

WASTEWATER EVALUATION REPORT
FOR
HAY CREEK VALLEY DEVELOPMENT
AT
2855 HAY CREEK ROAD
EL PASO COUNTY, COLORADO

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Project No. 22.886.076

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I. INTRODUCTION

1. General

This report presents the results of a wastewater evaluation report performed for the proposed Hay Creek Valley Development to be constructed at 2855 Hay Creek Road, El Paso County, Colorado. An attached Vicinity Map (Exhibit 1) shows the general location of the project. Our evaluation was performed for COLA, LLC, and was authorized by Mr. Timothy Buschar.

2. Property Description

Hay Creek Valley Development is located on six existing parcels. These parcels are located within the a portion of the Southeast Quarter of Section 33, and the Southwest Quarter of Section 34, Township 11 South, Range 67 West of the 6th P.M., El Paso County, Colorado. A full legal description of the development is included below.

The El Paso County Assessor identifies these parcels with the following Schedule Numbers: 7133007014, 7133000001, 7100000270, 7100000267, 7100000268 and 7100000269. The project is developed on approximately 214 acres with elevations ranging from 6,833 to 7,144 feet above sea level. The parcels will be developed into 20 individual residential lots, ranging from 5.5 acres to 17.3 acres. Additionally, there will be 3 tracts platted for non-residential uses.

For additional reference, the Legal Description (as provided by AzTec Consultants) of this site is:

A TRACT OF LAND SITUATED IN THE SOUTHEAST QUARTER OF SECTION 33 AND THE SOUTHWEST QUARTER OF SECTION 34, TOWNSHIP 11 SOUTH, RANGE 67 WEST OF THE 6th PRINCIPAL MERIDIAN; COUNTY OF EL PASO, STATE OF COLORADO; BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID SOUTHEAST QUARTER OF SECTION 33, FROM WHICH THE SOUTHEAST CORNER OF SAID SOUTHEAST QUARTER OF SECTION 33 BEARS NORTH 89°38'17" EAST, A DISTANCE OF 2,684.46 FEET, WITH ALL BEARINGS HEREIN RELATIVE THERETO;

THENCE NORTH 00°25'17" WEST, ALONG THE WEST LINE OF SAID SOUTHEAST QUARTER OF SECTION 33, A DISTANCE OF 1,169.26 FEET;

THENCE THE FOLLOWING TWENTY-TWO (22) COURSES;

1. SOUTH 71°29'43" EAST, A DISTANCE OF 140.51 FEET;
2. NORTH 82°07'46" EAST, A DISTANCE OF 458.69 FEET;
3. NORTH 71°31'45" EAST, A DISTANCE OF 369.66 FEET;
4. NORTH 89°30'59" EAST, A DISTANCE OF 195.64 FEET;
5. NORTH 82°27'48" EAST, A DISTANCE OF 300.93 FEET;
6. SOUTH 81°25'26" EAST, A DISTANCE OF 208.57 FEET;
7. NORTH 66°51'51" EAST, A DISTANCE OF 197.45 FEET;
8. NORTH 70°47'03" EAST, A DISTANCE OF 178.13 FEET;
9. NORTH 66°11'16" EAST, A DISTANCE OF 170.15 FEET;
10. NORTH 71°47'12" EAST, A DISTANCE OF 403.02 FEET;
11. NORTH 84°26'00" EAST, A DISTANCE OF 169.75 FEET;
12. SOUTH 87°26'44" EAST, A DISTANCE OF 197.38 FEET;

13. NORTH 74°51'53" EAST, A DISTANCE OF 86.71 FEET;
14. NORTH 86°13'24" EAST, A DISTANCE OF 233.11 FEET;
15. NORTH 80°10'48" EAST, A DISTANCE OF 260.90 FEET;
16. NORTH 78°52'32" EAST, A DISTANCE OF 149.05 FEET;
17. NORTH 71°58'16" EAST, A DISTANCE OF 210.75 FEET;
18. NORTH 49°30'50" EAST, A DISTANCE OF 403.50 FEET;
19. NORTH 57°57'37" EAST, A DISTANCE OF 170.21 FEET;
20. NORTH 37°03'08" EAST, A DISTANCE OF 266.68 FEET;
21. NORTH 43°48'53" WEST, A DISTANCE OF 107.37 FEET;
22. NORTH 20°29'00" WEST, A DISTANCE OF 220.10 FEET TO A POINT ON THE NORTH LINE OF SAID SOUTHWEST QUARTER OF SECTION 34;

THENCE NORTH 89°30'43" EAST, ALONG SAID NORTH LINE, A DISTANCE OF 1,125.83 FEET TO THE NORTHEAST CORNER OF SAID SOUTHWEST QUARTER OF SECTION 34;

THENCE SOUTH 00°28'46" WEST, ALONG THE EAST LINE OF SAID SOUTHWEST QUARTER OF SECTION 34, A DISTANCE OF 2,654.48 FEET TO THE SOUTHEAST CORNER OF SAID SOUTHWEST QUARTER;

THENCE SOUTH 89°38'45" WEST, ALONG THE SOUTH LINE OF SAID SOUTHWEST QUARTER, A DISTANCE OF 2,683.98 FEET TO THE SOUTHEAST CORNER OF SAID SOUTHWEST QUARTER OF SECTION 33;

THENCE SOUTH 89°38'17" WEST, ALONG THE SOUTH LINE OF SAID SOUTHWEST QUARTER OF SECTION 33, A DISTANCE OF 2,684.46 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 214.622 ACRES, (9,348,924 SQUARE FEET), MORE OR LESS.

3. Purpose and Scope

The purpose of this evaluation was to evaluate the site for general feasibility of the use of individual Onsite Wastewater Treatment Systems (OWTS) – a.k.a. septic systems. This report is part of the submittal of the Final Plat for this proposed subdivision to El Paso County. Matrix's scope of services included:

- Review of the soil information provided by Geologic Hazards Evaluation and Preliminary Geotechnical Investigation prepared by CTL Thompson on December 27, 2022;
- Analyze the site and soil conditions at the project site's boring locations;
- The drilling of fifteen exploratory borings. This scope follows the guidelines of El Paso County Board of Health, Chapter 8, On-Site Wastewater Treatment systems (OWTS) Regulations. These explorations were performed on 75 percent of the proposed lots at currently accessible locations across the proposed development area;
- Review the laboratory tests of samples obtained in CTL Thompson's report and evaluate relevant physical, geologic, and engineering properties of the soil; and
- Preparation of this report, which includes a description of the proposed project, a description of the surface and subsurface site conditions, and an evaluation of the feasibility of the use of OWTS for this development.

II. FIELD EXPLORATION AND LABORATORY TESTING

1. Field Exploration

A field exploration was performed by CTL Thompson on October 3, 7 and 14, 2022 which included the drilling of fifteen borings of 20 to 30 feet at the locations presented on Exhibit 2 – Borings Location Plan. This exploration and some of the basic information are presented in Table 1, below.

Table 1
Summary of Subsurface Exploration

Boring Designation	Approximate Boring Depth (feet below ground surface)	Approximate Depth to Groundwater (feet below ground surface)	Approximate Depth to Weathered Bedrock (feet below ground surface)	Approximate Depth to Bedrock (feet below ground surface)
Lot 1	30	None Encountered	None Encountered	26
Lot 3	30	29	None Encountered	18
Lot 5	25	None Encountered	18	16
lot 7	25	None Encountered	None Encountered	20
lot 9	20	None Encountered	None Encountered	7
lot 11	20	None Encountered	3	6
lot 12	20	None Encountered	None Encountered	7
lot 13	20	None Encountered	9	12
lot 14	30	None Encountered	None Encountered	12
lot 15	25	None Encountered	7	11
lot 16	20	None Encountered	3	6
lot 17	20	None Encountered	None Encountered	7
lot 18	20	None Encountered	None Encountered	12
lot 19	25	None Encountered	None Encountered	8
lot 20	20	None Encountered	10	13

The Borings were drilled using 4-inch diameter, continuous-flight, solid-stem auger and a Diedrich D-90, truck-mounted drill rig. Samples of the soils were obtained at 5 to 10-foot intervals using a 2.5-inch diameter (O.D.) modified California barrel sampler driven by blows from a 140-pound hammer falling 30 inches.

Appendix A of this report includes logs of the borings describing the subsurface conditions. The lines defining boundaries between soil and rock types on the logs are based upon drill behavior and interpolation between samples and are therefore approximate. Transition between soil and rock types may be abrupt or may be gradual.

Soil samples obtained were returned to the laboratory and visually classified. Laboratory testing was then assigned to representative samples. Testing included moisture content and dry density, sieve analysis (percent passing the No. 200 sieve), swell-consolidation, and water-soluble sulfate content tests.

2. Laboratory Testing

Laboratory tests were performed on selected soil samples to estimate their relative engineering properties. Tests were performed in general accordance with the following methods of ASTM or other recognized standards-setting bodies, and local practice:

- Description and Identification of Soils (Visual-Manual Procedure)
- Classification of Soils for Engineering Purposes
- Moisture Content
- Sieve Analysis of Fine and Coarse Aggregates
- Liquid Limit, Plastic Limit, and Plasticity Index
- Swell/Settlement

Results of the laboratory tests are included in Appendix B of this report. Selected test results are also shown on the boring logs in Appendix A.

3. General Geology

3.1 Site Description

The site was described by CTL Thompson personnel as follows:

The investigated property currently includes six individual lots consisting of between 31.9 and 37.7 acres. The western most lot is addressed as 2855 Hay Creek Road in Northern El Paso County, Colorado. The remaining five lots do not have an assigned address, according to the El Paso County Assessor. The site lies within the southeast quarter of Section 33 and the southwest quarter of Section 34, Township 11 South, Range 67 West of the 6th Principal Meridian), in El Paso County, Colorado. With exception to Lot 10, the site is undeveloped. Lot 10 is occupied with a single-family residence, an indoor horse-riding arena, and indoor horse stables. An outdoor arena is present, south of the existing residence. Past uses of the site have included horse boarding and grazing. The site and location of exploratory borings is shown in Exhibit 2.

Overall, the property is located within a valley, bound on the north, south, and west by bluffs ranging from about 40 to 200 feet above the valley floor. Generally, the overall ground surface across the property slopes downward to the east at grades of between about less than 2 percent to up to about 15 percent. Steeper slopes are located near the north and south site boundaries, sloping toward the valley floor by an estimated grade of between 5 and 40 percent. Vegetation on the site consists of a slight to moderate stand of mostly grasses, weeds, and coniferous trees. Dense scrub oak and coniferous trees are generally concentrated at the higher elevations along north and south property boundaries. The valley floor is generally barren of shrubs and trees.

The land to the north, east, and west are developed with large lot residences/mini ranches. The Air Force Academy bounds the site on the south. Hay Creek Road is located to the north of the Site.

3.2 Geologic Assessment

A geologic assessment was performed from the information received from the field exploration and laboratory testing and was supported by the geologic mapping information from the following sources:

- USDA NRCS Custom Soil Resource Report for El Paso County Area, Colorado.
- CGS Geologic Map of the Palmer Lake Quadrangle, El Paso County, Colorado by John W. Keller, Matthew L. Morgan, Jon P. Thorson, Neil R. Lindsay, and Peter E. Barkman, 2007
- Review of Available Geologic Hazard Studies in the surrounding area

Geologic map is presented as Exhibit 3-Regional Geology Map, attached to this report. An NRCS Soil Survey Map and associated Soil Descriptions are presented as Exhibits 4a and 4b. A USGS Topographic Map is attached as Figure 5.

III. ON SITE WATER TREATMENT

1. Evaluation

The site was evaluated for use of On-Site Wastewater Treatment Systems (OWTS); a.k.a. Septic Systems. For the purpose of submitting the Hay Creek Valley Final Plat, a review of the El Paso County's On-Site Wastewater, geological documents, and 15 profile borings were analyzed. The borings were performed at accessible locations across the site, and are shown on Exhibit 2. Logs of the borings are presented in Appendix A. Laboratory test results are presented in Appendix B, and select lab data is presented on the logs in Appendix A. Soil description and its depth are presented at the bottom of the logs in Appendix A as well.

For rough estimation of anticipated sewage flow, an assumed average 75 gallons per person per day is utilized from Section 8.4 of the El Paso County OWTS regulations. Assuming an average 4 people per dwelling the average flow per dwelling would be estimated at 300 gallons per day per dwelling. For all 20 lots this equates to 6,000 gallons per day. This is consistent with the Water Supply Summary that is also submitted as part of the Final Plat Documents and compliant with the water decree obtained through District Court, Water Division 2, State of Colorado.

