SAND, SILTY, VERY DENSE to DENSE, MOIST)

SANDSTONE, EXTREMELY WEAK, TAN, HIGHLY WEATHERED (SAND, SILTY, VERY DENSE, MOIST)

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-2				1
2-5		43	9.8	1
5-10		50	10.7	1
10-15		50 8"	9.8	2
15-20		50 7"	8.3	2
20-25		50 10"	8.6	2

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-2				1
2-5		50 10"	3.9	2
5-10		48	4.2	2
10-15		38	11.3	2
15-20		50 11"	10.7	2
20-25		50 10"	10.6	2



TEST BORING LOGS

SHOUP RD., PARCEL 52110-00-013
 M&S CIVIL CONSULTANTS

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 260651

FIG. B-2

TABLE B-1
DEPTH TO BEDROCK

TEST BORING	DEPTH TO BEDROCK (ft.)
1	4
2	3
3	7
4	1

TEST PIT 1
 DATE EXCAVATED 4/15/2026

TEST PIT 2
 DATE EXCAVATED 4/15/2026

REMARKS

REMARKS

REMARKS	Depth (ft.)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type	REMARKS	Depth (ft.)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
topsoil, brown	1						topsoil, brown	1					
sandy loam with gravel, tan, moist	2			gr	w	2A	sandy loam with gravel, tan, moist	2			gr	w	2
	3						sandy clay loam with gravel, tan, moist	3			gr	m	3
	4						sandy loam with gravel, tan, moist	4					
loamy sand with gravel, tan, moist	5			gr	w	1		5			gr	s	2
	6							6					
	7						Refusal at 5'6" due to sandstone bedrock	7					
sandy clay loam, tan, moist	8			ma	sl	3A		8					
	9							9					
	10							10					

Soil Structure Shape

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

Soil Structure Grade

weak - w
 moderate - m
 strong - s
 loose - l
 structureless - sl



TEST PIT LOGS

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 260651

FIG. B-3

TEST PIT 3
 DATE EXCAVATED 4/15/2026

TEST PIT 4
 DATE EXCAVATED 4/15/2026

REMARKS

REMARKS

Redoximorphic Features at 4'

sandy gravelly loam, tan to light brown, moist

sandy clay loam with gravel, olive, moist, redox at 4'

Refusal at 6' due to sandstone bedrock

Depth (ft.)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1			gr	m	2
2			gr	m	2
3			gr	m	2
4			gr	s	3
5			gr	s	3
6					
7					
8					
9					
10					

topsoil, brown

sandy clay loam, tan, moist

loamy gravelly sand, tan, moist

sandy gravelly loam, tan, moist

Depth (ft.)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	Soil Type
1					
2			ma	sl	3A
3			gr	w	1
4			gr	m	2
5			gr	m	2
6					
7					
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
 structureless - sl



TEST PIT LOGS

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FIG. B-4

APPENDIX C: Laboratory Test Results

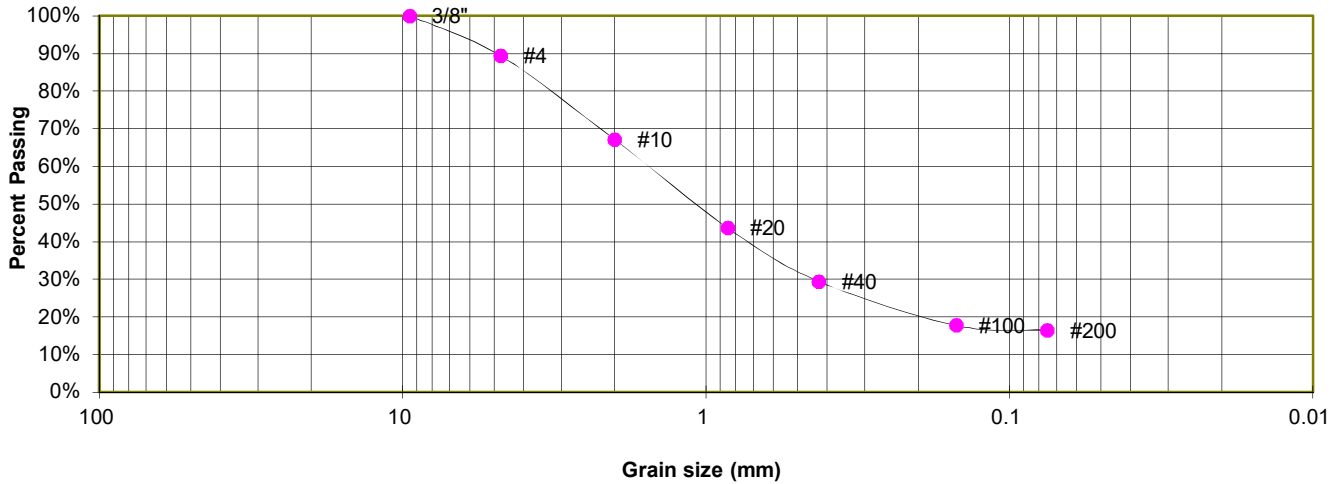
**TABLE C-1
SUMMARY OF LABORATORY TEST RESULTS**

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	16.5	29	21	8	0.00	SC	SAND, CLAYEY
1	3	5	13.6					SM	SAND, SILTY
2	2	10	19.9	30	23	7	<0.01	SM	SANDSTONE (SAND, SILTY)
2	4	5	10.6					SW-SM	SANDSTONE (SAND, WITH SILT)

TEST BORING 1
 DEPTH (FT) 2-3

SOIL DESCRIPTION SAND, CLAYEY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	89.4%
10	67.1%
20	43.7%
40	29.4%
100	17.7%
200	16.5%

ATTERBERG LIMITS

Plastic Limit	21
Liquid Limit	29
Plastic Index	8

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC



LABORATORY TEST RESULTS

SHOUP RD., PARCEL 52110-00-013
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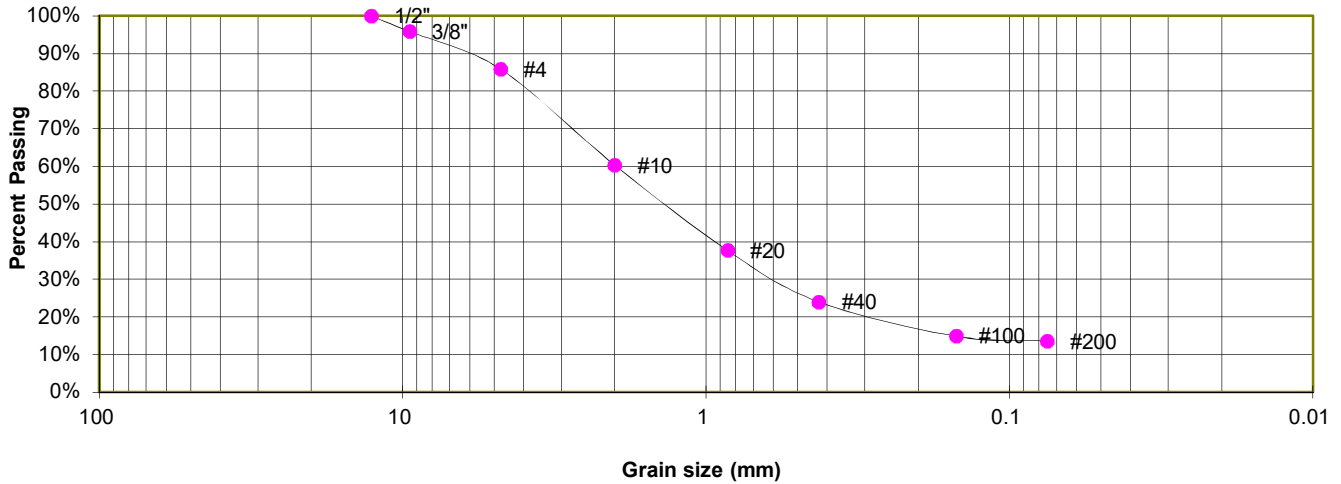
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FIG. C-1

