7/19/2024

Soils & Geology Report

Pikes Peak BOCES Educational Park

Northeast of Judge Orr Rd & Elbert Rd

Peyton, Colorado

VIVID Project No.: D24-2-759

VIVID Engineering Group

July 19, 2024

Report prepared for:

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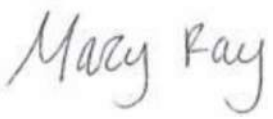
Prepared by:



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1.0 GENERAL SITE AND PROJECT

1.1 GENERAL

Vivid Engineering Group, Inc. (VIVID) has completed a soils & geology evaluation and report in general accordance with the Geology and Soils Report Standards as outlined in Chapter 8, Section 8.4.9 of the Land Development Code, dated August 27, 2019, and in general accordance with the El Paso County Soils & Geology Report Checklist.

1.2 PROJECT LOCATION

The proposed Pikes Peak BOCES Educational Park is planned to be located generally in the southwest corner of Section 35, Township 12 South, Range 64 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located at the northeast corner of the intersection of Judge Orr Road and Elbert Road as shown approximately on Figure 1 of this report.

1.3 EXISTING AND PROPOSED LAND USE

Based on information obtained from the El Paso County Assessor's website, the site is 86.38 acres with land use zoned for animal grazing. The El Paso County Schedule No. of the property is 4200000362. The proposed land use is to be an educational park with a portion of the site consisting of faculty housing.

1.4 PROJECT DESCRIPTION

Based on the information provided, we understand the Pikes Peak BOCES vocational education campus is to be constructed within the vacant property located northeast of the intersection of Judge Orr Road and Elbert Road in Peyton, Colorado as shown approximately in Figure 1 of this report. The educational campus is to include various educational buildings on the west side of the property including buildings for construction trades, medical, culinary arts, firefighting, law enforcement, information technology, veterinary services and horticultural sciences. A residential community is planned on the east side of the property to provide faculty housing. A water treatment facility is planned on the northwest side of the property, and a lift station and pond are planned on the southeast side. Paved parking lots and drive lanes are also planned throughout the campus and residential community. On-site wastewater treatment is not planned for this site.

Final grading plans were still being prepared when this report was completed; however, based on the preliminary site grading plan provided, cuts and fills of up to 13 feet are planned across the site.

1.5 QUALIFICATIONS OF PREPARERS

This report has been prepared under the direction of and reviewed by Brysen T. Mustain, who is a Professional Geologist as defined by Colorado Revised Statutes section 34-1-201(3).

2.0 STUDY OVERVIEW

2.1 PURPOSE AND SCOPE

The purpose of this evaluation was to research the general and site-specific geologic conditions of the subject site as well as observe the conditions at the site. The information gathered was used to analyze, evaluate, and identify potential geologic hazards at the site and assess the possible effect the potential hazards may have on the proposed development of the site. This investigation has been performed in general accordance with the Geology and Soils Report Standards as outlined in Chapter 8, Section 8.4.9 of the Land Development Code, dated August 27, 2019, and in general accordance with the El Paso County Soils & Geology Report Checklist.

2.2 SITE EVALUATION TECHNIQUES

Surface and subsurface conditions at the project site were evaluated using the following techniques:

- Review of available geologic, soil and topographic maps
- Review of available aerial photographs
- Field reconnaissance
- Subsurface exploration and lab testing
- Review of available flood hazards mapping

2.3 ADDITIONAL DOCUMENTS

In addition to performing borings to evaluate geologic conditions of the site, the following reports and maps were reviewed to aid in the evaluation of the subsurface conditions:

- *Geologic Map of the Falcon Quadrangle, El Paso County, Colorado (Morgan, M.L., and White, J.L.), 2012, Colorado Geological Survey Open-File Report OF-12-05, scale 1:24,000.*
- *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0559G, Federal Emergency Management Agency (FEMA), December 7, 2018.*
- *Google Earth Pro, Aerial Imagery dates 9/29/1999 to 10/31/2022, accessed 6/27/24.*
- Soil Survey of El Paso County Area, Colorado Soil Conservation Service, USDA, 1979.

2.4 ON-SITE WASTEWATER TREATMENT

It is our understanding that there will be no on-site wastewater treatment facility and that proposed sanitary sewer infrastructure will be connected to existing off-site sewer infrastructure. Therefore, lab testing and design for septic systems were not included in our scope.

3.0 SITE CONDITIONS

3.1 EXISTING SITE CONDITIONS

The site is located northeast of the intersection of Judge Orr Road and Elbert Road in El Paso County, Colorado. The site is currently vacant land with cattle grazing during parts of the year. Sparse residential properties are located north and east of the site. An unnamed ephemeral drainage is present to the northeast of the site, outside of the subject property boundary. The ground surface is predominately covered in arid grass with occasional cacti. Two seasonal pond features were present on the east portion of the site and were dry during the time of our investigation. Overhead electric borders the site to the east and then extends west onto a portion of the property. No exposures of bedrock or areas of groundwater seepage were observed at the time of our investigation.

3.2 TOPOGRAPHY

Based on the topographic map included in the phasing plan provided to us by William Guman & Associates, elevations of the site range from approximately 6743 feet in the northwest corner of the site to approximately 6699 feet at the southeast corner of the site. The site consists of rolling hills and slopes down gently to the southeast.

3.3 VEGETATION

The site vegetation generally consisted of arid grass and weeds with occasional cacti.

3.4 AERIAL PHOTGRAPHS

Based on our review of historic aerial photographs available on Google Earth Pro dating back to 1985, the site has been vacant. The overhead electric poles appear to have been installed around 2015 based on the historic aerial photos from Google Earth Pro.

4.0 FIELD INVESTIGATION AND LABORATORY TESTING

4.1 FIELD EXPLORATION

A field exploration performed from June 11 through June 14, 2024, included drilling 16 widely-spaced borings across the site at the approximate locations indicated on the Field Exploration Plans on Figures 2 and 3. A summary of the field exploration is presented below.

Table 1
Summary of Subsurface Exploration

Boring Designation	Approximate Total Depth of Exploration[1] [feet, bgs]	Approximate Depth to Groundwater at Time of Drilling[1] [feet, bgs]	Approximate Depth to Groundwater 7-10 Days After Drilling[1] [feet, bgs]	Approximate Depth to Bedrock[1] [feet, bgs]
B-1	29.3	None Encountered	14.5	6
B-2	29.5	None Encountered	5.5	4
B-3	29.4	None Encountered	None Encountered	2
B-4	29.4	None Encountered	26.5	5
B-5	29.3	9	8	17
B-6	29.5	16	13.5	17
B-7	29.3	17	10.5	20
B-8	29.3	14	13	22
B-9	29.4	None Encountered	9.5	14.5
B-10	29.4	13	27	17
B-11	29.5	None Encountered	28.5	19.5
B-12	29.3	None Encountered	None Encountered	7
B-13	29.5	14	6.5	6
B-14	29.5	13.5	8	7
B-15	29.3	14	None Encountered	19
B-16	29	13	10.5	14

1. Depths referenced to feet below existing ground surface (bgs).

The borings were advanced using a truck-mounted CME-45 and CME-55 drill rig equipped with continuous-flight auger. A 140-pound hammer falling 30 inches was used to record blow counts, or the relative density of the soil encountered. Samples were taken with a standard split-spoon (SPT) sampler,

2.0-inch I.D. California-type sampler, and by bulk methods. Penetration tests were obtained at the various sample depths as well.

Appendix A to this report includes logs 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.