2. NRCS Soil Survey Mapping

Mapping of the NRCS Soil Survey on this site is presented on Exhibit 4a with descriptions of the soil types presented on Exhibit 4b. The NRCS soil descriptions generally agree with the soils encountered in our investigation and the results of our laboratory soil testing.

3. Results of Evaluation

Soils encountered at the locations evaluated generally included Sand to Silty to Clay, Sandy to Weathered Bedrock to Bedrock and Sandstone. These coincide with Sand, Loamy Sand, Sandy Loam, and Loam (Soil Types 1 and 2) per USDA Soil Type categories. These soils are generally considered to have favorable percolation rates for conventional septic system design and construction. Only 2 lots (11 and 16) yielded weathered bedrock at less than 5 feet.

The percolation rates at our exploration locations are expected to range from approximately 5 to 25 min. per inch. LTAR values are based on soil types 1 and 2 characteristics shown on Table 10-1 of El Paso County's On-Site Wastewater Treatment Systems Regulations which are estimated to range from 0.60 to 0.80 gallons/square foot/day.

Weathered Bedrock, claystone and sandstone, sandy (claystone) or silty to clayey (sandstone), medium hard was encountered in six of the fifteen explorations at approximate depths of 3, 8, 9, 10, and 18 feet below the existing ground surface. Bedrock, claystone, sandy to very sandy, medium hard to very hard was encountered at nine of the fifteen explorations at approximate depths of 6, 7, 9, 11 and 12 feet below the existing ground surface. Bedrock, sandstone, slightly silty to silty, clayey to very clayey, hard to very hard was also encountered at approximate depths of 6, 7, 8, 11, 13, 15, 16, 18, 20 and 26 feet below the existing ground surface.

Groundwater was encountered in one of the fifteen explorations at an approximate depth of 29 feet below the existing ground surface. Table 1 presented in this report shows depth to bedrock and groundwater for each exploration in tabular format. This information is also presented on the individual exploration logs in Appendix A.

4. Conclusions

The locations evaluated as part of this study found soils that are generally described as well drained and with percolation rates that are favorable for conventional septic system construction. The boring logs found two areas that have weathered bedrock less than five feet deep. These areas of shallow bedrock have lower percolation rates that may require engineered systems.

5. Other Considerations

Existing Water Wells:

There are several wells located within the western and northern portion of the site adjacent to Hay Creek Drainage Feature. The wells are 275 to 561 feet deep and uses are Domestic and Domestic Stock. Wells are mapped adjacent the northern and western edge of the property and shown in Exhibit 7. The residential communities adjacent to the north and west are on individual wells for domestic & household only use and septic systems.

Existing Lakes, Streams, Irrigation Ditches, etc.:

The nearest lakes (Beaver Creek Dam, Lake Woodmoor and Monument Lake) are located 0.5 and 2 to 3 miles respectively north of the site. Hay Creek Valley (1st order drainage) runs along the north portion of the site and flows to the southeast of the site.

Availability of Central Sewage System:

The site is not within the boundaries of a water/sanitation district. Monument Sanitation District (MSD) boundary is located northeast of the site boundary and would be the closest connection if they allowed inclusion, which is unclear at this time. The estimated cost to tie into MSD's sewage system is significant and includes the main items presented in the table below. In summary, connecting to MSD's wastewater system results in an estimated cost on the order of \$2.4 M versus \$0.72 M for individual OWTS for full build out of the subdivision.

ITEM	AMOUNT	UNIT	UNIT COST	TOTAL COST
Lift Station	1	EA	\$ 450,000.00	\$ 450,000.00
8" Pipeline	15,800	LF	\$ 71.00	\$ 1,121,800.00
Manholes (1 per 400 LF)	40	LF	\$ 4,858.00	\$ 194,320.00
Installation	16	1,000 LF per segment	\$ 1,553.00	\$ 24,848.00
Design/Drawings	1	EA	\$ 35,000.00	\$ 35,000.00
Inclusion Fee 3)	1	EA	\$ 400,000.00	\$ 400,000.00
Tap fee	24	EA	\$ 8,000.00	\$ 160,000.00
TOTAL COST ESTIMATE				\$ 2,385,968.00

Notes:

- 1 – Unit cost for pipeline, manholes and their installation are from 2022 El Paso County Financial Assurance charts
- 2 – Design/Drawings include all system design, construction drawings, permits and financial assurances
- 3 – Inclusion fee can vary widely

Other considerations:

- It is unlikely MSD will service the site.
- The return flows from the planned septic systems meet the State's augmentation requirements for pumping from the Denver aquifer.

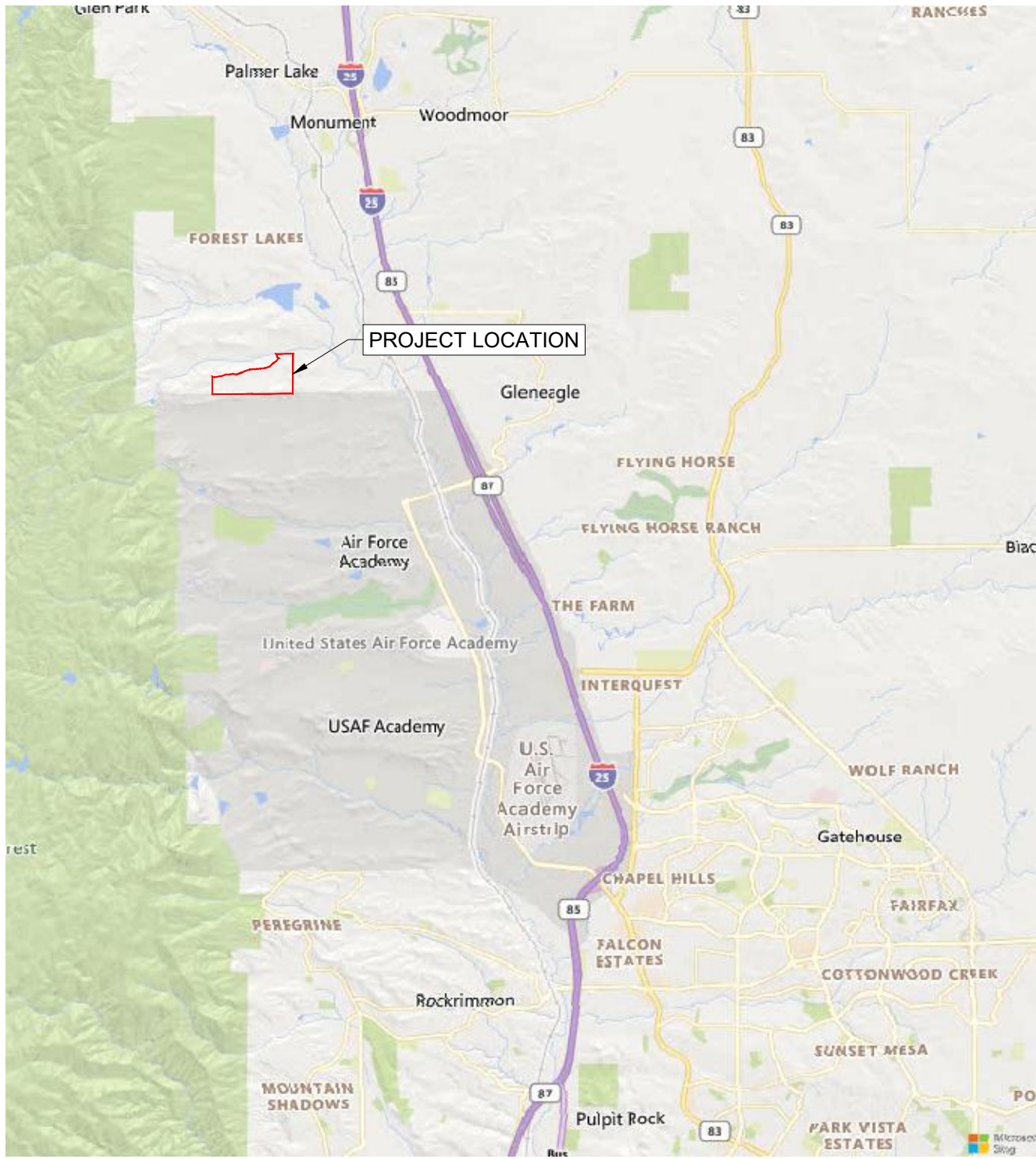
Based on our evaluation, inclusion into a special district would be cost prohibitive for the development.

IV. LIMITATIONS

Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Matrix makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

VICINITY MAP



FILE NAME: S:\22 886.076 Hay Creek-Forest Manor-CL Leary Properties\500 CADD\505 Exhibits\01\CONTENTS Map.dwg 23 12:13:56 PM

PREPARED BY:



HAY CREEK VALLEY DEVELOPMENT VICINITY MAP

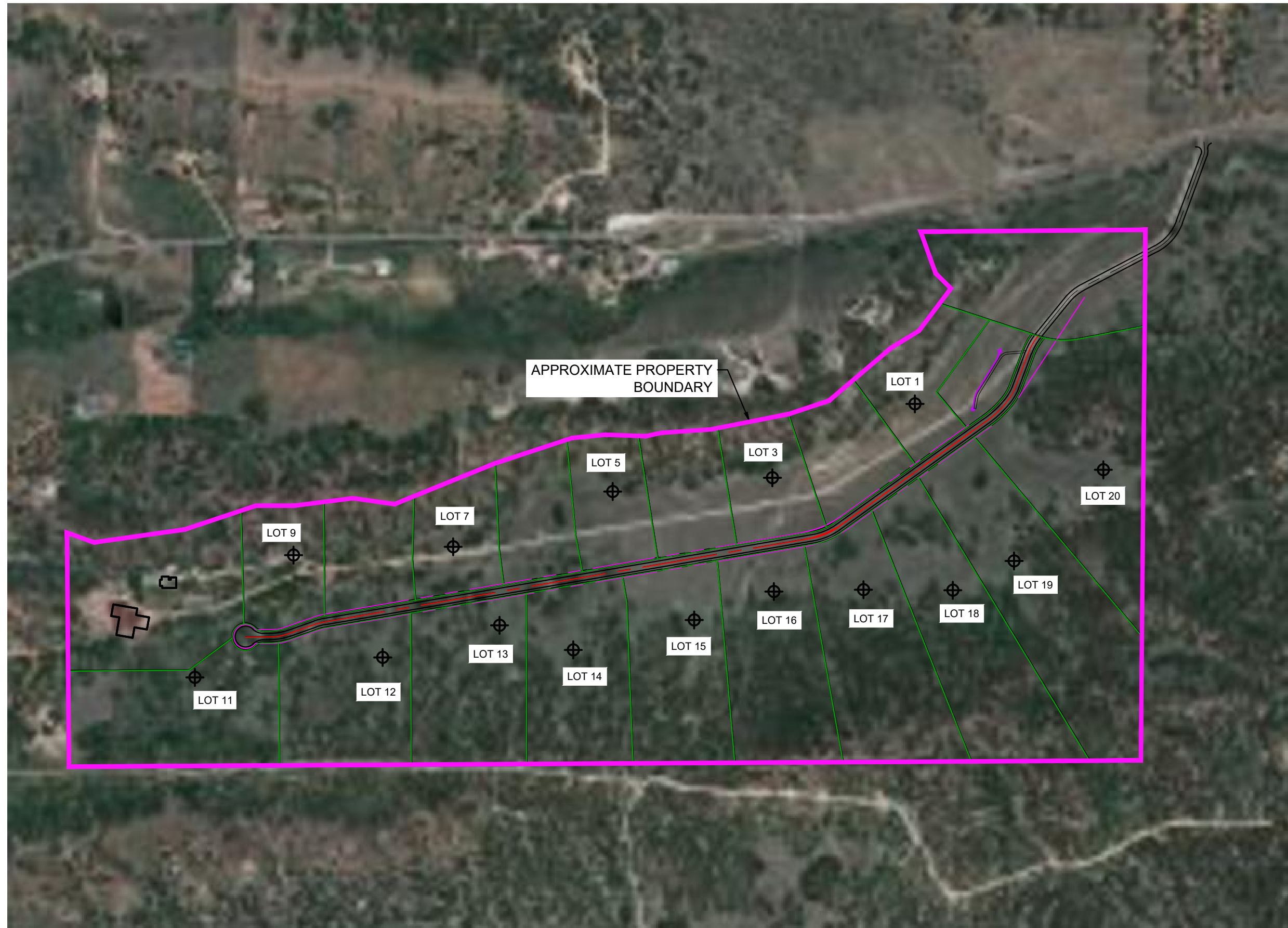
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BORINGS LOCATION MAP