TEST BORING 3
 DEPTH (FT) 5

SOIL DESCRIPTION SAND, SILTY
 SOIL TYPE 1

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	95.9%
4	85.8%
10	60.4%
20	37.7%
40	24.0%
100	14.9%
200	13.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



LABORATORY TEST RESULTS

SHOUP RD., PARCEL 52110-00-013
 M&S CIVIL CONSULTANTS

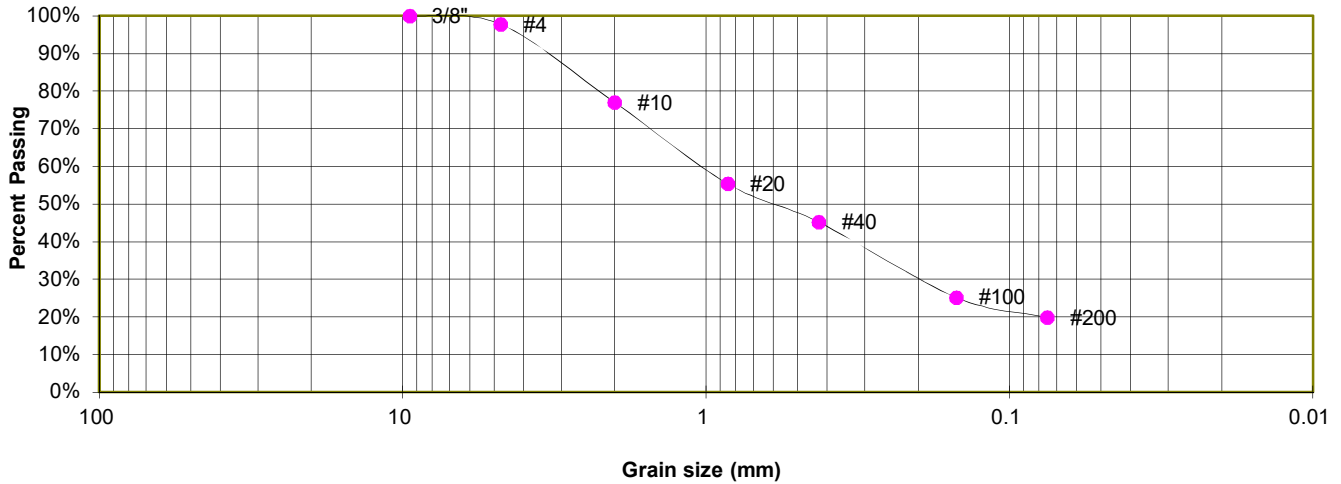
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FIG. C-2

TEST BORING 2
 DEPTH (FT) 10

SOIL DESCRIPTION SANDSTONE (SAND, SILTY)
 SOIL TYPE 2

**Sieve Analysis
 Grain Size Distribution**



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.8%
10	77.0%
20	55.4%
40	45.2%
100	25.2%
200	19.9%

ATTERBERG LIMITS

Plastic Limit	23
Liquid Limit	30
Plastic Index	7

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



LABORATORY TEST RESULTS

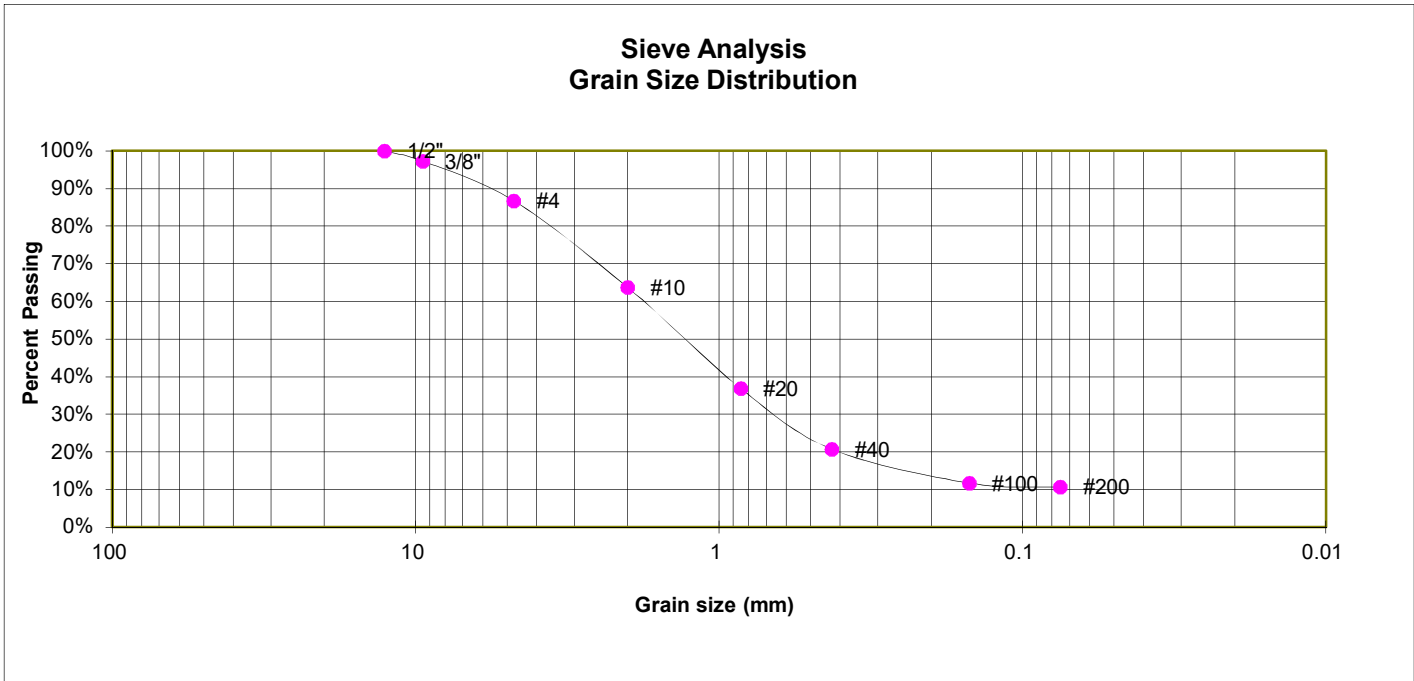
SHOUP RD., PARCEL 52110-00-013
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FIG. C-3