4.2 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 and Unit Weight
- Sieve Analysis of Fine and Coarse Aggregates
- Liquid Limit, Plastic Limit, and Plasticity Index
- Swell/Consolidation Test

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

Analytical testing for soil corrosivity was performed on selected samples and included the following tests:

- pH
- Resistivity
- Redox Potential
- Water-soluble Sulfates
- Water-soluble Chlorides
- Sulfide Presence

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

4.3 SUBSURFACE

VIVID explored the subsurface conditions by drilling, logging and sampling 16 exploratory borings across the site. The borings were drilled to a maximum depth of approximately 29.5 feet below the existing ground surface. The general profile encountered in our borings consisted of the following:

Sand and Clay

Predominantly silty to clayey sand and poorly to well graded sand with varying amounts of silt was encountered at the ground surface in every boring and extended to depths of between 2 and 22 feet below the existing ground surface. The sand soils were generally light to medium brown, light yellowish-brown, grayish-brown, and gray with iron-oxide staining, slightly moist to wet, and field penetration testing (blow counts) indicated the soils are loose to dense.

A layer of lean clay with sand was encountered below the sand in boring B-10 and extended to a depth of approximately 17 feet below the existing ground surface. The clay soil was gray with iron-oxide staining, moist and field penetration testing (blow counts) indicated the clay soils are very stiff in consistency.

Bedrock

Weathered to comparatively unweathered claystone and sandstone bedrock of the Black Squirrel Formation was encountered in every boring at the approximate depths presented in Table 1 of this report and extended to the maximum depths explored. The bedrock materials were light gray to dark gray, yellowish-brown, light to medium brown, reddish-brown, greenish-brown and grayish-brown in color, slightly moist to very moist, and field penetration resistance testing (blow counts) indicated the relative density of the bedrock materials ranged from moderately hard to very hard. Swell/consolidation testing performed on 12 samples of the claystone bedrock exhibited low to very high swell potential, with measured swells of between 0.2 and 9.0 percent (average 2.6 percent) when wetted under 1,000 psf load.

The boring logs in Appendix A should be reviewed for more detailed descriptions of the subsurface conditions at each of the boring locations explored.

5.0 SOILS, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 GEOLOGIC RECONNAISSANCE

A visual reconnaissance of the site was performed and was supported by the field drilling explorations, as well as review of available geologic mapping and information from the following sources:

- *Geologic Map of the Falcon Quadrangle, El Paso County, Colorado (Morgan, M.L., and White, J.L.), 2012, Colorado Geological Survey Open-File Report OF-12-05, scale 1:24,000.*
- Soil Survey of El Paso County Area, Colorado Soil Conservation Service, USDA, 1979

A portion of the geologic map that includes this site is presented as Figure 5 of this report. An NRCS Soil Survey Map and associated Soil Descriptions are presented as Figure 6.

5.2 SITE STRATIGRAPHY

A portion of the Geologic Map of the Falcon Quadrangle showing the approximate site boundaries is presented on Figure 5. Four mappable units were identified on the site:

Qes Holocene to upper Pleistocene eolian sand:	The eolian sand deposits encountered on the site are generally associated with the upper Pleistocene and Holocene Ages. The material is typically yellowish-brown to light brown to tan in color. This unit typically consists of fine to coarse-grained sand and silt windblown deposits.
Qp Holocene playa deposits:	The playa deposits encountered on the site are generally associated with the Holocene Age. Playa deposits form from flat-surfaced seasonal ponds within the eolian sand. The material typically consists of gray to dark brown clay, silt, sand and scattered gravel.
Qa_1 Upper Holocene Alluvium:	The alluvium is predominately present within or near the northeast border of the site, near the unnamed ephemeral drainage. Based on the mapping, the alluvium deposits are generally tan to pale-brown in color and consist of sand, gravel, silt and minor clay.
Tbs Black Squirrel Formation:	The Black Squirrel Formation (Tbs) is Paleocene in age. The Black Squirrel Formation is not mapped at the surface on the project site but is present below the surficial soils units described above and is anticipated to be relatively flat-lying/horizontal (i.e. not steeply bedded). The formation is mapped as being exposed on the ground surface just east of the subject property. The unit (Tbs) typically comprises cross-bedded, gray-green to tan to brownish-gray arkosic sandstone interbedded with sandy claystone. Clay content is quite variable and the expansion potential ranges from low to very high when wetted depending on the amount of clay content in the lenses.

5.3 USDA NRCS SOIL SURVEY

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey map of the project site can be found on Figure 6 of this report. The mapped units within the site area are described below.

- 8 – Blakeland loamy sand, 1 to 9 percent slopes. This unit comprises the majority of the site.
- 29 – Fluvaquentic Haplaquolls, nearly level. This unit is mapped within the southwest corner of the site.

5.4 ENGINEERING GEOLOGY AND MITIGATION OF GEOLOGIC HAZARDS

No geologic hazards were found that would preclude the proposed development as planned. The following presents a list of potential geologic hazards, their applicability to this site, and the typical mitigation techniques.

Expansive Soil and Bedrock

Weathered to competent claystone bedrock of the Black Squirrel Formation was encountered within several of our borings across the site at depths of between 2 and 22 feet below the existing ground surface. Based on our laboratory testing, the claystone bedrock exhibited measured swells of between 0.2 and 9.0 percent (average 2.6 percent) when wetted under a 1,000 psf load.

If claystone bedrock is encountered at elevations at or near bottom of structure elevations, mitigation for this potential hazard on the subject site may include over-excavation of a thick zone of the expansive materials and replacement with moisture treated soils or granular structural fill, or the use of deep foundations (i.e. drilled piers). Due to the variability in elevation of the claystone bedrock, depth and lateral extent of over-excavation will need to be determined during the time of the final Geotechnical Investigation for each phase. This mitigation method should be addressed in more detail in the site-specific Geotechnical Evaluation Report for each phase.

Settlement-Prone Soils

The overburden sand and clay soils may undergo some settlement if heavily loaded and/or wetted. Mitigation for this potential hazard may include over-excavation of the settlement-prone materials and replacement with moisture treated soils or granular structural fill. This mitigation method should be addressed in more detail in the site-specific Geotechnical Evaluation Report for each phase.

Erodible Soils

Soils with a sandy matrix, such as those encountered underlying the site, are susceptible to wind and water erosion when exposed. These concerns are normally addressed in an erosion control plan during construction and a long-term seeding/landscape plan that is typical for this type of development. Since we understand the majority of the site will have either a building constructed on it or will be paved and/or landscaped, the potential for erosion will be mitigated by these improvements.

Corrosive Soils

The site may be underlain by soil or bedrock materials that may contain corrosive minerals. Corrosive minerals can have detrimental effects on concrete and buried metals if not identified prior to design and properly mitigated.

Laboratory testing was completed to provide data regarding potential corrosivity of onsite soils. Our scope of services does not include corrosion engineering and, therefore, a detailed analysis of the corrosion test results is not included. A qualified corrosion engineer should be retained to review the test results and design protective systems that may be required.

Laboratory chloride concentration, sulfate concentration, pH, and electrical resistivity tests were performed on samples of onsite materials obtained during our field investigation. The results of the tests are included in Appendix C to this report and are summarized below in Table 2.

Table 2
Summary of Laboratory Soil Corrosivity Testing

Boring No.	Sample Depth (ft)	Material	Water Soluble Chloride (%)	pH	Redox Potential (mV)	Resistivity (ohm-cm)	Water Soluble Sulfate (%)	Sulfide Presence
B-3	9 & 19	CLAYSTONE	0.009	7.9	58.2	1100	<0.001	Positive
B-9	0-4	Silty SAND	0.004	7.5	55.8	2300	<0.001	Trace

Metal and concrete elements in contact with soil, whether part of a foundation system or part of a supported structure, are subject to degradation due to corrosion or chemical attack. Therefore, buried metal and concrete elements should be designed to resist corrosion and degradation based on accepted practices.

Based on the "10-point" method developed by the American Water Works Association (AWWA) in standard AWWA C105/A21.5, the corrosivity test results indicate that the onsite claystone and silty sand has corrosive potential just based upon the low electrical resistivity alone.

Mine Subsidence

This project is outside of any areas of known mining and mine subsidence. Geomorphic features associated with mining and mine subsidence were not observed on the site. Mine subsidence is not anticipated to be a significant design factor for this site

Slope Stability

Areas of unstable slopes or potentially unstable slopes were not observed on the site during the time of this investigation. Slope stability is not anticipated to be a significant design factor for this site.