APPROXIMATE PROPERTY BOUNDARY

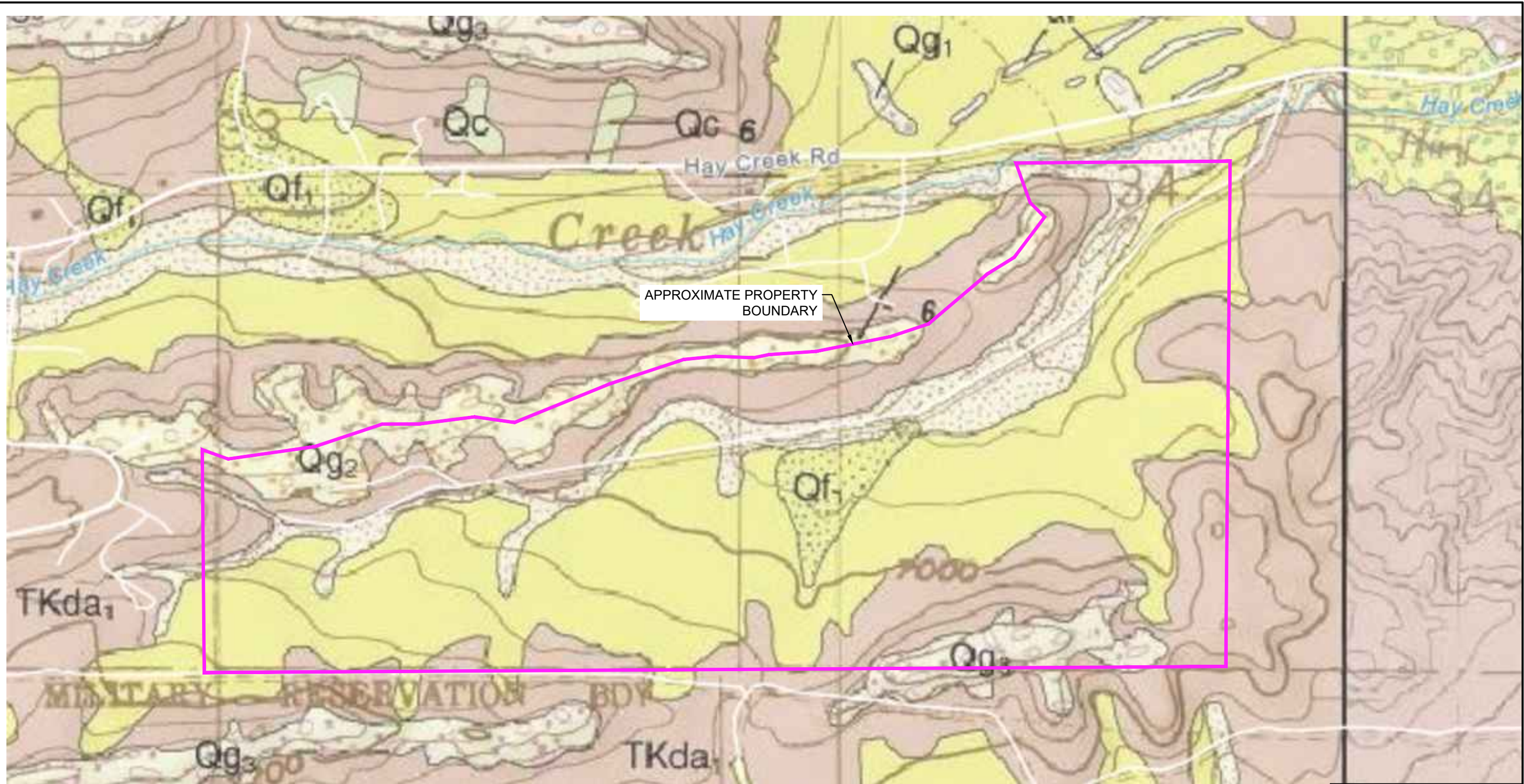
LEGEND
BORING LOCATIONS



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Hay Creek Valley_Location of Exploratory Borings

EXPLORATION LOCATION PLAN
MARCH 2023

REGIONAL GEOLOGY MAP



LEGEND

	Qf ₁	Alluvial fan deposit one (late Holocene)
	Qg ₁	Gravel deposit one (middle Pleistocene)
	Qg ₂	Gravel deposit two (early middle Pleistocene)
	Qg ₃	Gravel deposit three (early Pleistocene)
	Qc	Colluvium deposits, undivided (Holocene to late Pleistocene)
	TKda	Dawson Formation, undivided (Upper Cretaceous to middle? Eocene)—Shown only on cross sections
	TKda ₁	Dawson Formation, facies unit one (Upper Cretaceous to Paleocene)



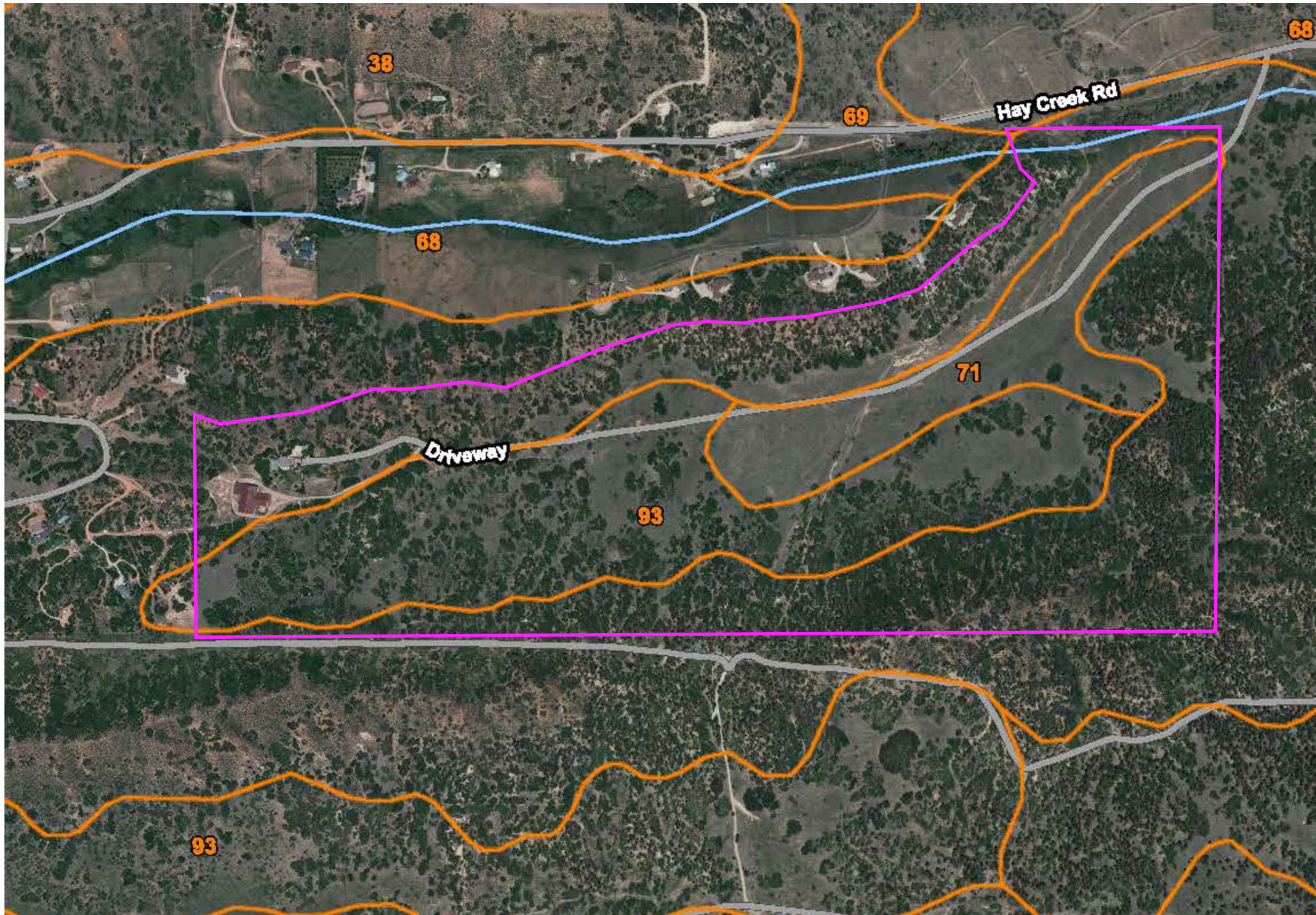
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 Hay Creek Valley_SITE- REGIONAL GEOLOGY MAP_recover

REGIONAL GEOLOGY MAP

MARCH 2023

NRCS SOIL SURVEY MAP



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Hay Creek Valley_NRCS SOIL SURVEY MAP

NRCS SOIL SURVEY MAP

MARCH 2023

Not to scale. Base image from <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.

NRCS CUSTOM SOIL RESOURCE REPORT
(Soil Descriptions)

El Paso County Area, Colorado

38—Jarre-Tecolote complex, 8 to 65 percent slopes

Map Unit Setting

National map unit symbol: 368c
Elevation: 6,700 to 7,500 feet
Frost-free period: 90 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Jarre and similar soils: 40 percent
Tecolote and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jarre

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 5 inches: gravelly sandy loam
Bt - 5 to 22 inches: gravelly sandy clay loam
2C - 22 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 8 to 30 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: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Description of Tecolote

Setting

Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Custom Soil Resource Report

Typical profile

A - 0 to 3 inches: very stony loam
E - 3 to 12 inches: very gravelly loamy sand
Bt - 12 to 45 inches: extremely gravelly sandy clay loam
C - 45 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 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: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R048AY255CO - Pine Grasslands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

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

Custom Soil Resource Report

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

93—Tomah-Crowfoot complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 36bb

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: Hills, alluvial fans

Custom Soil Resource Report

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
Bt - 22 to 48 inches: stratified coarse sand to sandy clay loam
C - 48 to 60 inches: coarse sand

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 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 supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Hills, alluvial fans
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: 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 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 supply, 0 to 60 inches: Low (about 4.7 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: R049XY216CO - Sandy Divide

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:

Hydric soil rating: No

Pleasant

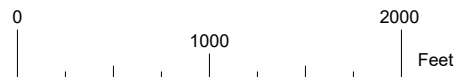
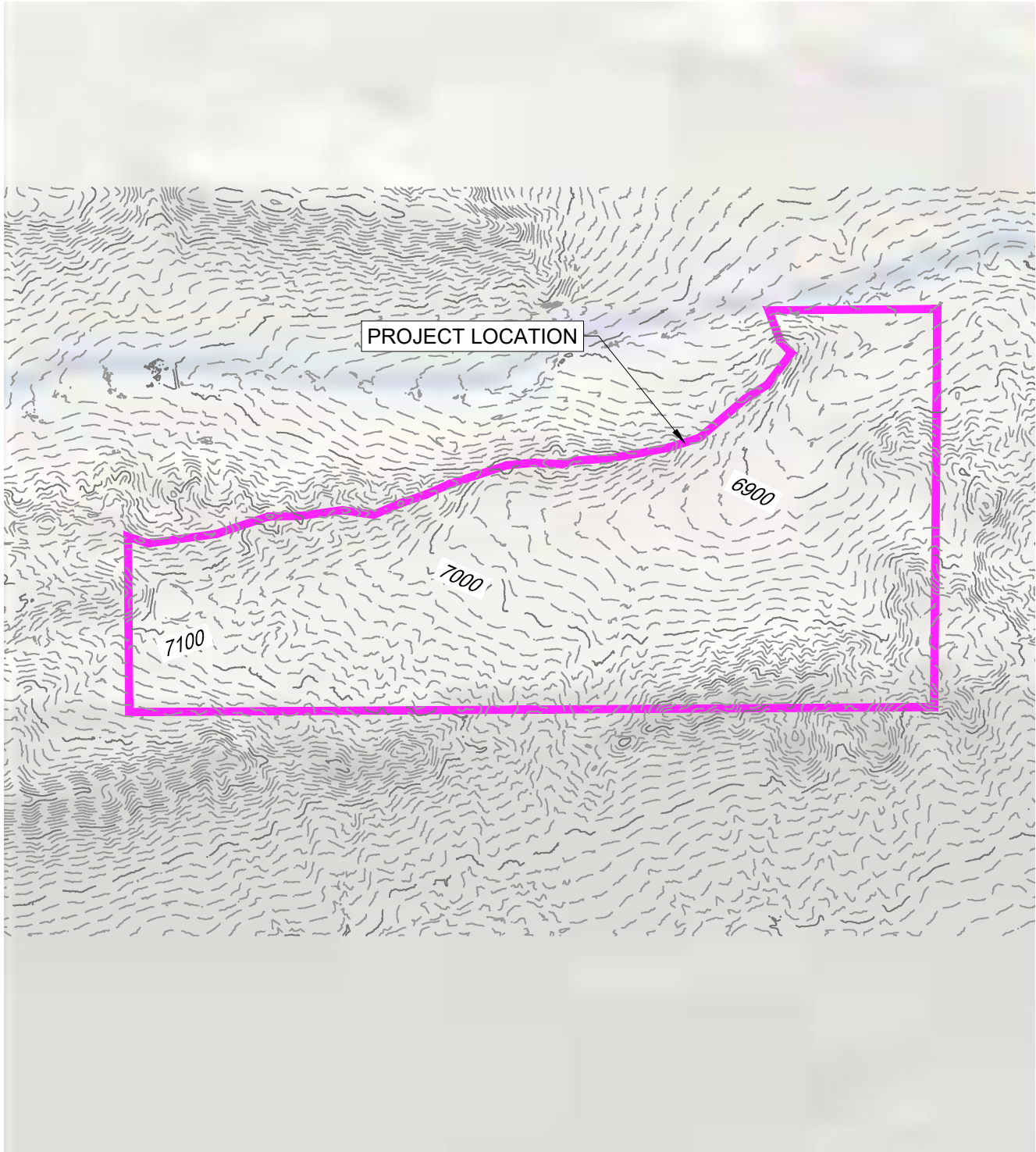
Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