TEST BORING 4
 DEPTH (FT) 5

SOIL DESCRIPTION SANDSTONE (SAND, WITH SILT)
 SOIL TYPE 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.3%
4	86.8%
10	63.7%
20	36.9%
40	20.7%
100	11.8%
200	10.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



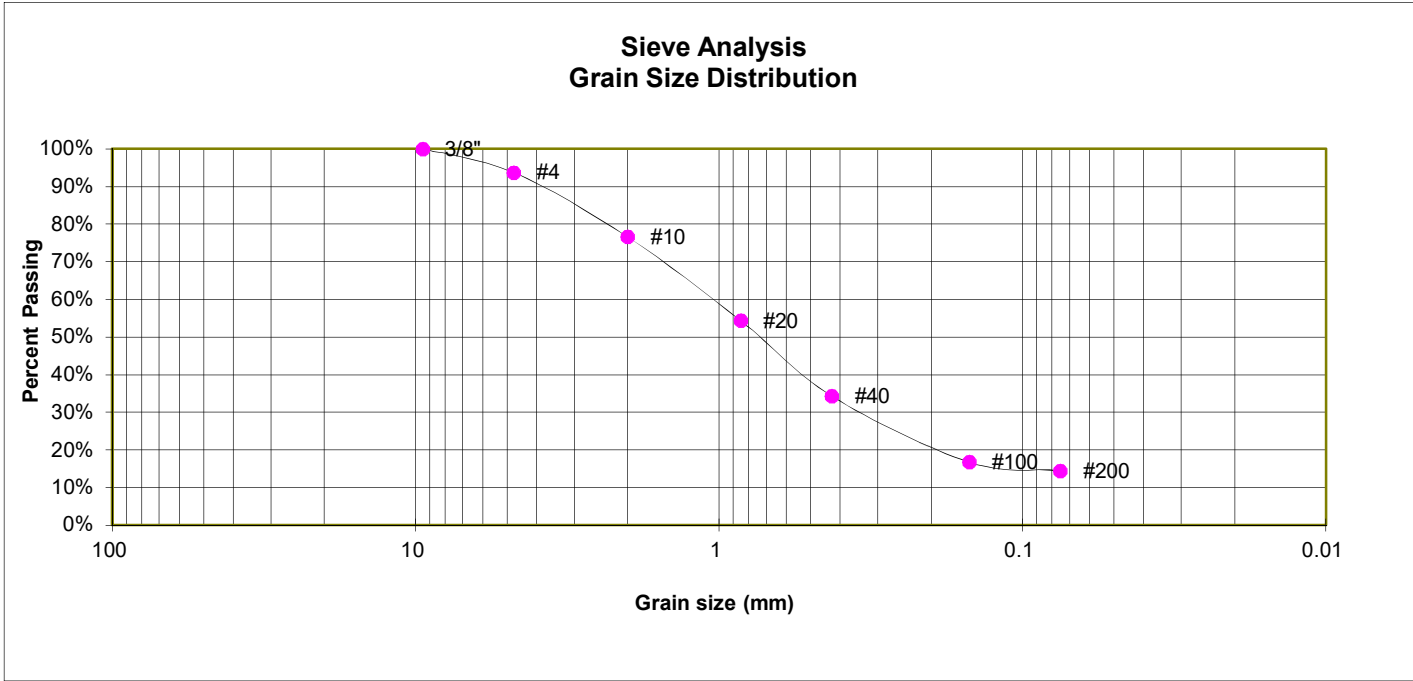
LABORATORY TEST RESULTS

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FIG. C-4

TEST PIT	TP-1	SOIL DESCRIPTION SAND, SILTY
DEPTH (FT)	18-48"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.8%
10	76.6%
20	54.4%
40	34.3%
100	16.7%
200	14.5%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



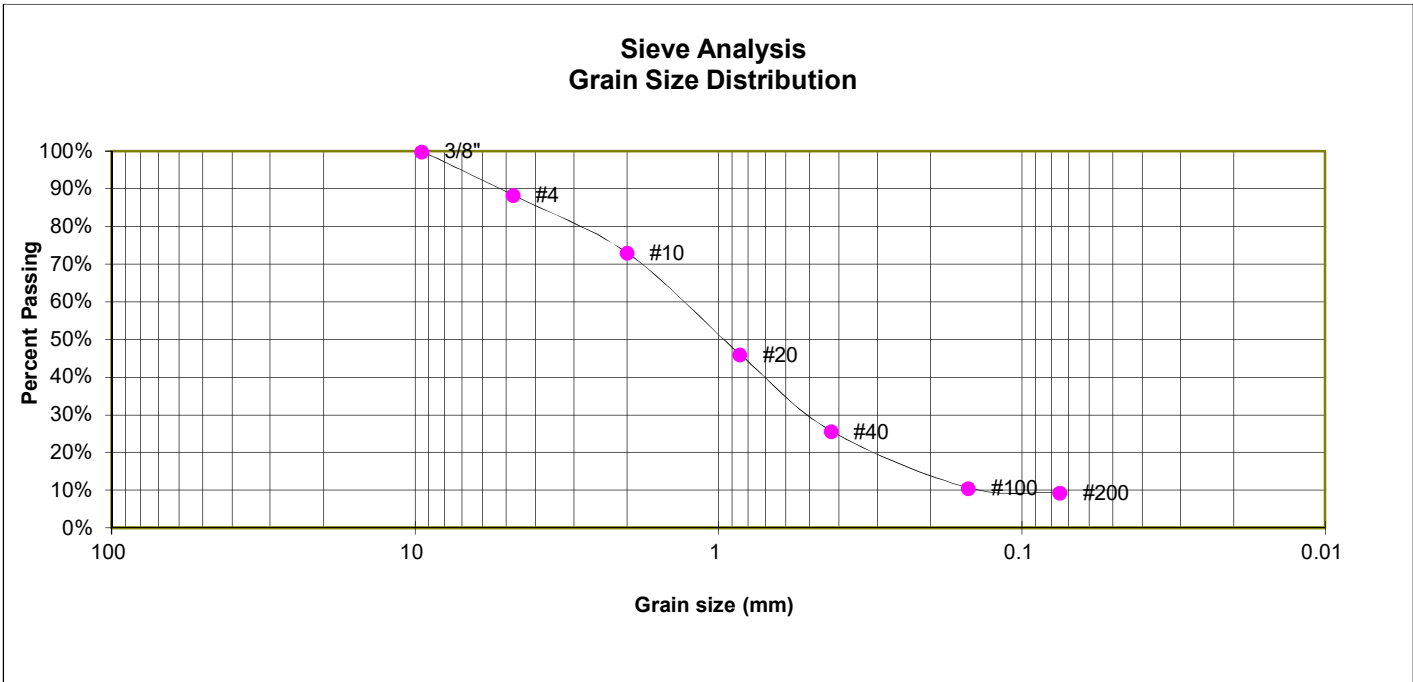
LABORATORY TEST RESULTS

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FIG. C-5

TEST PIT	TP-1	SOIL DESCRIPTION SAND, GRAVELLY, WITH SILT
DEPTH (FT)	48-84"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	88.3%
10	73.1%
20	46.1%
40	25.7%
100	10.6%
200	9.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