Flooding Potential

As shown on Figure 4, the project site is outside of mapped flood hazard areas. Based on the mapping and our site observations, flooding is not considered to be a hazard for this development.

Seismicity

The major structural feature of this region is the Rampart Range Fault System which is located more than approximately 15 miles west of the site along the Front Range. There is evidence of movement during the past 2 million years along this fault zone. The Rampart Range Fault is considered to be active by the Colorado Geologic Survey. This area, as is the case with most of central Colorado, is subject to a degree of risk due to seismic activity. The site soils on the property generally classify as Site Class C (very dense soil and soft rock) and Site Class D (stiff soil profile) according to the 2015 International Building Code. Seismicity is not anticipated to be a significant design factor for this site and should be addressed in the site-specific Geotechnical Evaluation Report.

Elevated Radioactivity/Radon

Results of an EPA supported radon study in Colorado found that soils similar to those that underlie this site are generally below the EPA guideline level of 4 pCi/l. However, radon levels often vary significantly within the same geologic formation. It should be mentioned that all of El Paso County is considered to be in Zone 1 of the EPA's Map of Radon Zones, which is a county considered to have a predicted average indoor radon screening level greater than 4 pCi/L. This is a more significant issue for inhabited below-grade construction and structures that are more air tight such as residential structures. The higher concentrations of radon gas normally occur in residential structures that have been sealed to prevent exchange of outside air. Buildup of radon gas can usually be mitigated by providing frequent exchange of air within the structure and by sealing joints and cracks that are located adjacent to the subsoil. The presence and concentration of radon gas was not included in this investigation and should be performed during site-specific geotechnical investigations for individual residential lots.

Groundwater and Surface Water Drainage

Groundwater was encountered in fourteen of the exploratory borings at the locations, approximate depths, and times presented above in Table 1, and on the individual boring logs presented in Appendix A. Groundwater may tend to perch on top of the less-permeable clay soils and claystone bedrock layers within the Black Squirrel Formation. If shallow groundwater is encountered during site-specific geotechnical investigations for structures and individual lots, it should be mitigated with cut-off or foundation perimeter drains that are common local design and construction techniques.

Based on the topography of the site, the surface water likely drains to the south and southeast. Ponding may occur within the pond features on the east side of the site during high precipitation events.

5.5 ECONOMIC MINERAL RESOURCES

Based on the El Paso County Aggregate Resource Map, the site is located within the Upland Deposits. These deposits consist of sand, gravel with silt and clay and are remnants of older streams deposited on topographic highs or bench like features.

According to the Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands, the site is mapped within the Denver Basin Coal Region. However, the nearest historic coal mine sites are located 10 miles southwest in eastern Colorado Springs. The site is mapped "poor" for coal resources. This area is not prospective for metallic mineral resources.

5.6 CONCLUSIONS

It is our opinion that the project site exhibits no geologic hazards that pose a significant risk to the proposed project or adjacent properties that cannot be mitigated through proper land usage planning, foundation design, engineering design, and/or construction practice.

The site does have expansive soil and bedrock that will require mitigation for vertical movement (heave) due to swell. These types of mitigations are relatively standard in this area. Recommendations regarding mitigation of the expansive soils and bedrock may include over-excavation of a thick zone of expansive materials from below foundations and slabs, and replacement with moisture treated soils and/or imported granular structural fill, or the use of a deep foundation system. These recommendations should be addressed in the site-specific Geotechnical Evaluation Report.

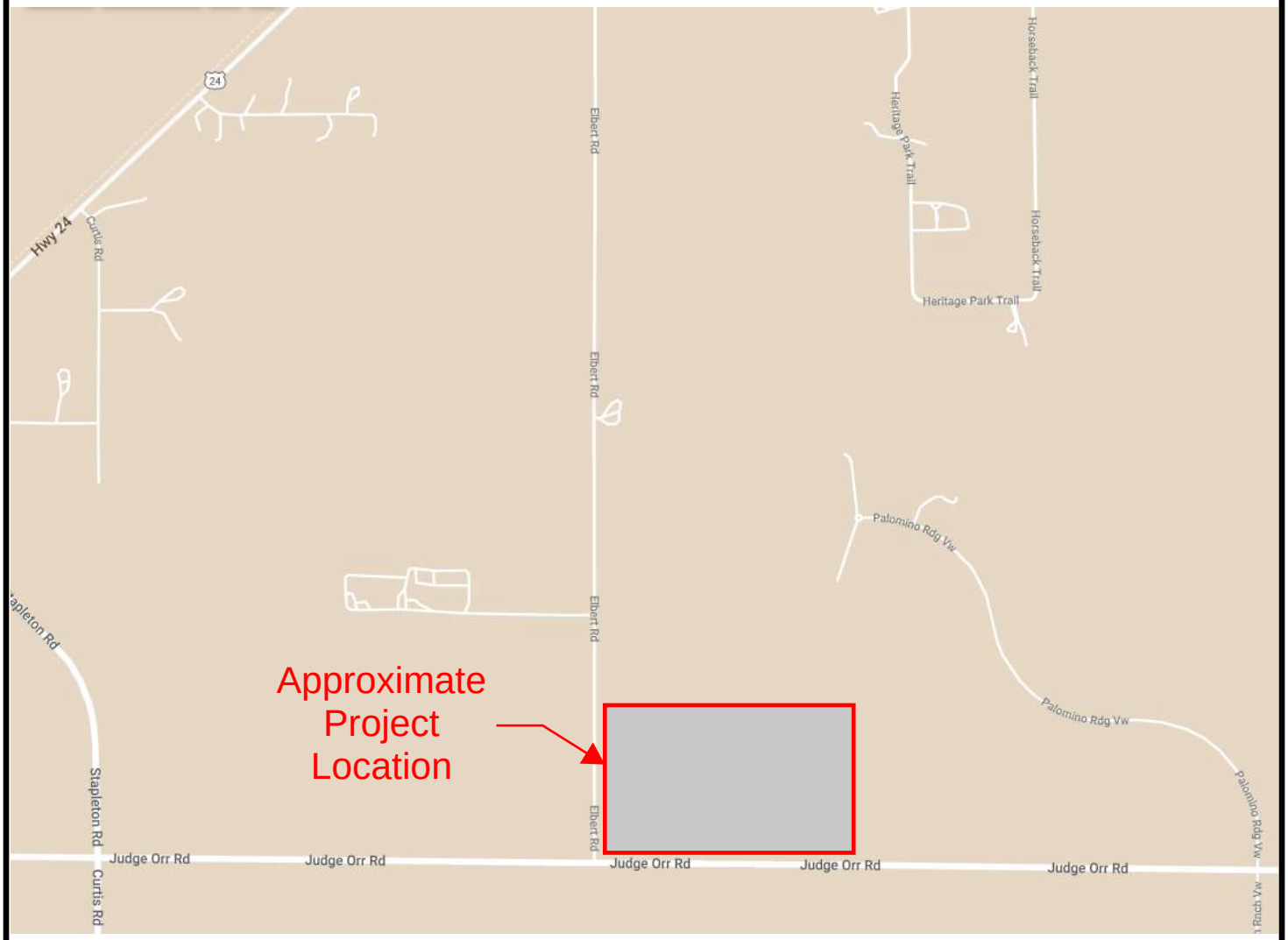
Based upon the results of this evaluation, the recommendations and comments contained in this report as well as the site-specific Geotechnical Evaluation Report should be incorporated into the plans, designs, specifications and construction planning for this project.