TOPOGRAPHIC MAP

FILE NAME: S:\22 886.076 Hay Creek-Forest Manor-CL Leary Properties\500 CADD\505 Exhibits\TOPOGRAPHIC MAP\20230304.1 PM



PREPARED BY:



TOPOGRAPHIC MAP

DESIGNED BY:
DRAWN BY:
CHECKED BY:

HA
RM

SCALE

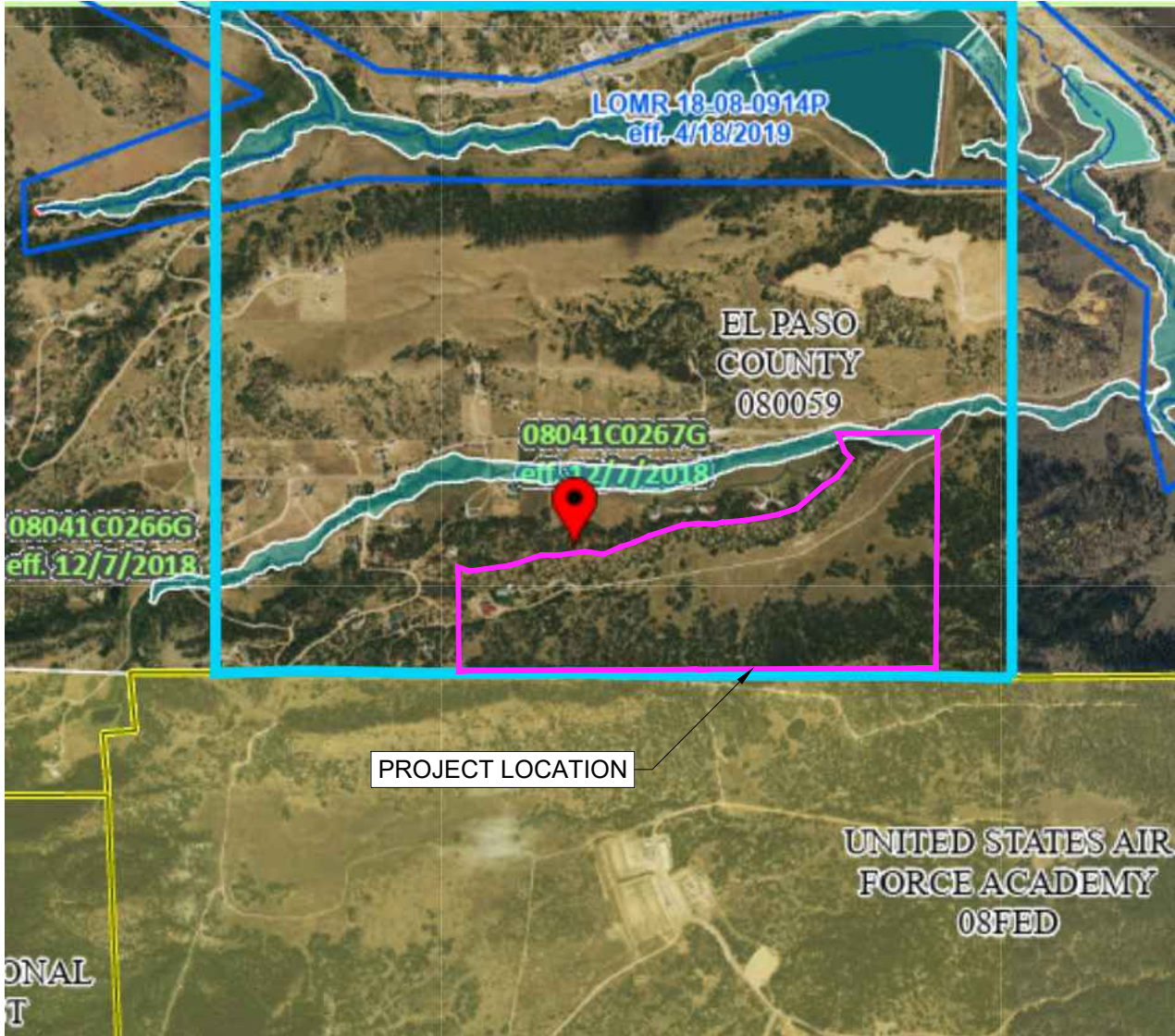
HORIZ. 1:10000
VERT. N/A

DATE:
SHEET

MARCH 2023
01 OF 01

DRAWING No.
01

FLOOD HAZARD MAP



FILE NAME: S:\22.886.076 Hay Creek-Forest Manor-OLeary Properties\500 CADD\505 Exhibits\DTL D\01EEL-A\A\FRD 2023\FRD 2023 2023.03.09 13 PM

PREPARED BY:



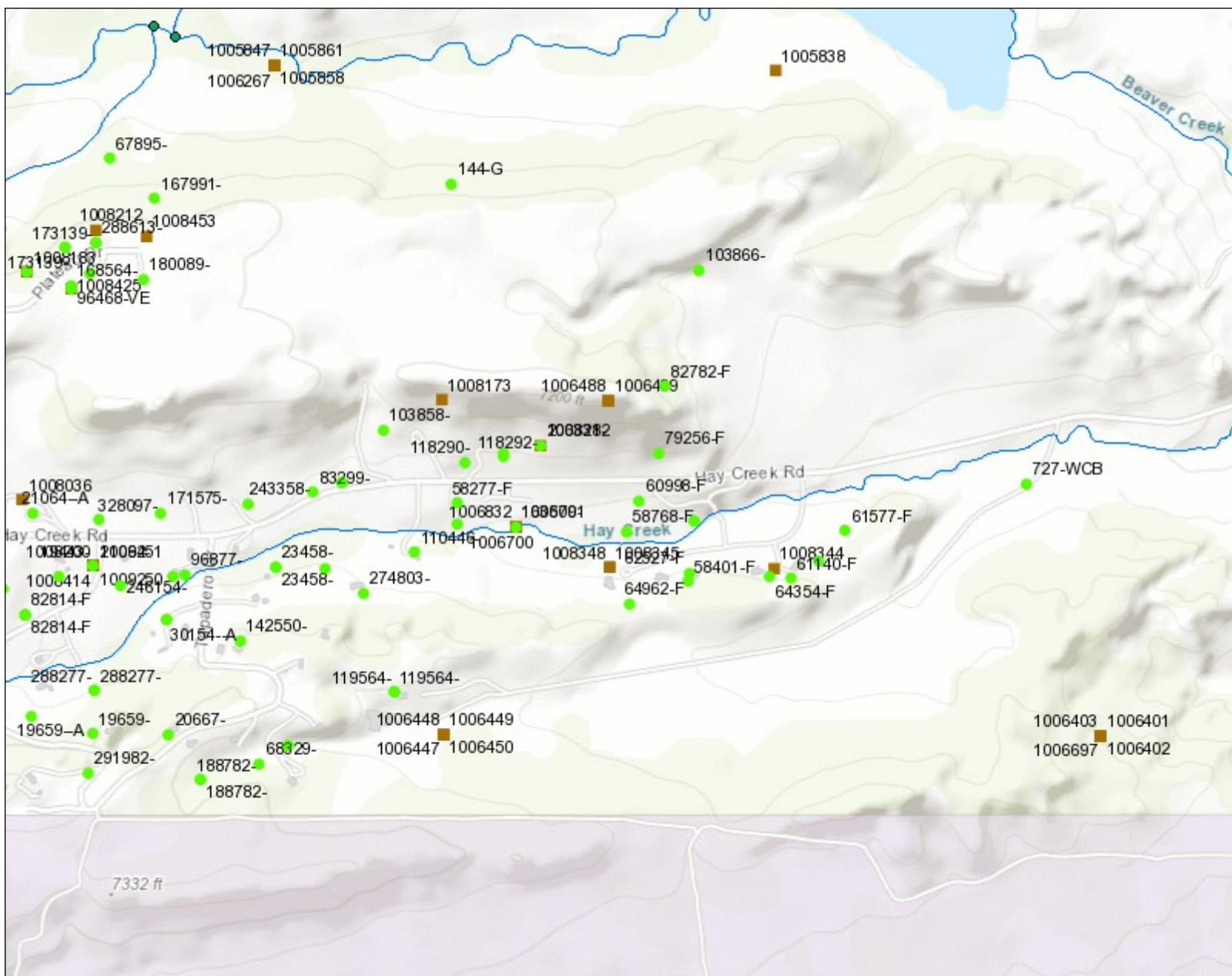
FLOOD HAZARD MAP

DESIGNED BY:	SCALE	DATE:	MARCH 2023	DRAWING No. 01
DRAWN BY: HA	HORIZ. 1:10000	SHEET	01 OF 01	
CHECKED BY: RM	VERT. N/A			

MAP OF WELLS



Map of Wells



Legend

- Well Constructed
- Ground Water
- Confluence Point
- Source Water Route Framework
- County

Location

Notes

2,339 0 1,169 2,339 Feet



1: 14,032

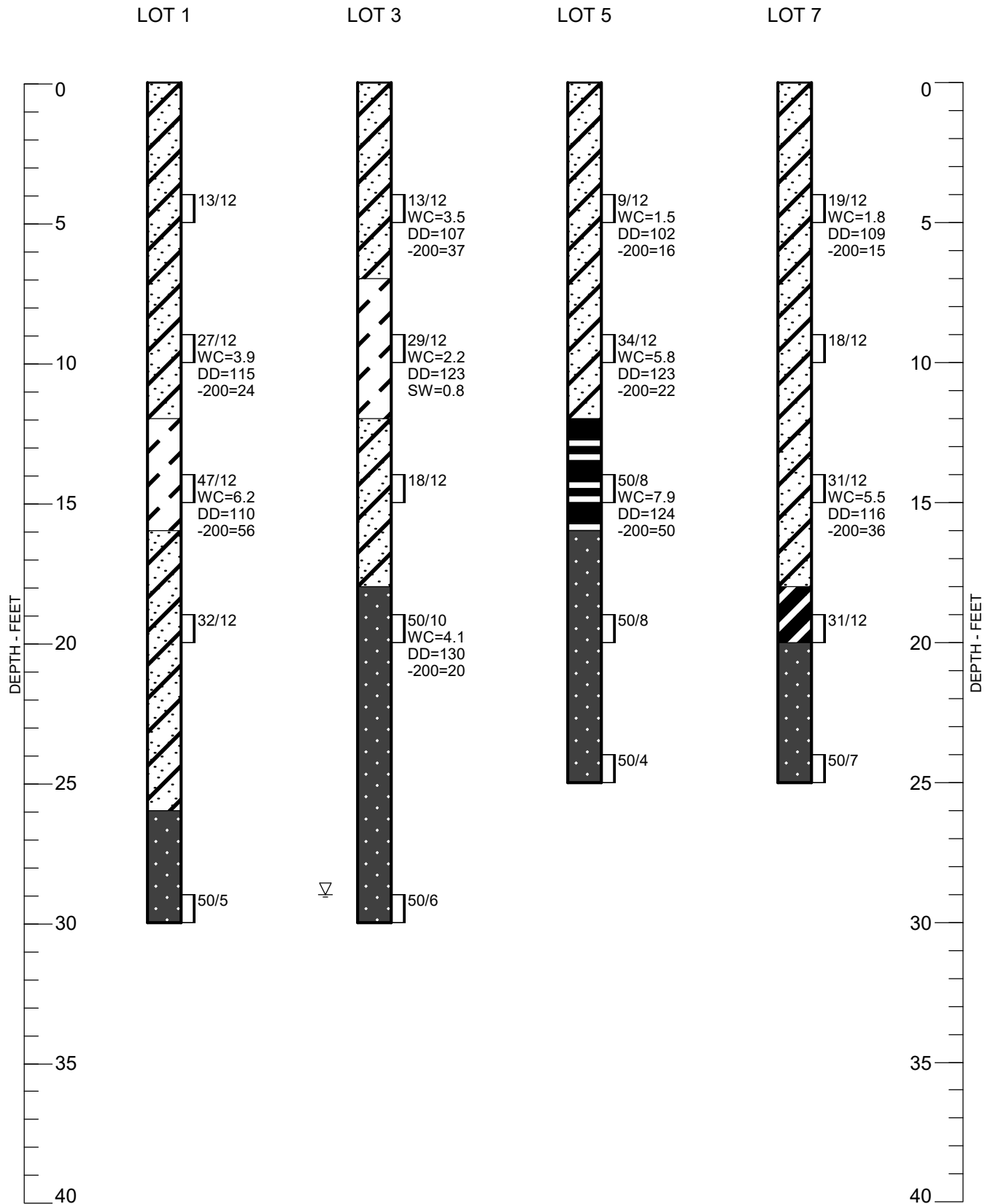


This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Date Prepared: 4/27/2023 12:35:36 PM