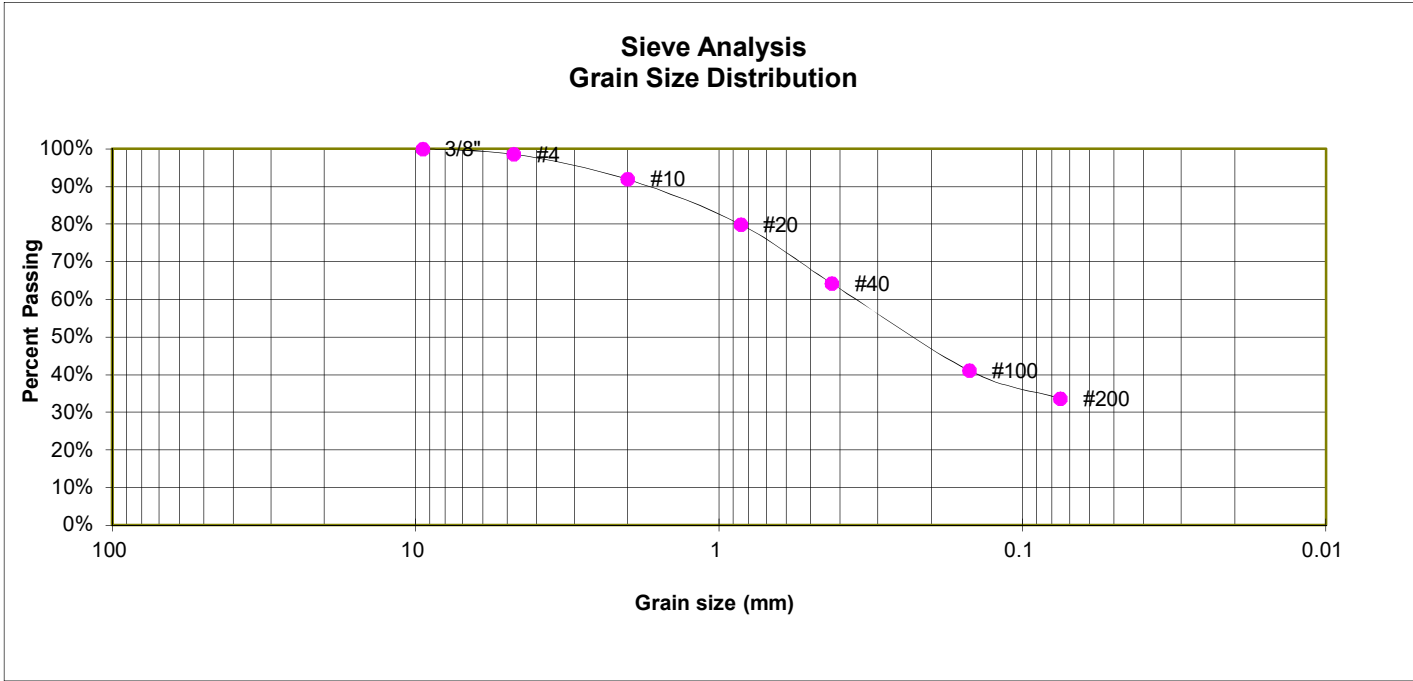
LABORATORY TEST RESULTS

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FIG. C-6

TEST PIT	TP-1	SOIL DESCRIPTION SAND, CLAYEY
DEPTH (FT)	84-96"	SOIL TYPE # 4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.6%
10	91.9%
20	79.9%
40	64.3%
100	41.1%
200	33.7%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC



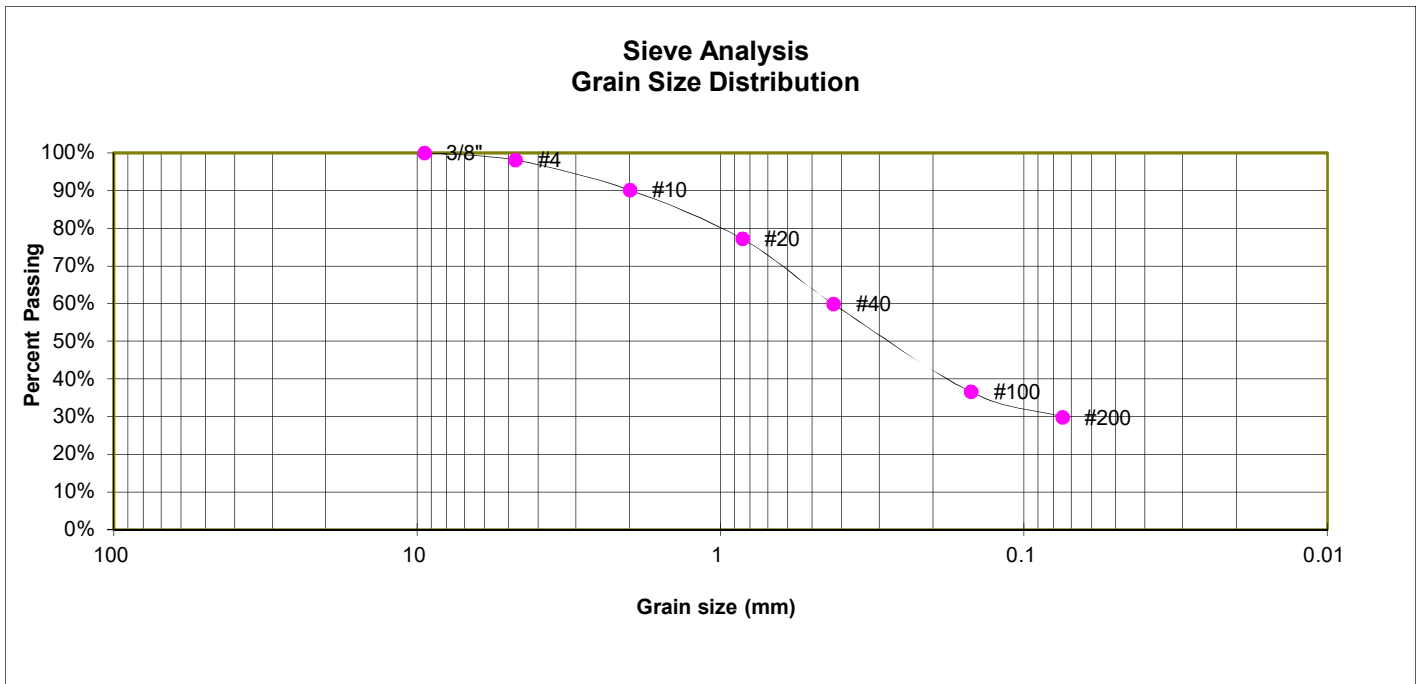
LABORATORY TEST RESULTS

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FIG. C-7

TEST PIT	TP-2	SOIL DESCRIPTION SAND, SILTY
DEPTH (FT)	6-18"	SOIL TYPE # 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.1%
10	90.1%
20	77.2%
40	59.9%
100	36.6%
200	29.9%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