6.0 LIMITATIONS

6.1 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of VIVID's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions and opinions are based on a limited number of observations and data. Data or conclusions presented herein apply to the specific test pit and percolation test locations only. It is likely that subsurface conditions will vary somewhat beyond the locations investigated. VIVID makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

Figures



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REFERENCE:
Base image obtained from
Google My Maps, 6/17/2024

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Project No. D24-2-759

Date: 6/17/2024

Drawn by: SAM

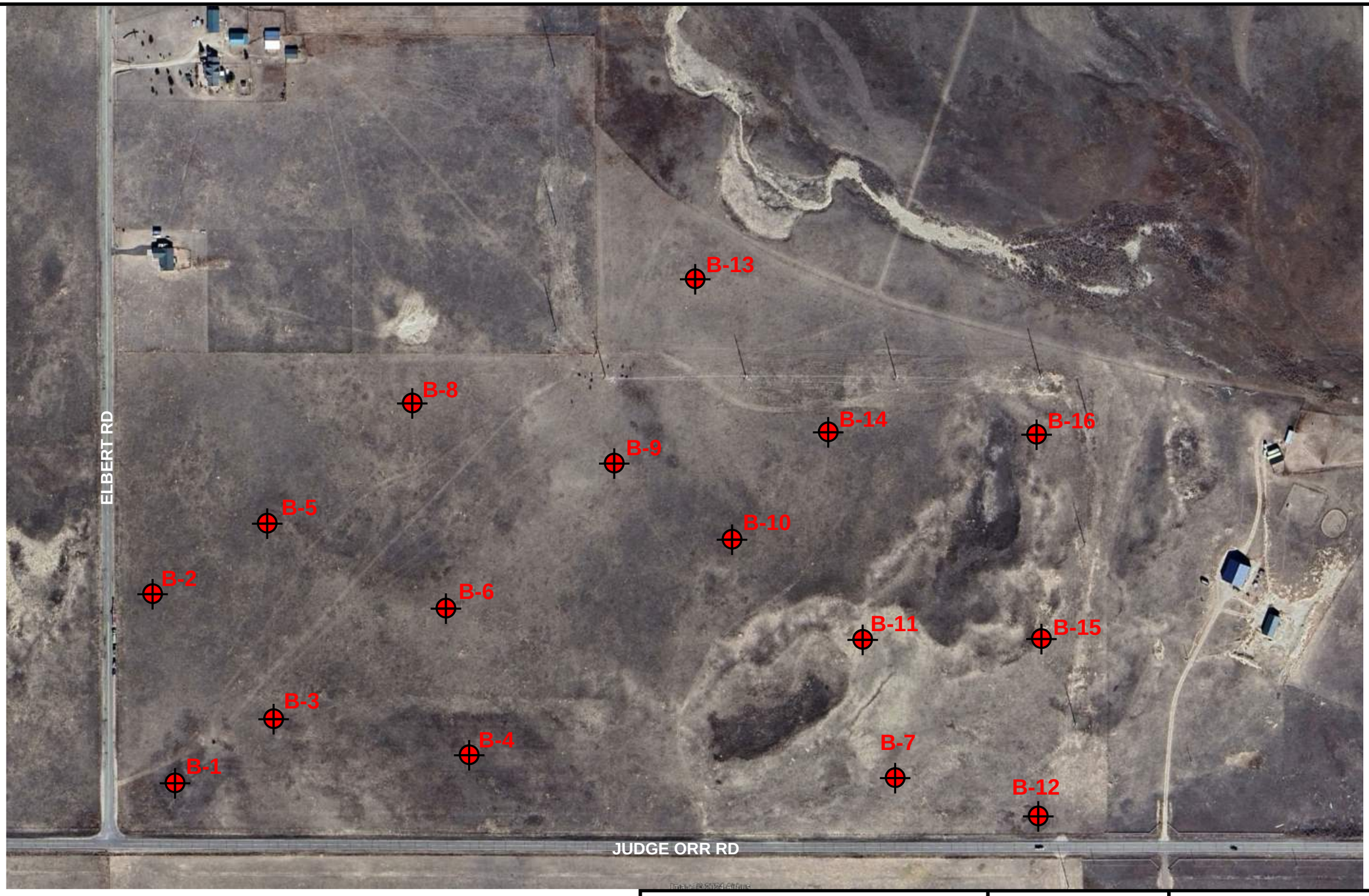
Reviewed by: BTM

VICINITY MAP

Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE

1



Note: Not to Scale.

REFERENCE
Base Image obtained from Google Earth Pro, 2024.

LEGEND
B-1 Approximate Boring Location

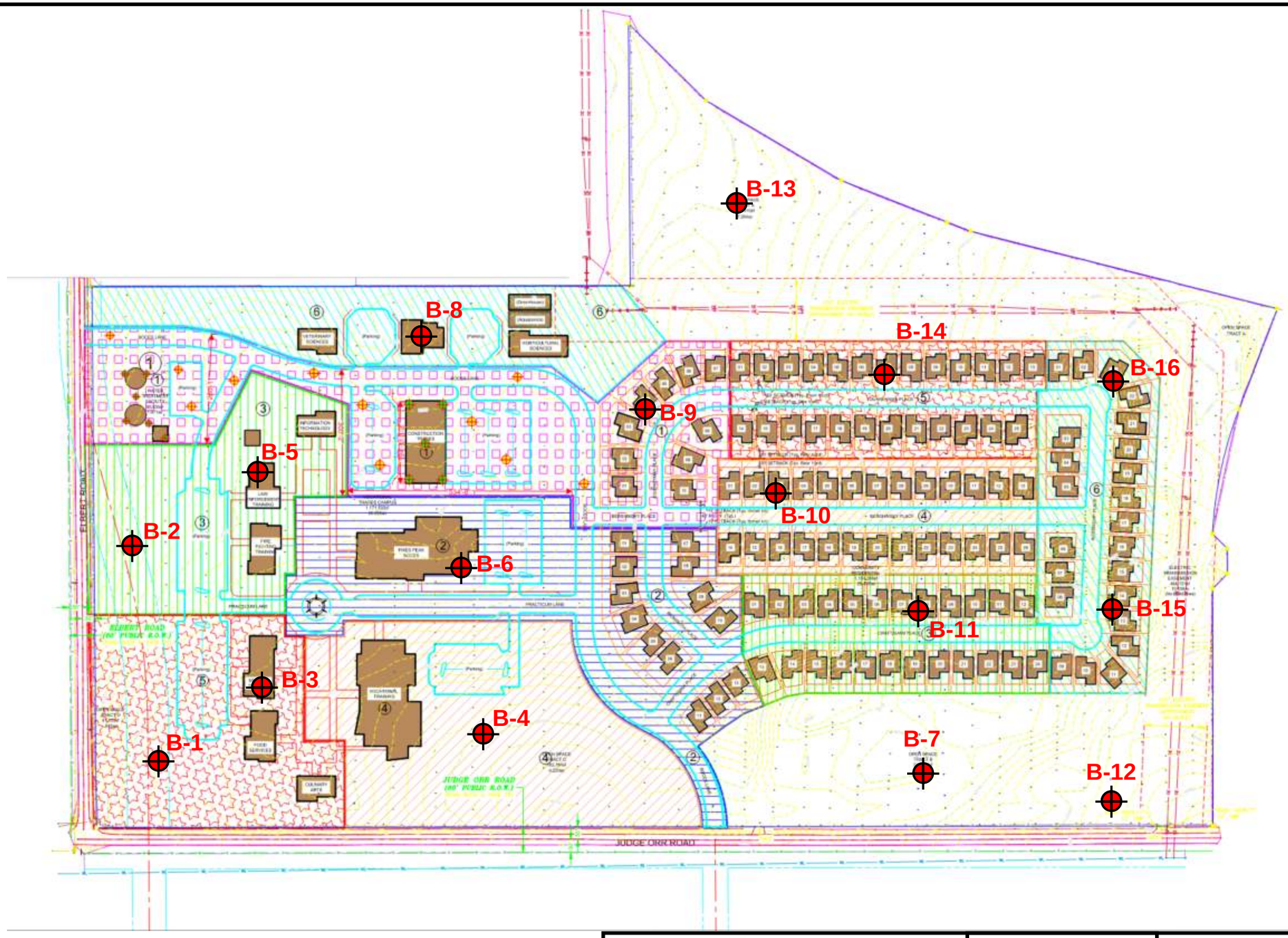
VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, CO 80907
719-896-4356

Project No. D24-2-759
Date: 6/17/2024
Drawn by: SAM
Reviewed by: BTM

FIELD EXPLORATION PLAN
(AERIAL)

Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE
2



Note: Not to Scale.