APPENDIX A

Logs of Explorations



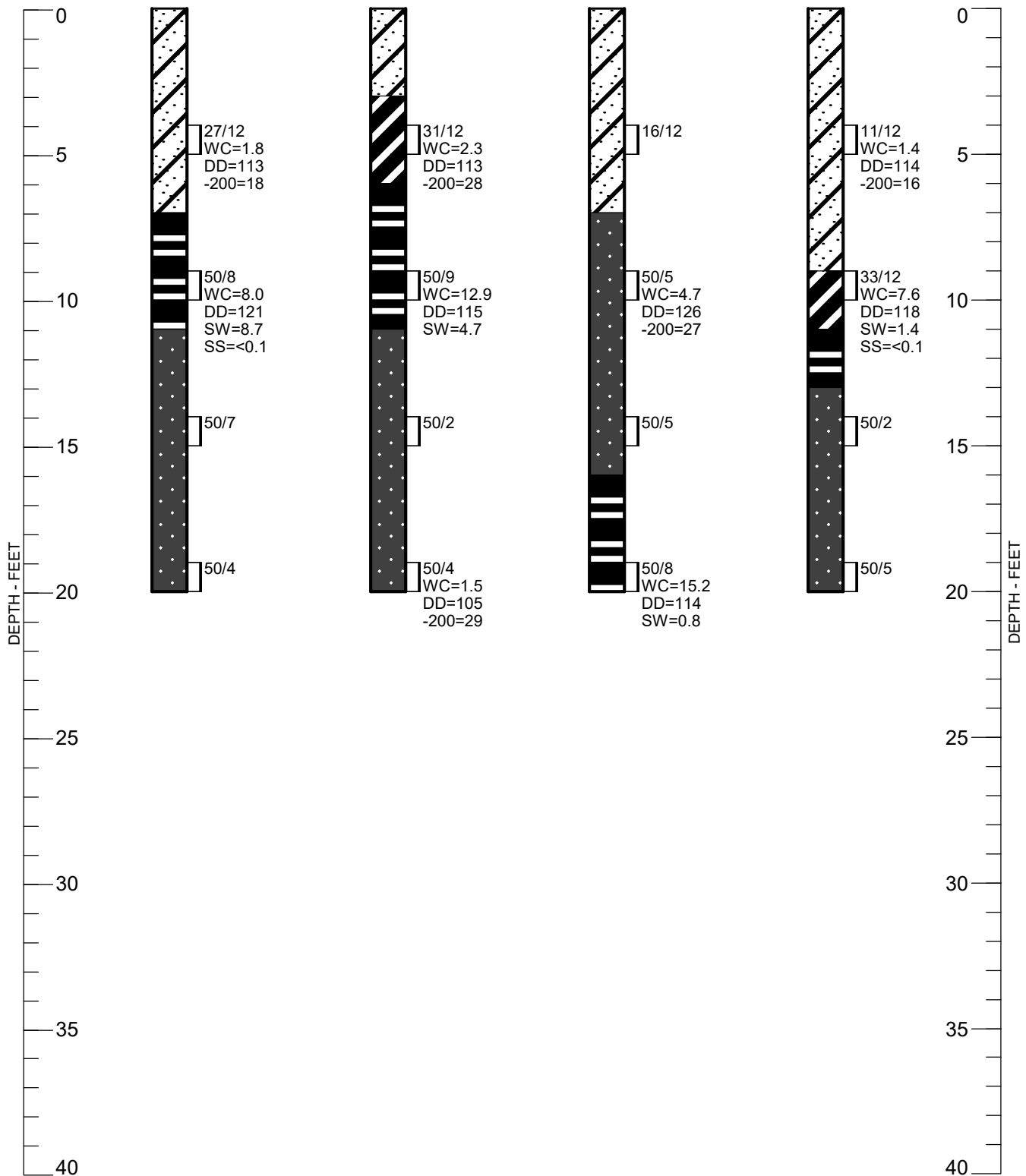


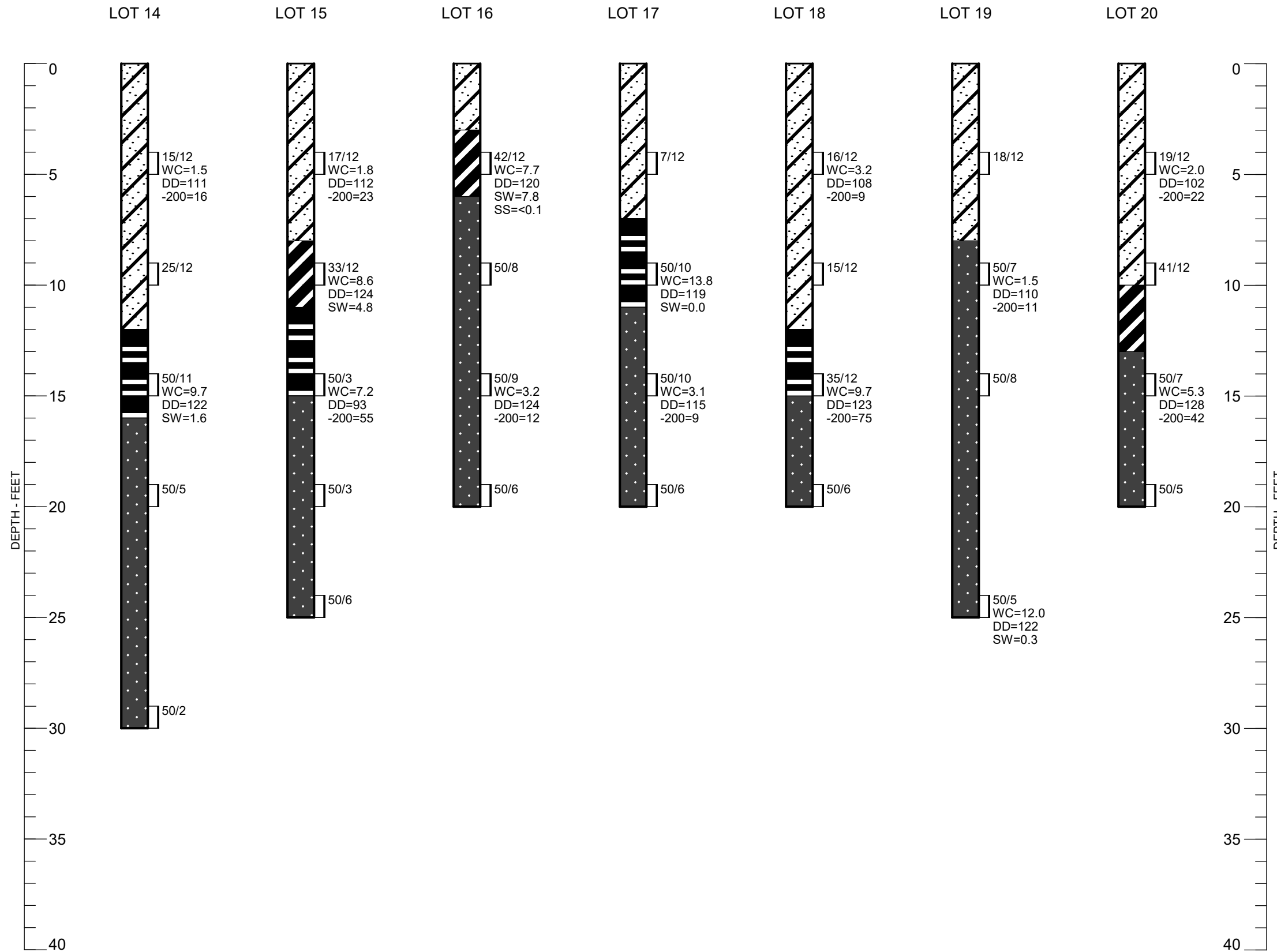
LOT 9

LOT 11

LOT 12

LOT 13





LEGEND:

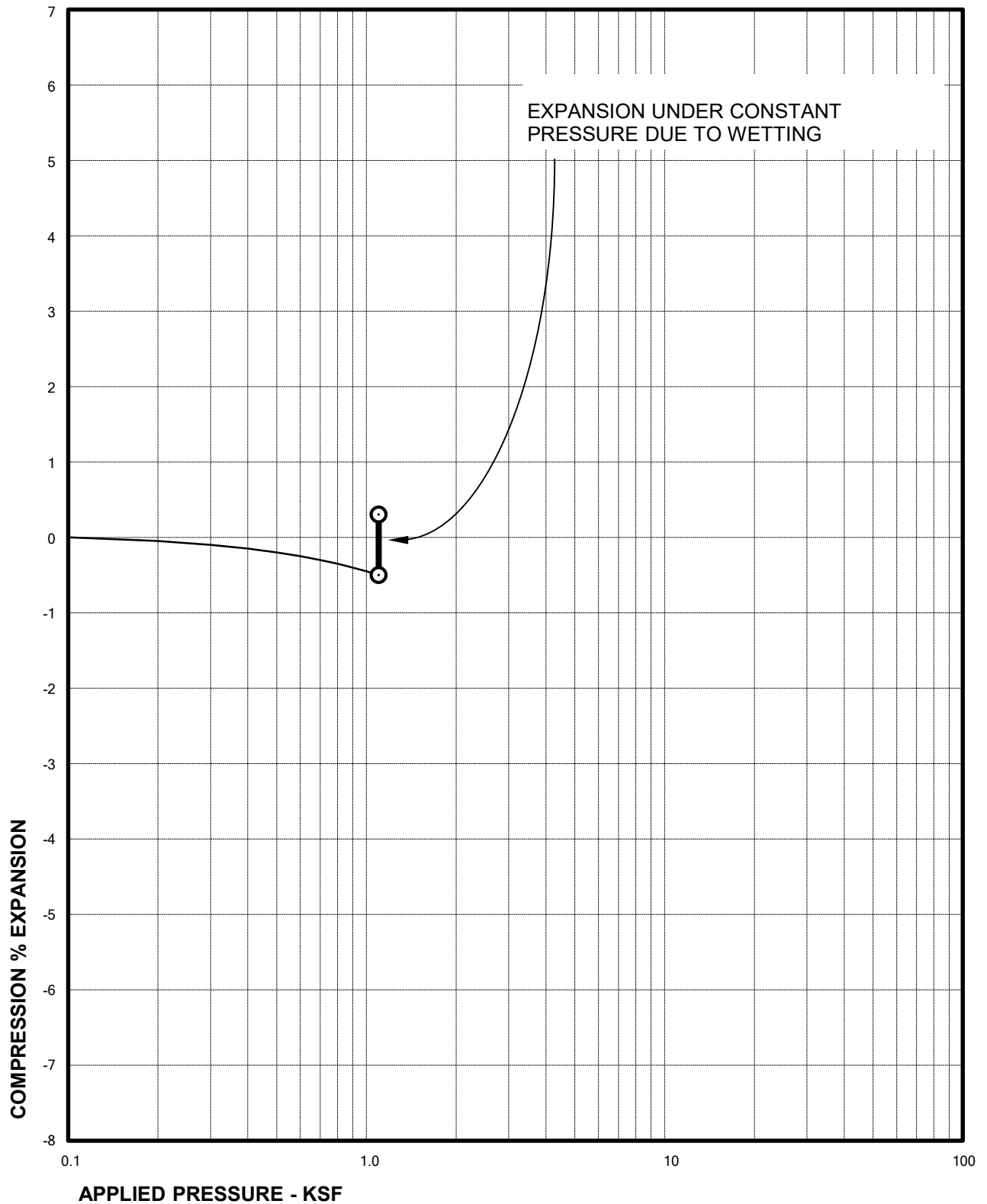
- SAND, SLIGHTLY SILTY TO VERY SILTY, LOOSE TO VERY DENSE, SLIGHTLY MOIST TO MOIST, LIGHT BROWN TO BROWN, OCCASIONAL LENSES OF SANDY CLAY (SP-SM, SM).
- CLAY, SANDY TO VERY SANDY, VERY STIFF, SLIGHTLY MOIST TO MOIST, BROWN (CL).
- WEATHERED BEDROCK, CLAYSTONE AND SANDSTONE, SANDY (CLAYSTONE) OR SILTY TO CLAYEY (SANDSTONE), MEDIUM HARD, MOIST, LIGHT BROWN TO RED BROWN.
- BEDROCK. CLAYSTONE, SANDY TO VERY SANDY, MEDIUM HARD TO VERY HARD, MOIST, LIGHT BROWN TO BROWN, RED BROWN, GRAY BROWN.
- BEDROCK. SANDSTONE, SLIGHTLY SILTY TO SILTY, CLAYEY TO VERY CLAYEY, HARD TO VERY HARD, SLIGHTLY MOIST TO MOIST, LIGHT BROWN TO BROWN, RED BROWN, GRAY TO GRAY BROWN.
- DRIVE SAMPLE. THE SYMBOL 13/12 INDICATES 13 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.
- GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED OCTOBER 3, 7, AND 14, 2022 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A DIEDRICH D-90, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
 DD - INDICATES DRY DENSITY. (PCF)
 SW - INDICATES SWELL WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE. (%)
 -200 - INDICATES PASSING NO. 200 SIEVE. (%)
 SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