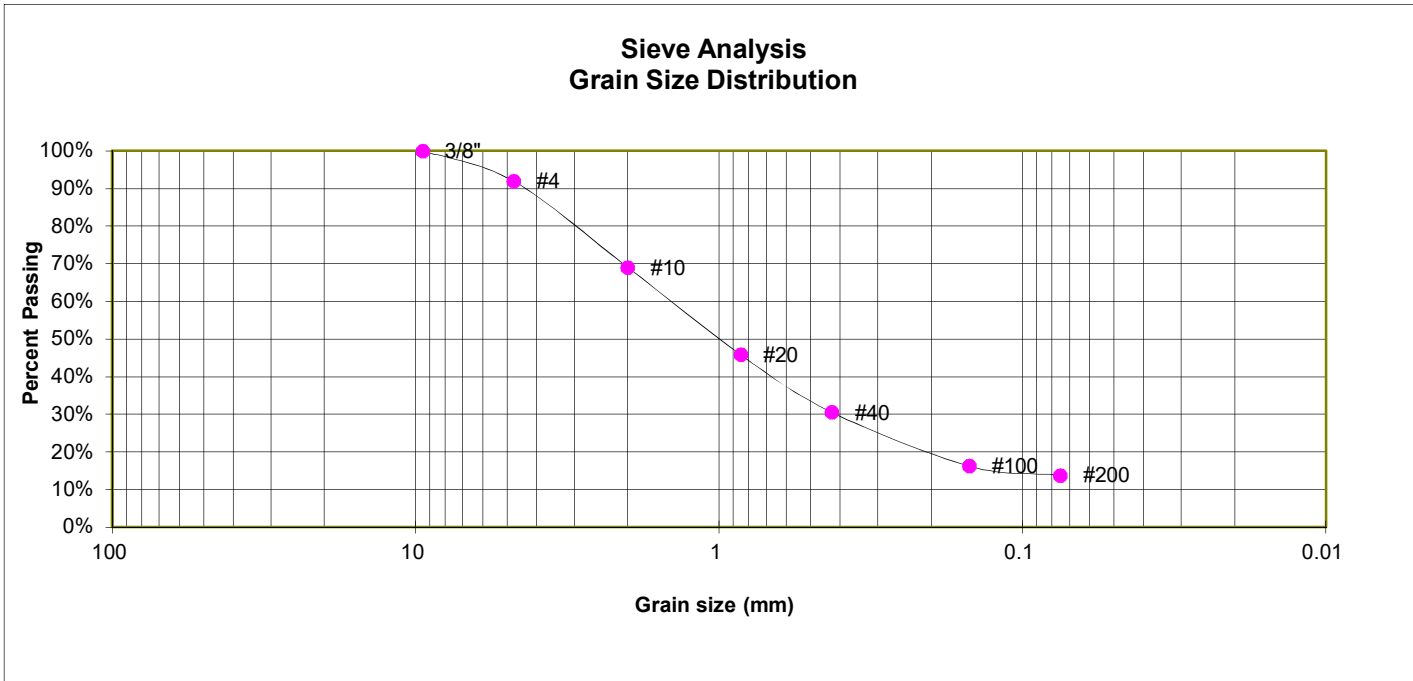
LABORATORY TEST RESULTS

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FIG. C-8

TEST PIT	TP-2	SOIL DESCRIPTION SANDSTONE (SAND, SILTY)
DEPTH (FT)	18-36"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.9%
10	69.1%
20	45.9%
40	30.5%
100	16.2%
200	13.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



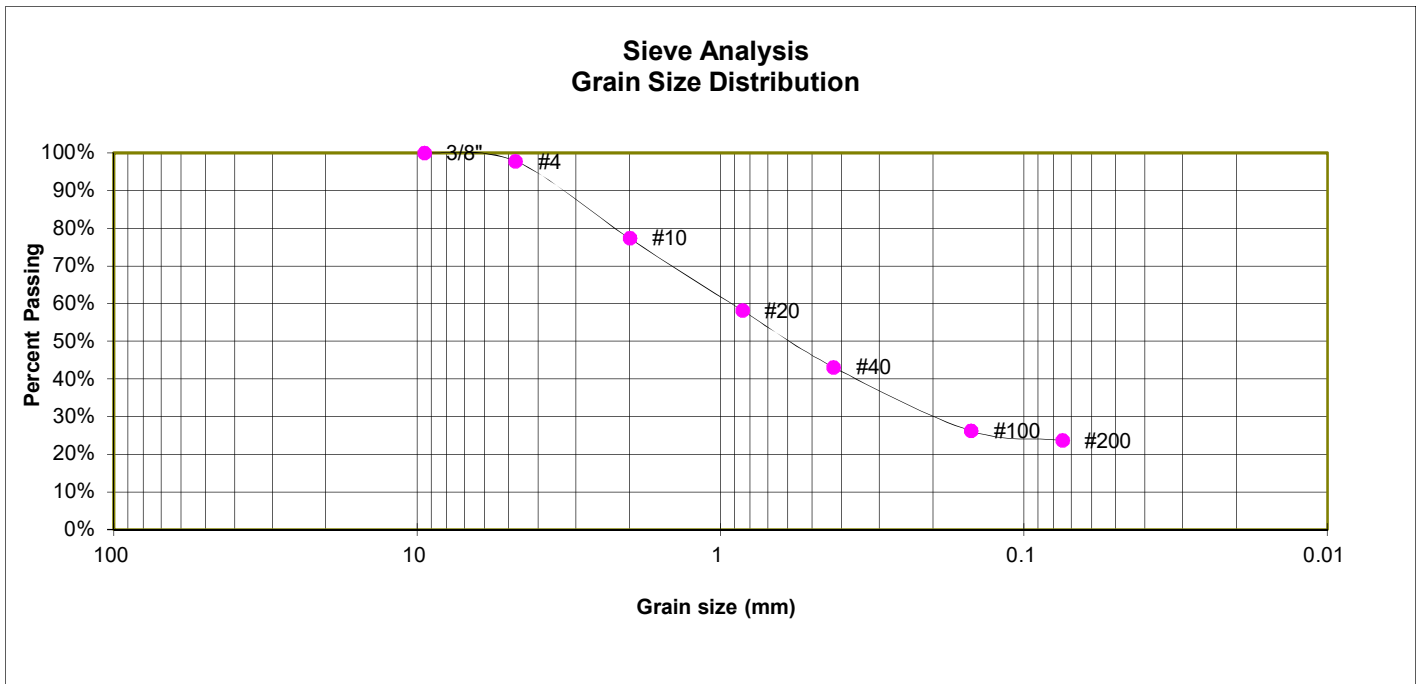
LABORATORY TEST RESULTS

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FIG. C-9

TEST PIT	TP-2	SOIL DESCRIPTION SANDSTONE (SAND, SILTY)
DEPTH (FT)	36-66"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.8%
10	77.3%
20	58.2%
40	43.1%
100	26.2%
200	23.7%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM



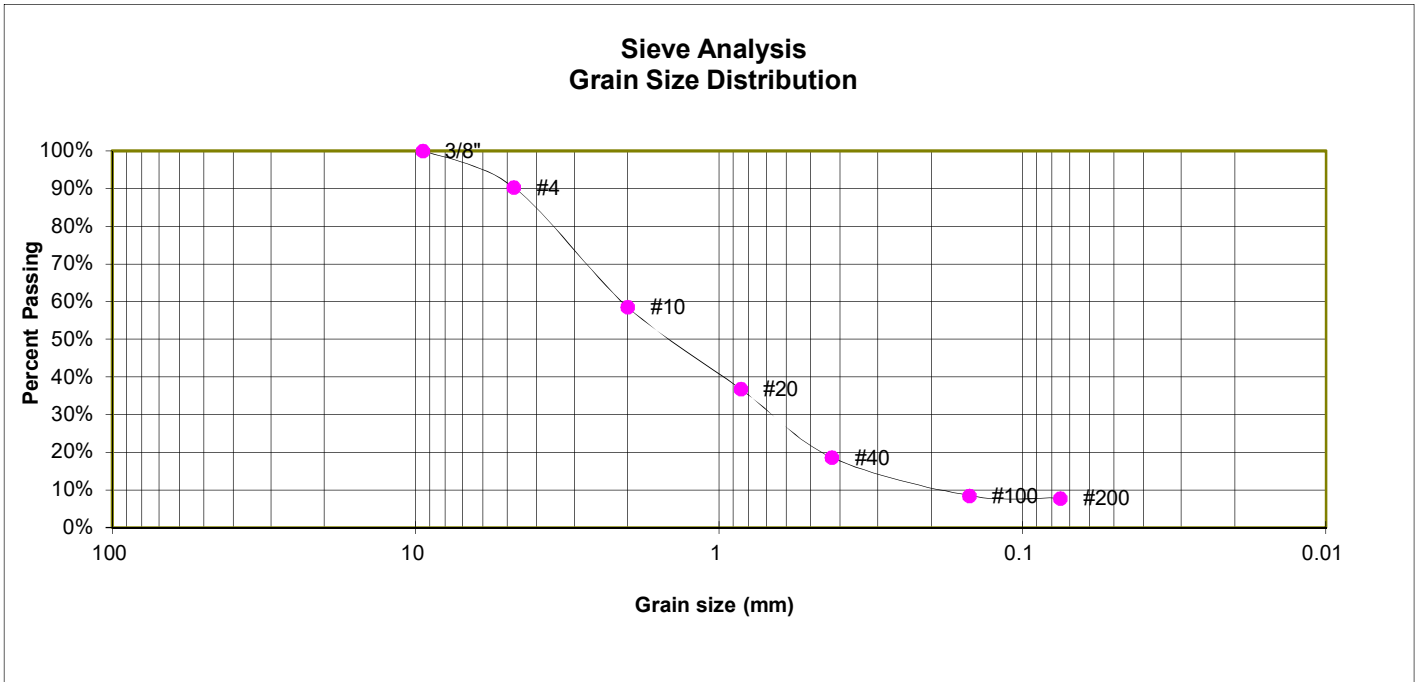
LABORATORY TEST RESULTS

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FIG. C-10

TEST PIT	TP-3	SOIL DESCRIPTION SANDSTONE (SAND, WITH SILT)
DEPTH (FT)	0-18"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	90.3%
10	58.5%
20	36.8%
40	18.6%
100	8.5%
200	7.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



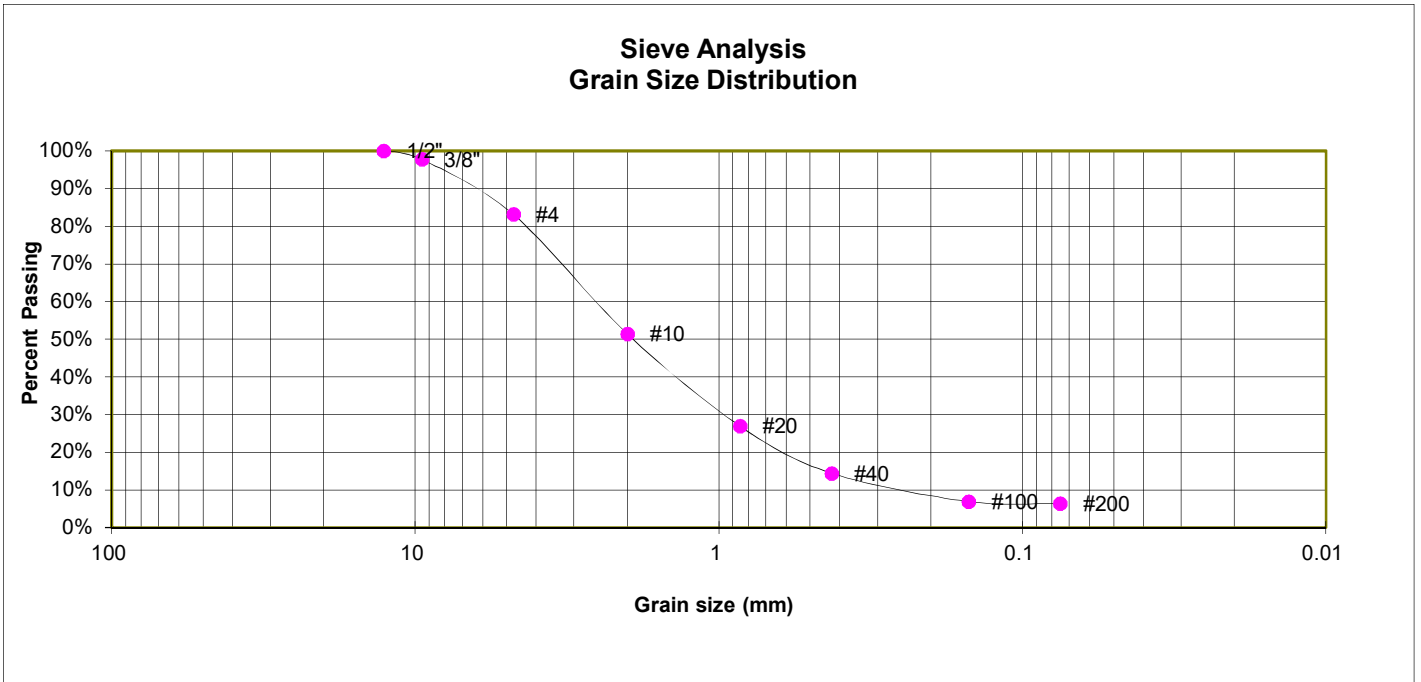
LABORATORY TEST RESULTS

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FIG. C-11

TEST PIT	TP-3	SOIL DESCRIPTION SANDSTONE (SAND, WITH SILT)
DEPTH (FT)	18-42"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	97.7%
4	83.1%
10	51.4%
20	26.9%
40	14.4%
100	6.9%
200	6.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SW-SM