REFERENCE
Base Image obtained from plans by William Guman & Associates dated 3/27/24.

LEGEND
B-1 Approximate Boring Location

VIVID Engineering Group
VIVID Engineering Group, Inc.
1053 Elkton Drive
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Project No. D24-2-759
Date: 6/17/2024
Drawn by: SAM
Reviewed by: BTM

FIELD EXPLORATION PLAN (CONCEPTUAL)

Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE
3

Note: Not to Scale.

REFERENCE
Base Image obtained from https://msc.fema.gov/portal/search?AddressQuery=Judge%20Orr%20Road%20and%20Elbert%20Road%2C%20El%20Paso%20County, 2024

VIVID Engineering Group, Inc.
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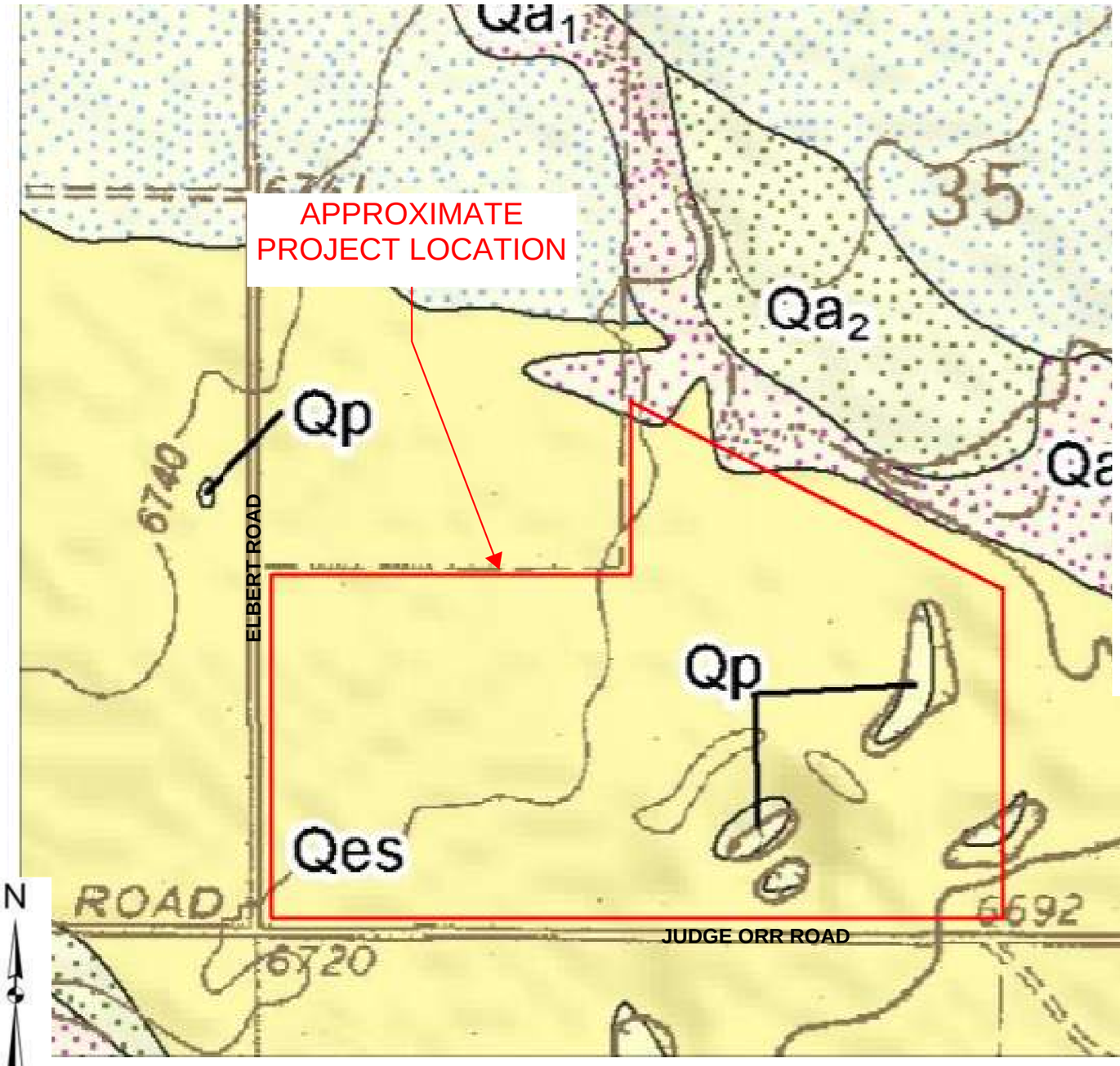
Project No. D24-2-759
Date: 7/1/2024
Drawn by: MBR
Reviewed by: BTM

FLOOD HAZARD MAP

Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE
4



EOLIAN DEPOSITS

Qes

Eolian sand (Holocene to upper Pleistocene) — Yellowish-brown to tan, fine- to coarse-grained, frosted sand and silt deposited by wind. Typically this unit is faintly stratified and non-cohesive; dune forms are not present. The unit is likely deposited as a sandsheet by winds capable of moving very fine gravel-sized clasts. Eolian sand is moderately compacted, easily excavated, and drains well. Unit locally may exceed 5 feet in thickness.

PLUVIAL DEPOSITS

Qp

Playa deposits (Holocene) — Gray to dark brown, moderately well sorted, moderately consolidated, clay, silt, sand, and scattered granules. Forms flat-surfaced seasonal ponds within eolian sand (Qes). In some areas this unit may be overlain by windblown sand and sheetwash deposits.

ALLUVIAL DEPOSITS

Qa_1

Alluvium one (upper Holocene) — Tan to pale-brown, poorly to moderately sorted, poorly consolidated, sand, gravel, silt, and minor clay and occasional boulders in the currently active stream channels or in low stream-terrace deposits less than 5 feet above the current stream channel. It may be deposited as non-terrace forming alluvium in valleys and swales. Clasts are subrounded to well rounded and the dominant sediment is sandy gravel with a sandy silt matrix. The unit correlates with the Post-Piney Creek Alluvium described by Hunt (1954) in the Denver area and of Maberry and Lindvall (1972). The unit is subject to frequent flooding and is a source of sand and gravel. Maximum exposed thickness of the unit locally exceeds 5 feet.

BEDROCK

Denver Basin Group

Tbs

Black Squirrel Formation (Paleocene) — Gray-green to tan to brownish gray, moderately-well sorted cross-bedded sandy arkoses interbedded with micaceous sandy claystones that contain abundant plant fragments and occasional, fine- to medium-grained massive arkosic beds. Intermittent paleosols are developed locally. The exposed upper part of the Black Squirrel Formation is gradational with the overlying Dawson Arkose making the location of the contact problematic. The basal contact with the underlying Jimmy Camp Formation is not exposed within the mapped area. Thickness may reach 600 feet in the Monument area; however, the exposed thickness in the Falcon quadrangle is approximately 130 feet. The claystones within this unit may be prone to swelling when wet. The Black Squirrel Formation is described in detail by Thorson (2011).

Note: Not to Scale.

REFERENCE

Base Image obtained from Falcon Quadrangle Geologic Map, El Paso County, Colorado (Morgan, M.L., and White, J.L.), 2012, Colorado Geological Survey Open-File Report OF-12-05.