APPENDIX B

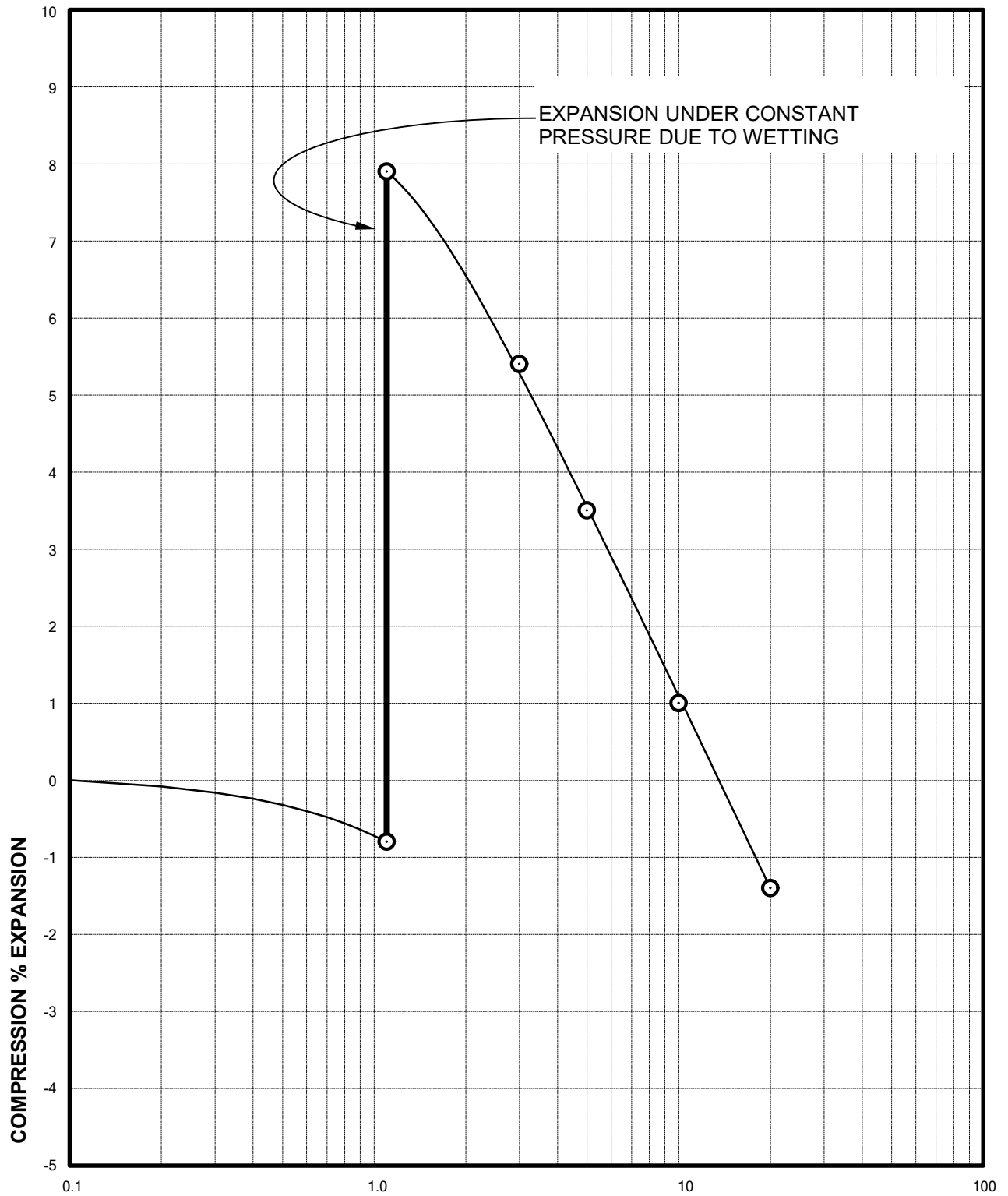
Laboratory Test Results



Sample of CLAY, SANDY (CL)
From LOT 3 AT 9 FEET

DRY UNIT WEIGHT= 123 PCF
MOISTURE CONTENT= 2.2 %

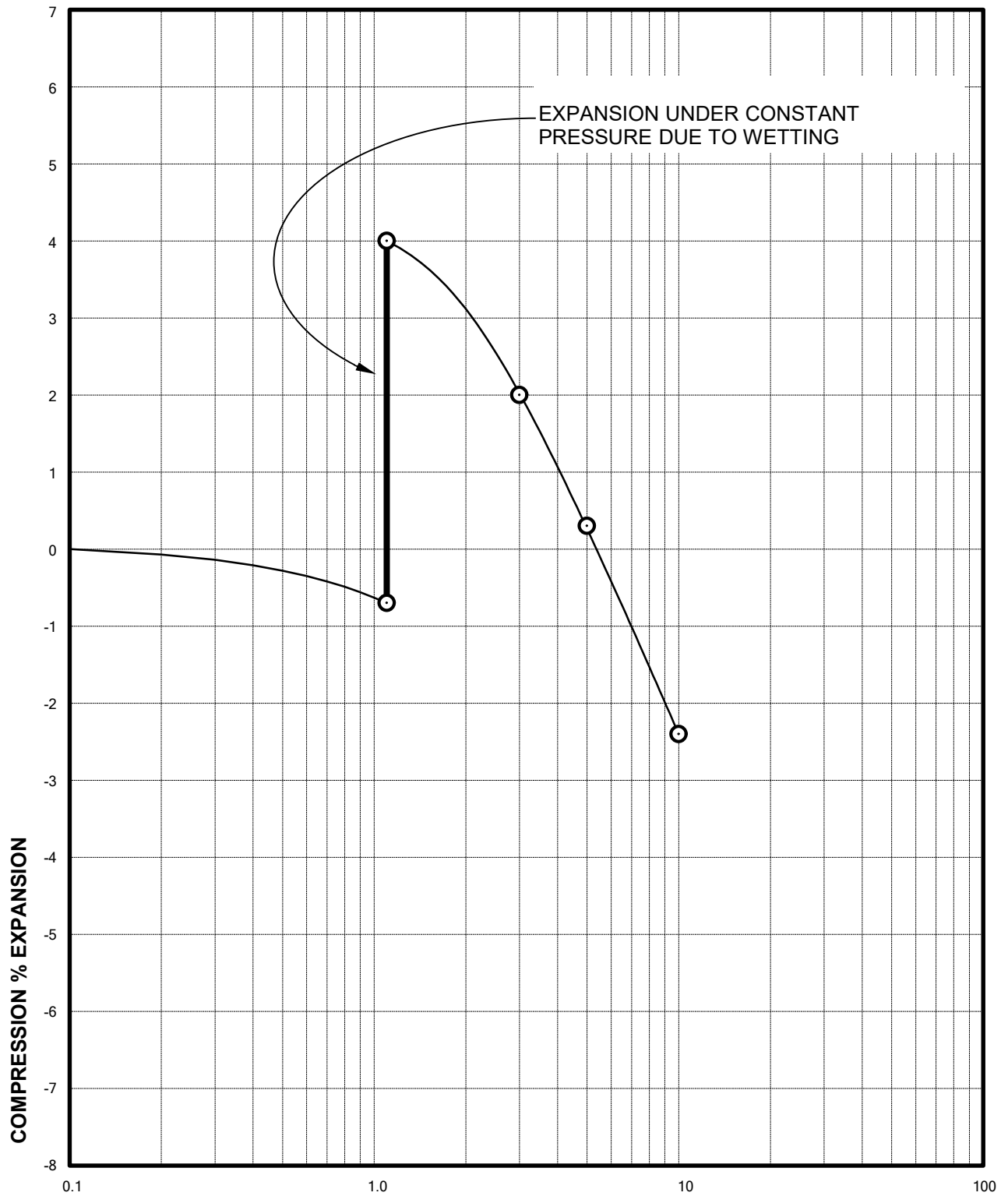
Swell Consolidation Test Results



APPLIED PRESSURE - KSF
Sample of CLAYSTONE, SANDY
From LOT 9 AT 9 FEET

DRY UNIT WEIGHT= 121 PCF
MOISTURE CONTENT= 8.0 %

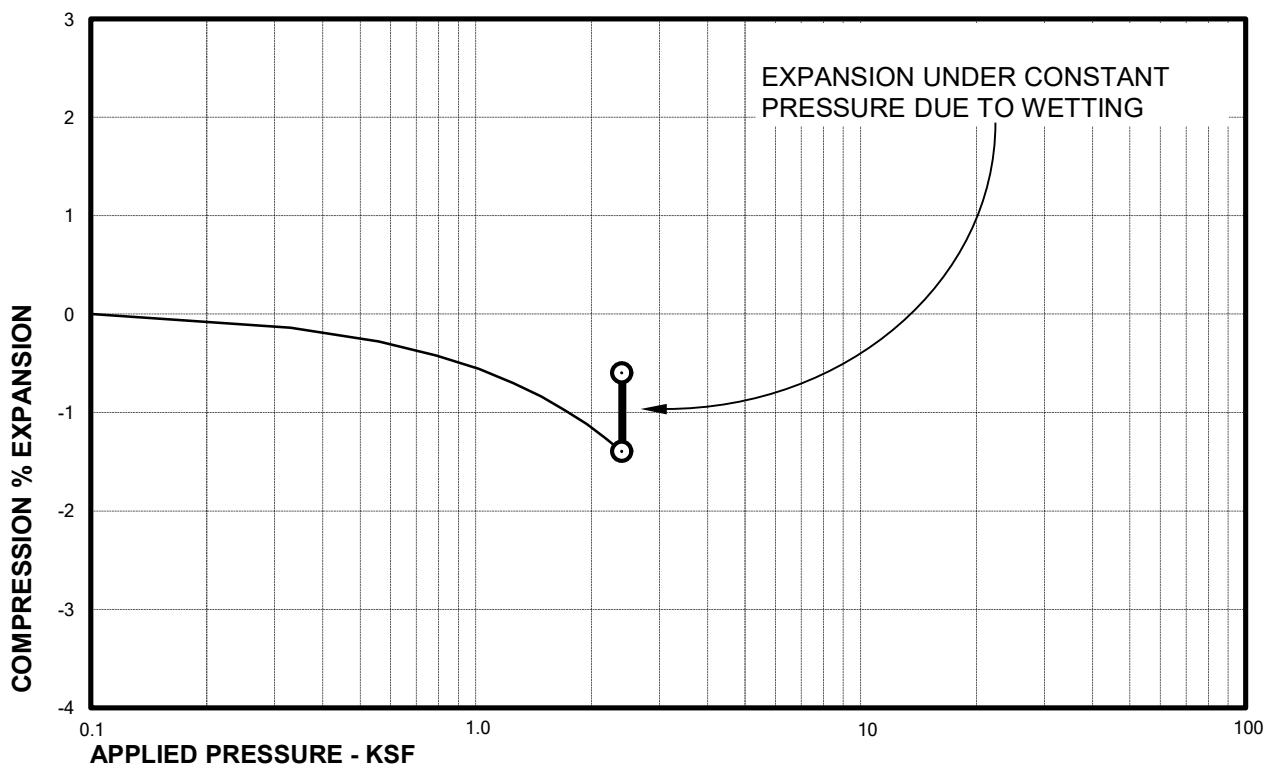
Swell Consolidation Test Results



APPLIED PRESSURE - KSF
Sample of CLAYSTONE, SANDY