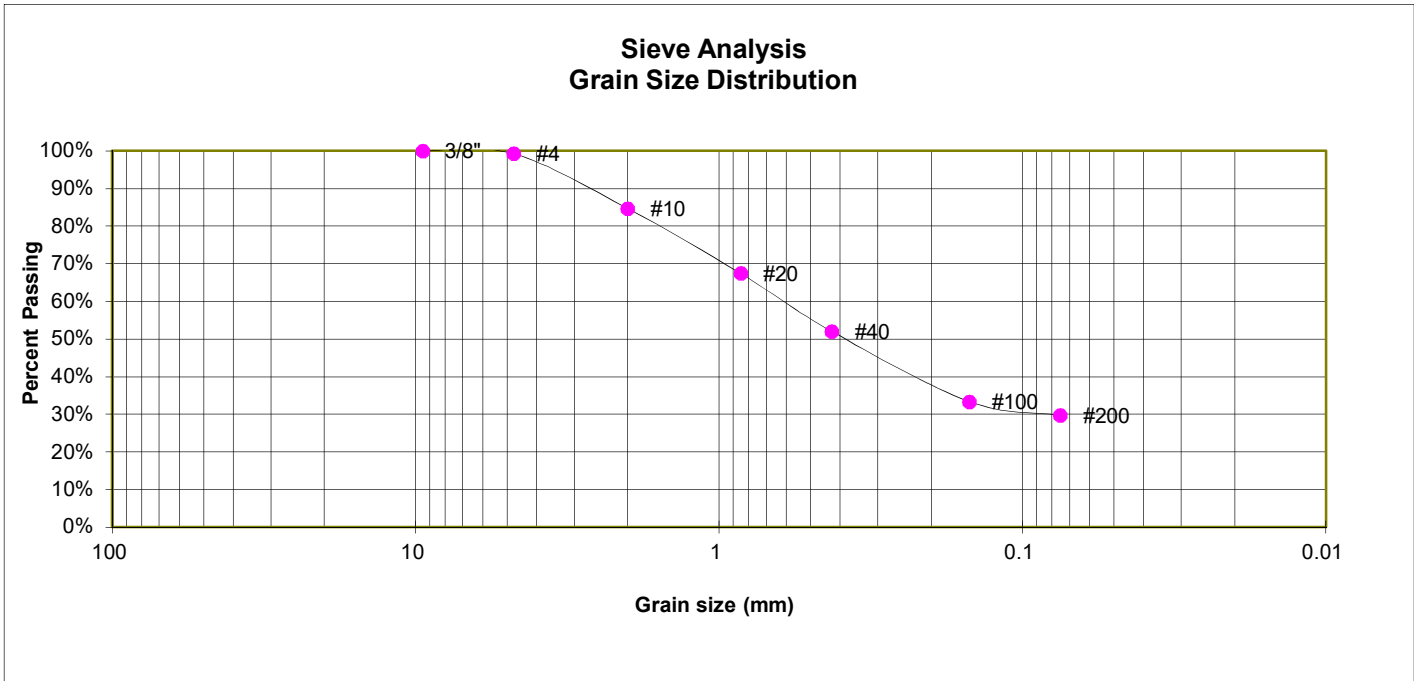
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FIG. C-12

TEST PIT	TP-3	SOIL DESCRIPTION SANDSTONE (SAND, CLAYEY)
DEPTH (FT)	48-60"	SOIL TYPE # 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.2%
10	84.7%
20	67.4%
40	52.0%
100	33.4%
200	29.8%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC



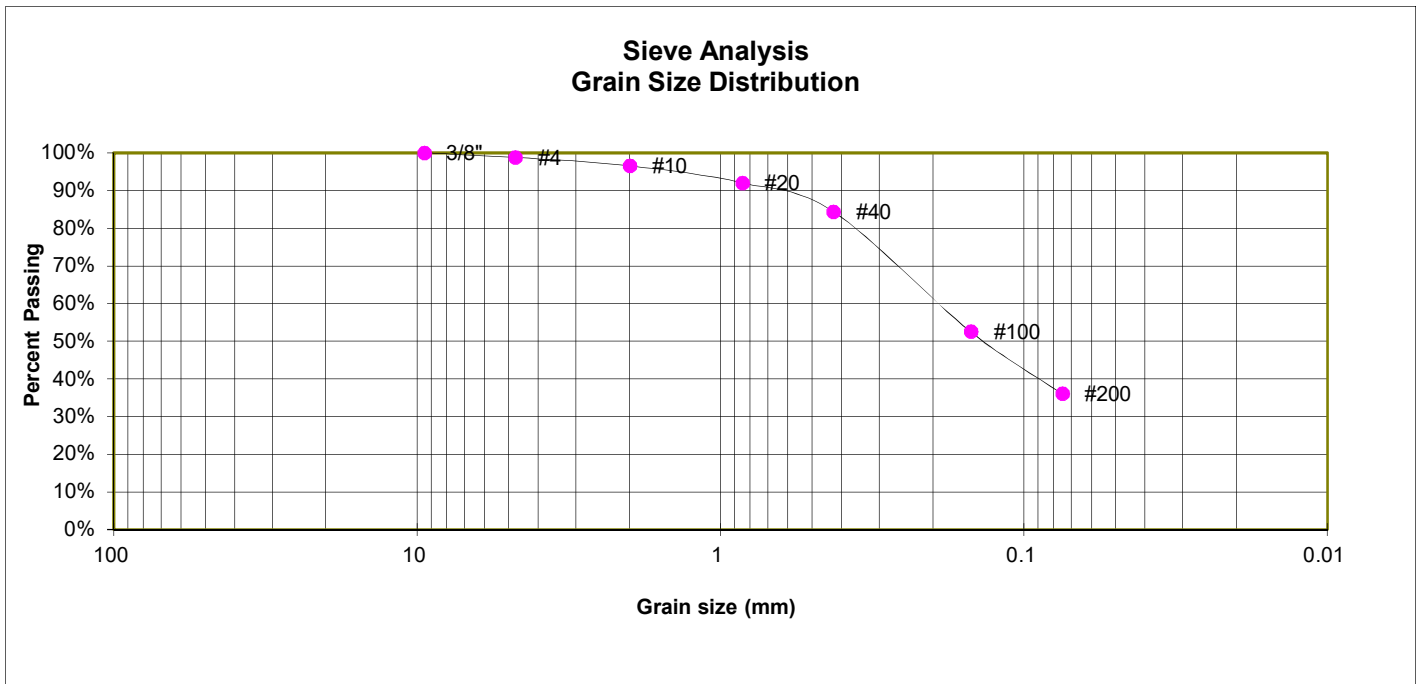
LABORATORY TEST RESULTS

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FIG. C-13

TEST PIT	TP-4	SOIL DESCRIPTION SAND, CLAYEY
DEPTH (FT)	12-36"	SOIL TYPE # 2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.8%
10	96.6%
20	92.1%
40	84.4%
100	52.5%
200	36.1%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC