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Project No. D24-2-759

Date: 7/1/2024

Drawn by: MBR

Reviewed by: BTM

GEOLOGIC MAP

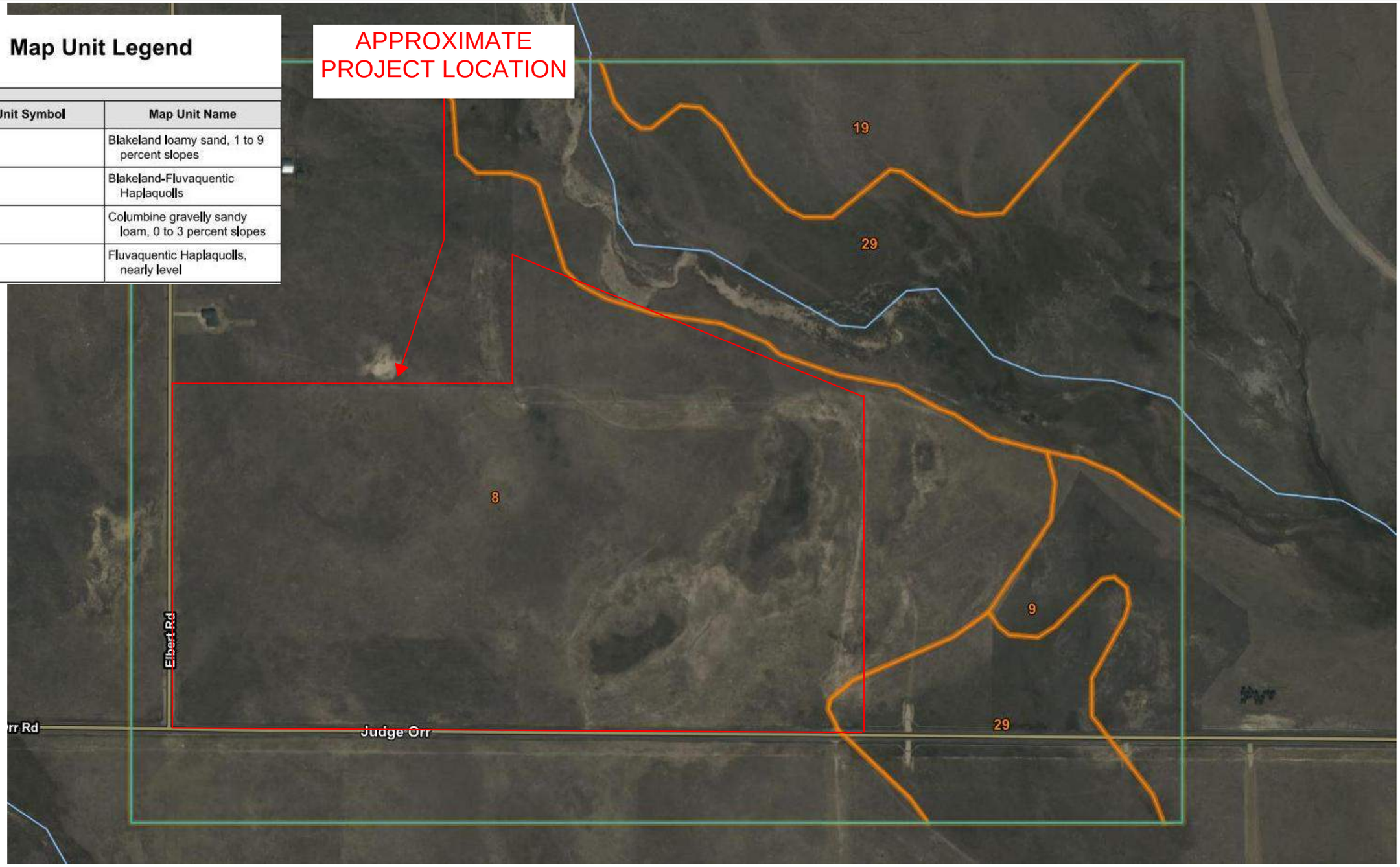
Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE

5

Map Unit Legend

Map Unit Symbol	Map Unit Name
8	Blakeland loamy sand, 1 to 9 percent slopes
9	Blakeland-Fluvaquentic Haplaquolls
19	Columbine gravelly sandy loam, 0 to 3 percent slopes
29	Fluvaquentic Haplaquolls, nearly level



Note: Not to Scale.

REFERENCE
Base Image obtained from Soil Survey of El Paso County Area, Colorado Soil Conservation Service, USDA, 1979

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Drawn by: MBR

Reviewed by: BTM

NRCS SOIL SURVEY MAP

Pikes Peak BOCES Educational Park
Soils & Geology Evaluation
Northeast of Judge Orr Road and Elbert Road
Peyton, Colorado

FIGURE
6

Appendix A

Log of Exploratory Borings

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KEY TO SYMBOLS

CLIENT William Guman & Associates, Ltd.

PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation

PROJECT NUMBER D24-2-759

PROJECT LOCATION Peyton, Colorado

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


CL: USCS Low Plasticity Clay


CLAYSTONE


SANDSTONE


SC: USCS Clayey Sand


SM: USCS Silty Sand


SP: USCS Poorly-graded Sand


SP-SM: USCS Poorly-graded Sand with Silt


SW-SM: USCS Well-graded Sand with Silt


WEATHERED CLAYSTONE

SAMPLER SYMBOLS


Grab Sample


2" I.D. Modified California Sampler (MC)


Standard Penetration Test (SPT)

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
MC - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
FINES- PERCENT PASSING NO. 200 SIEVE


Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

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BORING NUMBER B-1

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 14.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Silty SAND, medium brown, slightly moist to moist, medium dense
5	MC	8-8	MC = 13.9% DD = 108.2 pcf LL = 24 PL = 22 Fines = 15.0%		
					6.0
	MC	14-16	MC = 10.5% DD = 123.7 pcf LL = 37 PL = 21 Fines = 32.0%		**Black Squirrel Formation** Clayey SANDSTONE, light gray and yellowish-brown, moist, moderately hard
10	MC	14-28			
					12.0
					Black Squirrel Formation CLAYSTONE, gray with iron oxide staining, moist to very moist, very hard
15	MC	27-50/3"	MC = 17.6% DD = 112.0 pcf Swell = 2.7% when wetted under 1,000 psf load		
					19.0
20	MC	30-50/5"			**Black Squirrel Formation** Clayey SANDSTONE, gray and medium brown, very moist, very hard
25	MC	50/6"			
	MC	50/4"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-2

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 5.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, medium brown, moist, loose
	SPT	2-2-3 (5)			
					4.0
5	MC	6-9			**Black Squirrel Formation** Weathered CLAYSTONE, yellowish-brown, reddish-brown and gray, moist to very moist, moderately hard
10	MC	16-27	MC = 19.3% DD = 108.3 pcf Swell = 0.2% when wetted under 1,000 psf load		
					12.0
					Black Squirrel Formation Clayey SANDSTONE, light gray, moist, hard to very hard
15	MC	50/5"			
20	MC	32-50/3"	MC = 11.5% DD = 125.4 pcf LL = 34 PL = 20 Fines = 31.0%		
25	MC	50/6"			
	MC	50/6"			29.5
					Bottom of borehole at 29.5 feet.

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BORING NUMBER B-3

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION _____ **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- None Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Silty SAND, light brown, slightly moist
2.0					**Black Squirrel Formation** Weathered CLAYSTONE, light gray, slightly moist to moist, moderately hard to hard
5	SPT	17-21-33 (54)	MC = 10.7% LL = 48 PL = 21 Fines = 63.0%		
	MC	18-23	MC = 17.9% DD = 112.7 pcf LL = 57 PL = 28 Fines = 97.0%		
9.0					**Black Squirrel Formation** CLAYSTONE, medium brown, moist, hard to very hard
10	MC	25-38	Chloride = 0.009%, pH = 7.9, Redox Potential = 58.2 mV, Resistivity = 1100 ohm-cm, Sulfate = <0.001%, Sulfide = Positive		
15	MC	50/4"	MC = 22.3% DD = 110.7 pcf Swell = 9.0% when wetted under 1,000 psf load		
20	MC	50/4"			
25	MC	50/4"			
29.4	MC	50/5"			

Bottom of borehole at 29.4 feet.