From LOT 11 AT 9 FEET

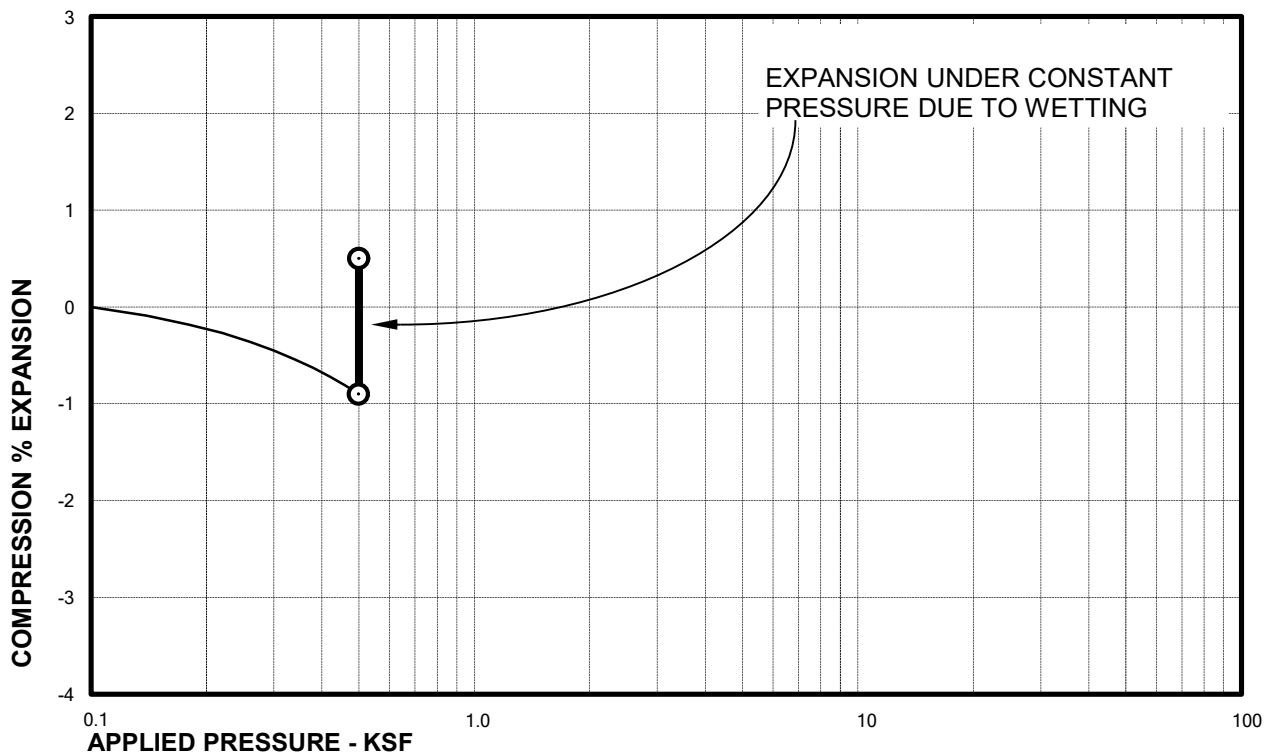
DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 12.9 %

Swell Consolidation Test Results



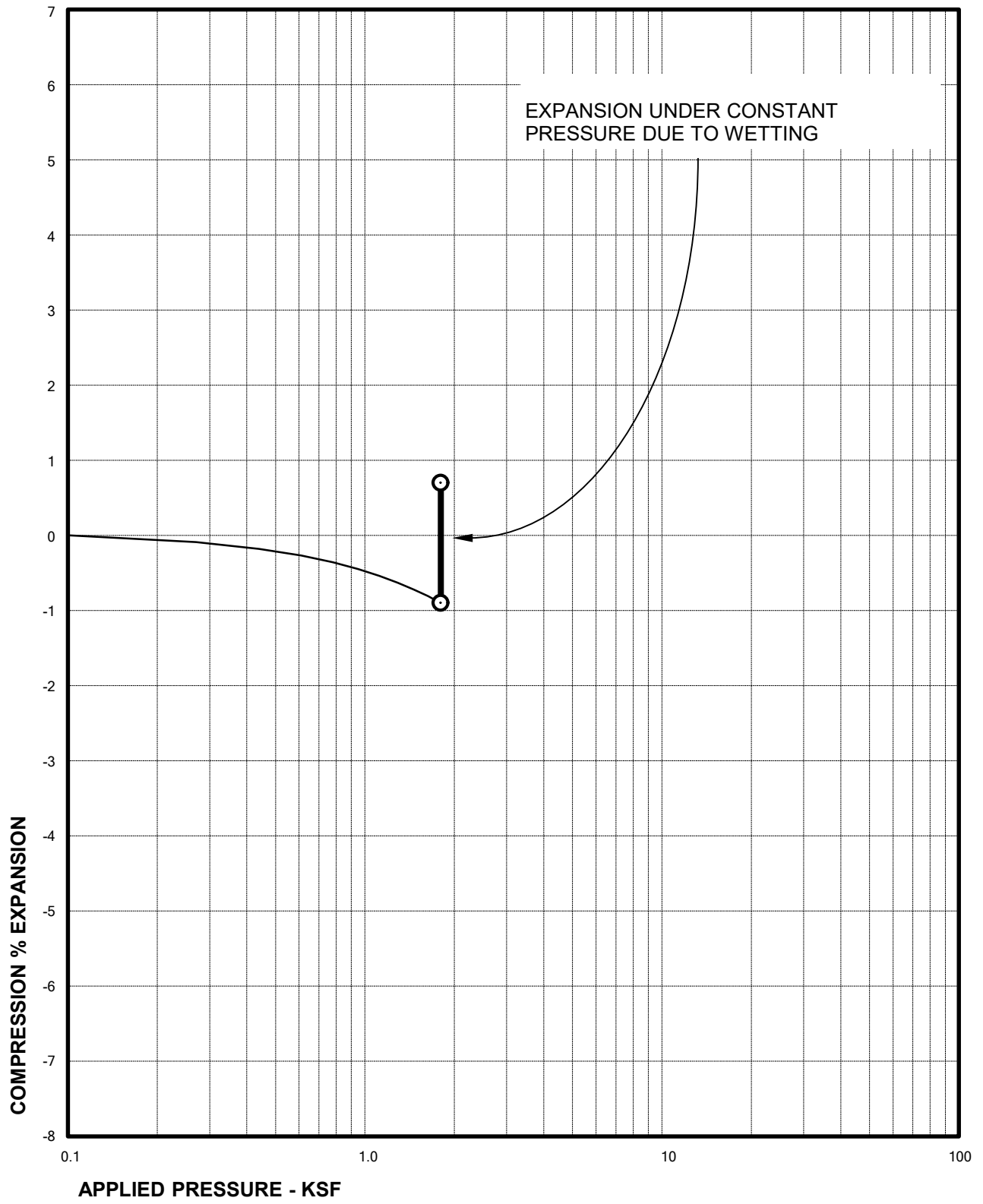
Sample of CLAYSTONE, SANDY
From LOT 12 AT 19 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 15.2 %



Sample of WEATHERED CLAYSTONE
From LOT 13 AT 9 FEET

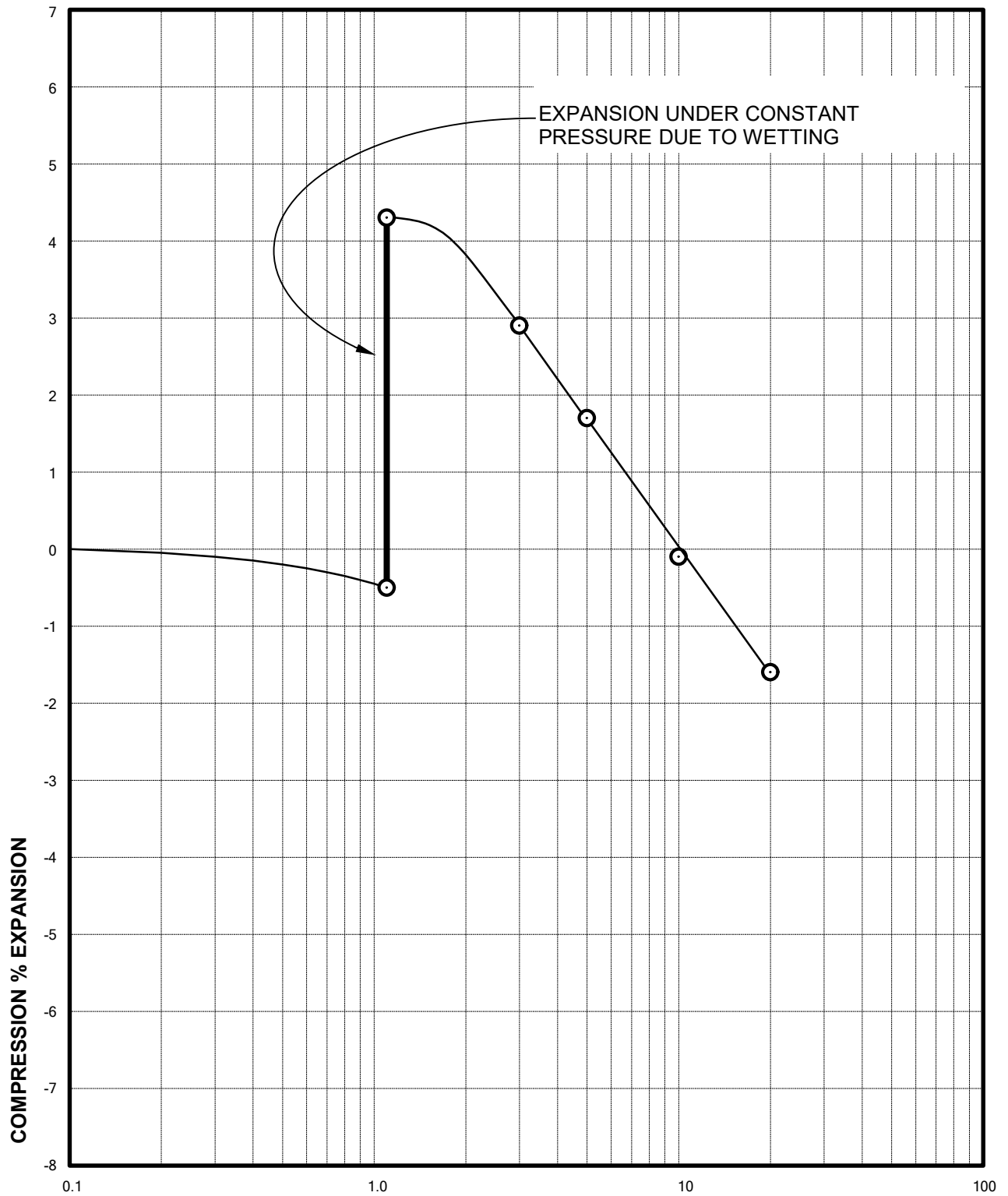
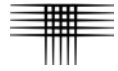
DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 7.6 %