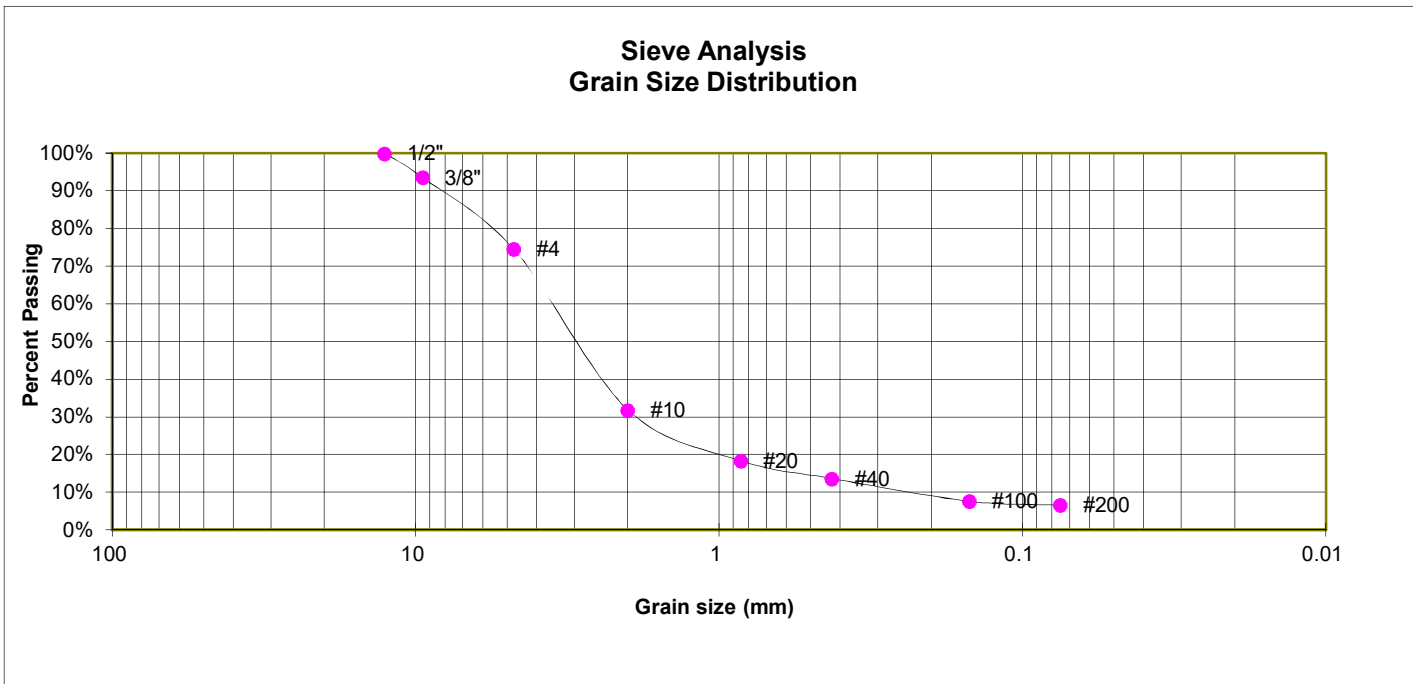
LABORATORY TEST RESULTS

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FIG. C-14

TEST PIT	TP-4	SOIL DESCRIPTION SAND, WITH SILT
DEPTH (FT)	36-48"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	93.6%
4	74.5%
10	31.8%
20	18.4%
40	13.6%
100	7.6%
200	6.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SP-SM



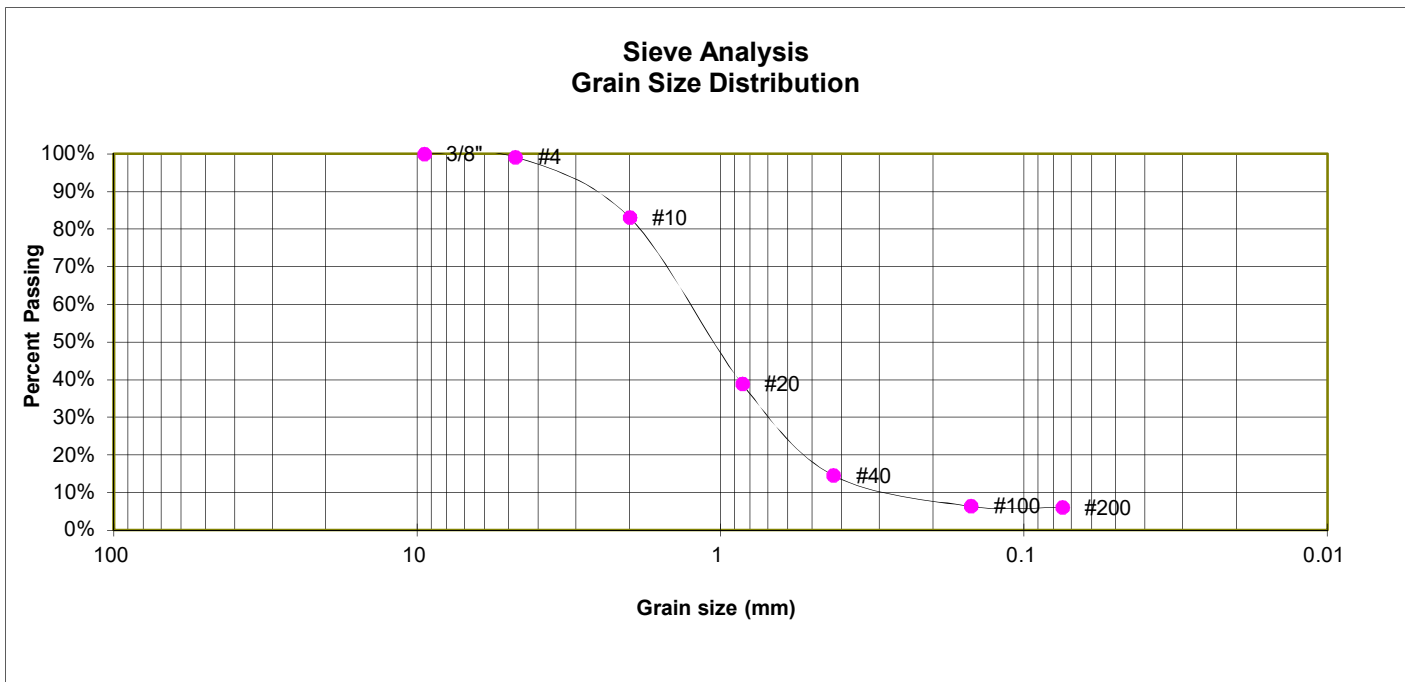
LABORATORY TEST RESULTS

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FIG. C-15

TEST PIT	TP-4	SOIL DESCRIPTION SANDSTONE (SAND, WITH SILT)
DEPTH (FT)	48-96"	SOIL TYPE # 1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.2%
10	83.2%
20	38.9%
40	14.6%
100	6.4%
200	6.1%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SP-SM



LABORATORY TEST RESULTS

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FIG. C-16



APPENDIX D: USDA Soil Survey Descriptions

El Paso County Area, Colorado

26—Elbeth sandy loam, 8 to 15 percent slopes

Map Unit Setting

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

Map Unit Composition

Elbeth and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landscape: Uplands
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: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat):
Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.1 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: 10 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 23, Aug 29, 2025



El Paso County Area, Colorado

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

Map Unit Setting

National map unit symbol: 368h

Landscape: Uplands

Elevation: 7,000 to 7,700 feet

Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent

Minor components: 15 percent

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

Description of Kettle

Setting

Landscape: Uplands

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: 10 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 23, Aug 29, 2025