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BORING NUMBER B-4

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 26.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Well-Graded SAND with silt, light brown, moist, loose to medium dense
	SPT	2-3-6 (9)			
5	SPT	7-7-4 (11)	MC = 5.1% LL = NP PL = NP Fines = 12.0%	5.0	**Black Squirrel Formation** Weathered CLAYSTONE, yellowish-brown, moist, moderately hard
10	MC	11-21	MC = 23.9% DD = 101.2 pcf Swell = 2.3% when wetted under 1,000 psf load	13.0	**Black Squirrel Formation** CLAYSTONE, gray, moist to very moist, hard to very hard
15	MC	50/6"			
20	MC	25-50/5"	MC = 23.5% DD = 100.9 pcf Swell = 2.1% when wetted under 1,000 psf load		
25	MC	32-50/5"			
	MC	50/5"		29.4	Bottom of borehole at 29.4 feet.

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BORING NUMBER B-5

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 9.00 ft
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 8.00 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Poorly Graded SAND, medium brown to light brown, slightly moist to wet, medium dense
5	SPT	4-7-9 (16)			
	MC	12-24	MC = 10.0% DD = 109.1 pcf LL = NP PL = NP Fines = 4.1%		▼ ▽
10	MC	12-19			
15	MC	14-22			
					17.0
					Black Squirrel Formation Clayey SANDSTONE, light gray, moist to very moist, very hard
20	MC	50/5"			
25	MC	50/3"			
	MC	50/4"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-6

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 16.00 ft
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 13.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, light brown, slightly moist to wet, medium dense to loose
	SPT	4-5-6 (11)			
5	SPT	5-5-4 (9)			
10	MC	4-5			
					▼
15	MC	7-6			
					▽
					17.0
					Black Squirrel Formation SANDSTONE, light brown, very moist, moderately hard
20	MC	15-21			
					24.0
25	MC	50/5"	MC = 19.5% DD = 112.5 pcf Swell = 1.1% when wetted under 1,000 psf load		**Black Squirrel Formation** CLAYSTONE, dark yellowish-brown, very moist, very hard
	MC	50/6"			29.5
					Bottom of borehole at 29.5 feet.

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BORING NUMBER B-7

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/13/24 **COMPLETED** 6/13/24
GROUND ELEVATION ___ **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 17.00 ft
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 10.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, light brown, moist to wet, loose to medium dense
	GB				
5	SPT	3-4-4 (8)			
	MC	8-9	MC = 7.6% LL = NP PL = NP Fines = 13.0%		
10	MC	7-8			
					▼
15	MC	12-16			
					▽
20	MC	12-6			20.0
					Black Squirrel Formation Sandy CLAYSTONE, yellowish-brown, moist, very hard
25	MC	50/4"			
	MC	50/4"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-8

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 14.00 ft
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- Caved to 13 feet below ground surface

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Poorly Graded SAND with silt, light brown, slightly moist to wet, loose to dense
	SPT	5-4-4 (8)	MC = 5.3% LL = NP PL = NP Fines = 11.0%		
5	SPT	3-4-4 (8)			
10	MC	8-13			
15	MC	9-11			▽
20	MC	40-30			
					22.0
					Black Squirrel Formation Clayey SANDSTONE, gray, very moist, very hard
25	MC	50/3"			
	MC	50/4"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-9

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 9.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB		Chloride = 0.004%, pH = 7.5, Redox Potential = 55.8 mV, Resistivity = 2300 ohm-cm, Sulfate = <0.001%, Sulfide = Trace		Silty SAND, light yellowish-brown, moist, medium dense
5	SPT	5-6-5 (11)			
	MC	16-18	MC = 9.5% LL = NP PL = NP Fines = 30.0%		
					8.5
10	MC	7-8			Clayey SAND, gray and medium brown with iron oxide staining, moist to wet, medium dense
15	MC	10-22	MC = 21.5% DD = 109.4 pcf Swell = 1.5% when wetted under 1,000 psf load		14.5 **Black Squirrel Formation** Weathered CLAYSTONE, greenish-brown, moist, moderately hard
					17.0 **Black Squirrel Formation** CLAYSTONE, greenish-brown, gray, slightly moist, very hard
20	MC	50/3"			
25	MC	50/4"			
	MC	50/5"			29.4 Bottom of borehole at 29.4 feet.

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BORING NUMBER B-10

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING 13.00 ft
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 27.00 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, light brown to medium brown, moist, loose to medium dense
	SPT	4-2-4 (6)			
5	SPT	3-2-2 (4)			
10	MC	10-14			
12.0					Lean CLAY with sand, gray with iron oxide staining, moist, very stiff
15	MC	11-16	MC = 20.5% DD = 104.8 pcf LL = 45 PL = 24 Fines = 81.0%		
17.0					**Black Squirrel Formation** CLAYSTONE, yellowish-brown, slightly moist to very moist, hard to very hard
20	MC	28-50			
25	MC	50/4"			
	MC	50/5"			
29.4					Bottom of borehole at 29.4 feet.

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BORING NUMBER B-11

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 28.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Poorly Graded SAND with silt, light brown, moist, loose to medium dense
5	SPT	4-3-3 (6)	MC = 8.0% LL = NP PL = NP Fines = 5.0%		
	MC	5-7			
10	MC	6-6			
15	MC	7-10			
20	MC	11-17	MC = 21.1% DD = 106.3 pcf Swell = 1.5% when wetted under 1,000 psf load		19.5 **Black Squirrel Formation** Sandy CLAYSTONE, yellowish-brown, moist, hard to very hard
25	MC	50/6"			
	MC	50/6"			29.5 Bottom of borehole at 29.5 feet.

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BORING NUMBER B-12

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/14/24 **COMPLETED** 6/14/24
GROUND ELEVATION _____ **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING --- None Encountered
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- None Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, medium brown to grayish-brown, moist, medium dense to loose
	SPT	6-7-9 (16)			
5	SPT	6-5-4 (9)	MC = 13.0% LL = NP PL = NP Fines = 37.0%		
					7.0
					Black Squirrel Formation Weathered CLAYSTONE, grayish-brown, moist, moderately hard
10	MC	9-13	MC = 29.3% DD = 93.1 pcf Swell = 2.7% when wetted under 1,000 psf load		
					12.0
					Black Squirrel Formation CLAYSTONE, grayish-brown to dark gray, moist, hard to very hard
15	MC	23-30	MC = 23.5% DD = 100.0 pcf Swell = 2.4% when wetted uner 1,000 psf load		
20	MC	27-50/3"	MC = 26.8% DD = 94.7 pcf Swell = 2.5% when wetted under 1,000 psf load		
25	MC	50/5"			
	MC	50/3"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-13

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 14.00 ft
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 6.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB			Silty SAND, medium brown to light brown, slightly moist, loose
5	SPT	3-3-3 (6)		
				6.0
				▼ **Black Squirrel Formation**
	MC	15-30		SANDSTONE, grayish-brown, very moist, moderately hard to very hard
10	MC	18-40		
				▽
15	MC	18-20		
20	MC	50/5"		
				22.0
				Black Squirrel Formation
				CLAYSTONE, grayish-brown to gray, slightly moist, very hard
25	MC	50/3"		
	MC	50/6"		29.5
				Bottom of borehole at 29.5 feet.

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BORING NUMBER B-14

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/12/24 **COMPLETED** 6/12/24
GROUND ELEVATION **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 13.50 ft
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
▼ **AFTER DRILLING** 8.00 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Silty SAND, light brown, moist, medium dense to dense
	MC	5-11		
5	MC	16-21		
				7.0
				Black Squirrel Formation
				▼ Clayey SANDSTONE, gray, very moist, moderately hard to very hard
10	MC	15-28		
				▽
15	MC	43-50/4"		
20	MC	50/6"		
				22.0
				Black Squirrel Formation
				CLAYSTONE, gray, moist, very hard
25	MC	50/6"		
	MC	50/6"		29.5
				Bottom of borehole at 29.5 feet.