Sample of CLAYSTONE, SANDY
From LOT 14 AT 14 FEET

DRY UNIT WEIGHT= 122 PCF
MOISTURE CONTENT= 9.7 %

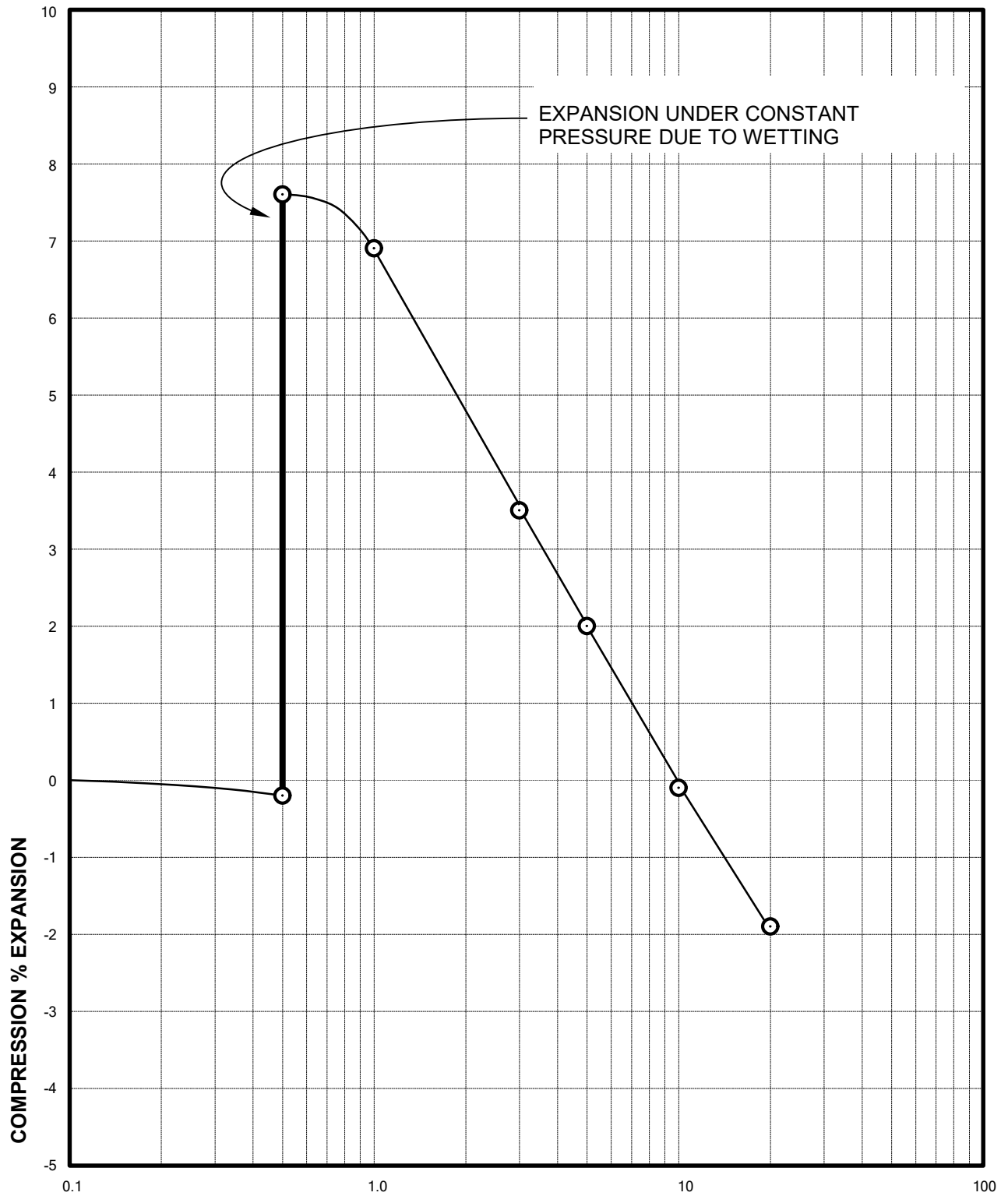
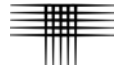
Swell Consolidation Test Results



APPLIED PRESSURE - KSF
Sample of WEATHERED CLAYSTONE
From LOT 15 AT 9 FEET

DRY UNIT WEIGHT= 124 PCF
MOISTURE CONTENT= 8.6 %

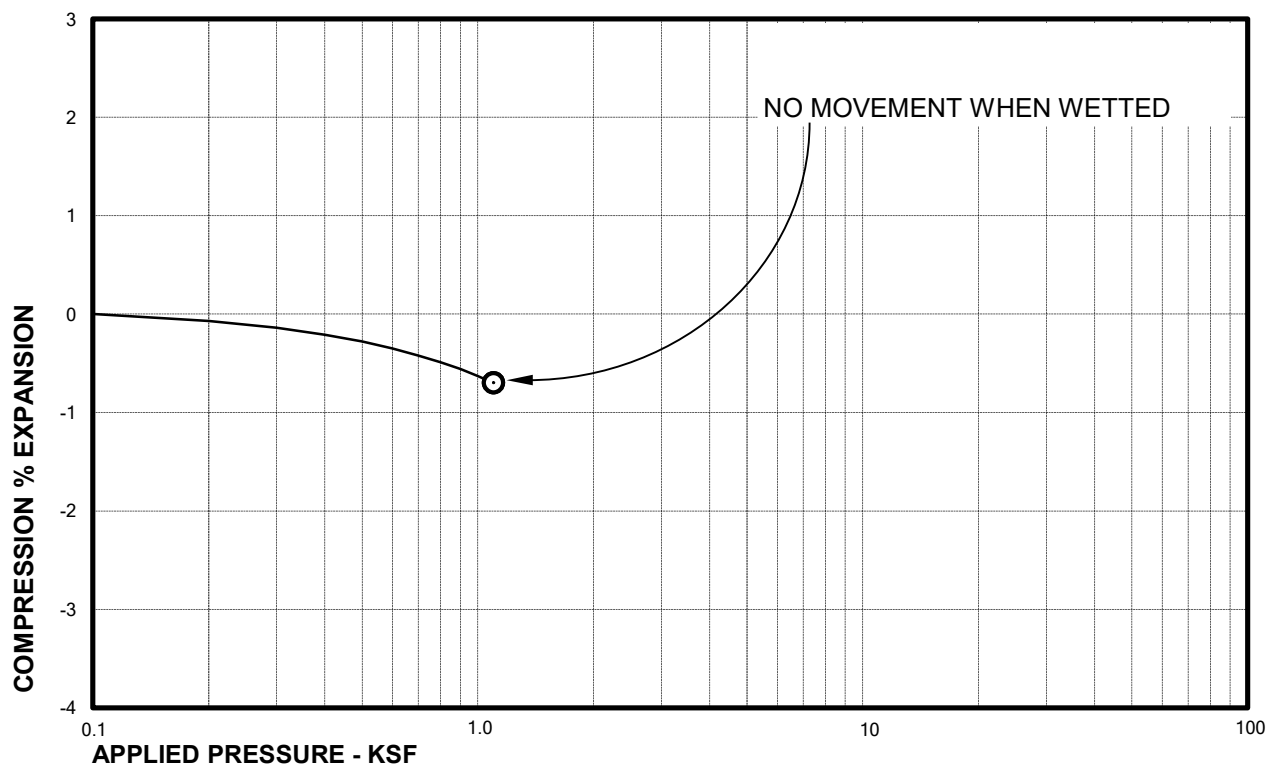
Swell Consolidation Test Results



APPLIED PRESSURE - KSF
Sample of WEATHERED CLAYSTONE
From LOT 16 AT 4 FEET

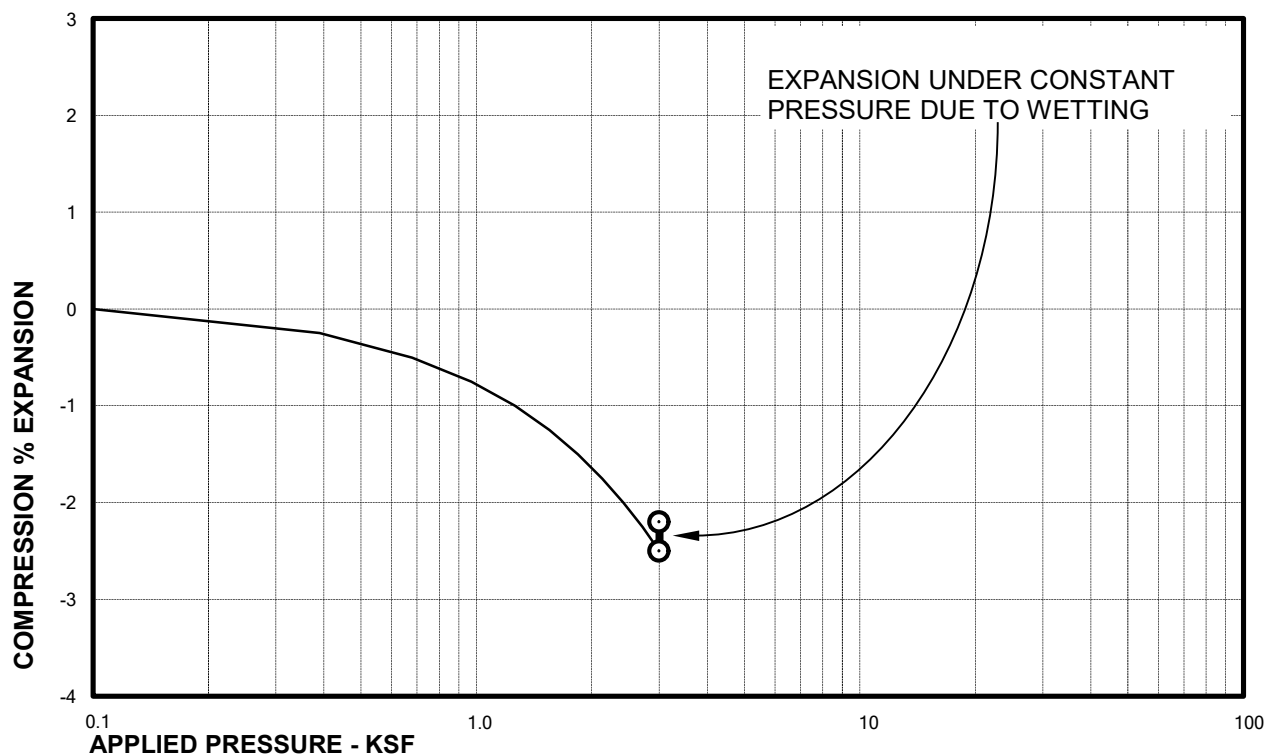
DRY UNIT WEIGHT= 120 PCF
MOISTURE CONTENT= 7.7 %

Swell Consolidation Test Results



Sample of CLAYSTONE, SANDY
From LOT 17 AT 9 FEET

DRY UNIT WEIGHT= 119 PCF
MOISTURE CONTENT= 13.8 %



Sample of SANDSTONE, CLAYEY
From LOT 19 AT 24 FEET

DRY UNIT WEIGHT= 122 PCF
MOISTURE CONTENT= 12.0 %

TABLE B-I



**SUMMARY OF LABORATORY TESTING
CTLJT PROJECT NO. CS19573.000-115**

LOT	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*			PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
				LIQUID LIMIT	PLASTICITY INDEX	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)			
1	4	2.3	113						28		SAND, SILTY (SM)
1	9	3.9	115						24		SAND, SILTY (SM)
1	14	6.2	110						56		CLAY, VERY SANDY (CL)
3	4	3.5	107						37		SAND, VERY SILTY (SM)
3	9	2.2	123			0.8	1100				CLAY, SANDY (CL)
3	19	4.1	130						20		SAND, SILTY (SM)
5	4	1.5	102						16		SAND, SILTY (SM)
5	9	5.8	123						22		SAND, SILTY (SM)
5	14	7.9	124						50		CLAYSTONE, VERY SANDY
7	4	1.8	109						15		SAND, SILTY (SM)
7	14	5.5	116						36		SAND, VERY SILTY (SM)
9	4	1.8	113						18		SAND, SILTY (SM)
9	9	8.0	121			8.7	1100	17,000		<0.1	CLAYSTONE, SANDY
11	9	12.9	115			4.7	1100	6,500			CLAYSTONE, SANDY
11	19	1.5	105						29		SANDSTONE, SILTY
12	9	4.7	126						27		SANDSTONE, SILTY
12	19	15.2	114			0.8	2400				CLAYSTONE, SANDY
13	4	1.4	114						16		SAND, SILTY (SM)
13	9	7.6	118			1.4	1100			<0.1	WEATHERED CLAYSTONE
14	4	1.5	111						16		SAND, SILTY (SM)
14	14	9.7	122			1.6	1800				CLAYSTONE, SANDY
15	4	1.8	112						23		SAND, SILTY (SM)
15	9	8.6	124			4.8	1100	12,000			WEATHERED CLAYSTONE
15	14	7.2	93						55		CLAYSTONE, VERY SANDY
16	4	7.7	120			7.8	500	11,000		<0.1	WEATHERED CLAYSTONE
16	14	3.2	124						12		SANDSTONE, SLIGHTLY SILTY
17	9	13.8	119			0.0	1100				CLAYSTONE, SANDY
17	14	3.1	115						9		SANDSTONE, SLIGHTLY SILTY
18	4	3.2	108						9		SAND, SLIGHTLY SILTY (SP-SM)
18	14	9.7	123						75		CLAYSTONE, SANDY
19	9	1.5	110						11		SANDSTONE, SLIGHTLY SILTY
19	24	12.0	122			0.3	3000				SANDSTONE, CLAYEY

* SWELL MEASURED UNDER ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.



TABLE B-1

SUMMARY OF LABORATORY TESTING CTLJT PROJECT NO. CS19573.000-115

LOT	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*			PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
				LIQUID LIMIT	PLASTICITY INDEX	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)			
20	4	2.0	102						22		SAND, SILTY (SM)
20	14	5.3	128						42		SANDSTONE, VERY CLAYEY

* SWELL MEASURED UNDER ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.