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BORING NUMBER B-15

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/11/24 **COMPLETED** 6/11/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
▽ **AT TIME OF DRILLING** 14.00 ft
LOGGED BY D. Crozier **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING --- None Encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB MC	12-15			Silty SAND, light brown and light yellowish-brown, moist to moist, medium dense
5	MC	11-14			
	MC	8-12			
10	MC	11-18	MC = 9.8% DD = 103.8 pcf LL = NP PL = NP Fines = 14.0%		
					12.0
					Clayey SAND, grayish-brown with iron oxide staining, very moist to wet, dense
15	MC	15-32			▽
					19.0
20	MC	31-50/4"	MC = 17.1% DD = 112.0 pcf Swell = 3.1% when wetted under 1,000 psf load		**Black Squirrel Formation** CLAYSTONE, gray and greenish-brown, moist, hard to very hard
25	MC	50/5"			
	MC	50/4"			29.3
					Bottom of borehole at 29.3 feet.

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BORING NUMBER B-16

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado
DATE STARTED 6/11/24 **COMPLETED** 6/11/24
GROUND ELEVATION ---- **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING 13.00 ft
LOGGED BY S. Mulcahey **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING 10.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Poorly Graded SAND with silt, light brown, moist to wet, medium dense to dense
	MC	8-14			
5	MC	11-14			
10	MC	23-30	MC = 6.2% DD = 113.7 pcf LL = NP PL = NP Fines = 5.0%		
14.0					
15	MC	50/5"			**Black Squirrel Formation** Clayey SANDSTONE, gray, moist to very moist, very hard
20	MC	50/2"			
25	MC	50/2"			
29.0					Bottom of borehole at 29.0 feet.

Appendix B

Geotechnical Laboratory Test Results

Vivid Engineering Group, Inc.
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SUMMARY OF LABORATORY RESULTS

CLIENT William Guman & Associates, Ltd.

PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation

PROJECT NUMBER D24-2-759

PROJECT LOCATION Peyton, Colorado

Exploration ID	Approx. Sample Depth (ft)	Sample Description	Passing 3/4" Sieve (%)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	Dry Density (pcf)
B-1	4.0	SILTY SAND(SM)			15	24	22	2	13.9	108.2
B-1	7.0	CLAYEY SAND(SC)		99	32	37	21	16	10.5	123.7
B-1	14.0								17.6	112.0
B-2	9.0								19.3	108.3
B-2	19.0	CLAYEY SAND(SC)		99	31	34	20	14	11.5	125.4
B-3	4.0	SANDY LEAN CLAY(CL)		100	63	48	21	27	10.7	
B-3	7.0	FAT CLAY(CH)			97	57	28	29	17.9	112.7
B-3	14.0								22.3	110.7
B-4	4.0	WELL-GRADED SAND with SILT(SW-SM)	100	92	12	NP	NP	NP	5.1	
B-4	9.0								23.9	101.2
B-4	19.0								23.5	100.9
B-5	7.0	POORLY GRADED SAND(SP)		97	4	NP	NP	NP	10.0	109.1
B-6	24.0								19.5	112.5
B-7	7.0	SILTY SAND(SM)			13	NP	NP	NP	7.6	
B-8	2.0	POORLY GRADED SAND with SILT(SP-SM)			11	NP	NP	NP	5.3	
B-9	4.0	SILTY SAND(SM)			30	NP	NP	NP	9.5	
B-9	14.0								21.5	109.4
B-10	14.0	LEAN CLAY with SAND(CL)			81	45	24	21	20.5	104.8
B-11	4.0	POORLY GRADED SAND with SILT(SP-SM)			5	NP	NP	NP	8.0	
B-11	19.0								21.1	106.3
B-12	4.0	SILTY SAND(SM)			37	NP	NP	NP	13.0	
B-12	9.0								29.3	93.1
B-12	14.0								23.5	100.0
B-12	19.0								26.8	94.7
B-15	9.0	SILTY SAND(SM)			14	NP	NP	NP	9.8	103.8
B-15	19.0								17.1	112.0
B-16	9.0	POORLY GRADED SAND with SILT(SP-SM)		87	5	NP	NP	NP	6.2	113.7

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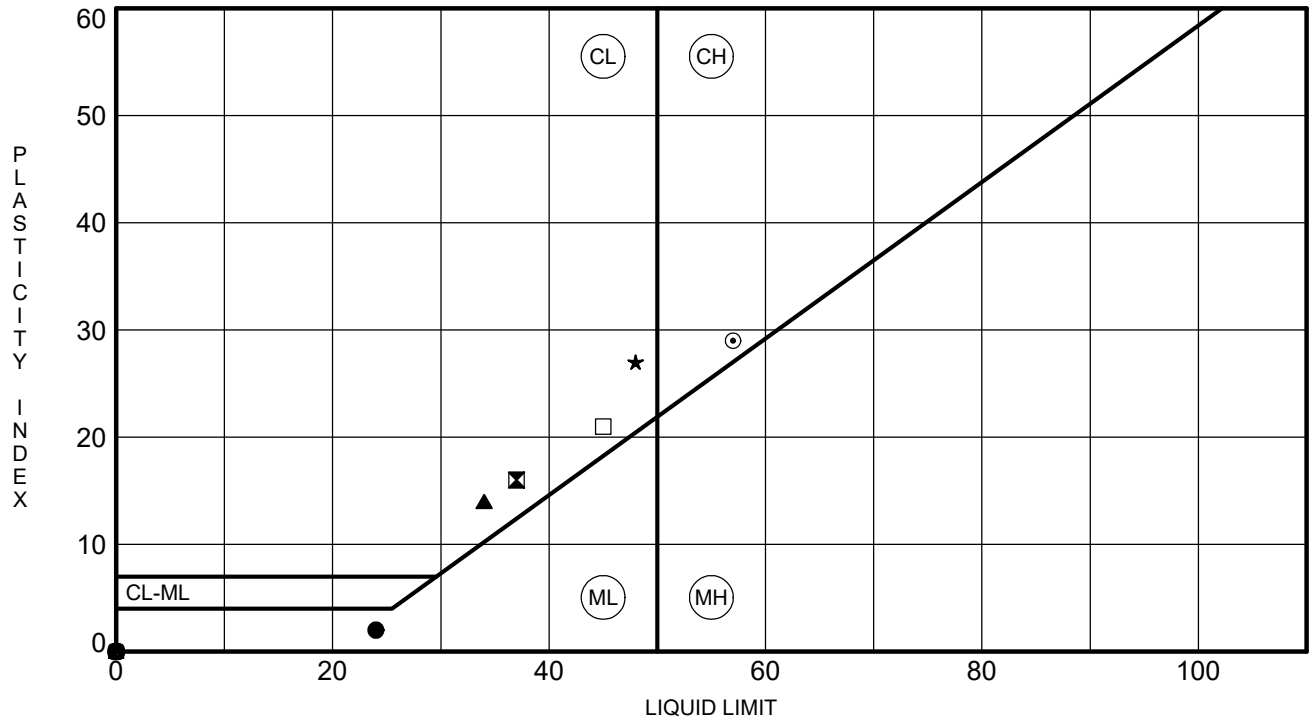
ATTERBERG LIMITS' RESULTS

CLIENT William Guman & Associates, Ltd.
PROJECT NAME Pikes Peak BOCES Soils & Geology Evaluation
PROJECT NUMBER D24-2-759
PROJECT LOCATION Peyton, Colorado



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	B-1	4.0	24	22	2	15	SILTY SAND(SM)
⊠	B-1	7.0	37	21	16	32	CLAYEY SAND(SC)
▲	B-2	19.0	34	20	14	31	CLAYEY SAND(SC)
★	B-3	4.0	48	21	27	63	SANDY LEAN CLAY(CL)
⊙	B-3	7.0	57	28	29	97	FAT CLAY(CH)
✿	B-4	4.0	NP	NP	NP	12	WELL-GRADED SAND with SILT(SW-SM)
○	B-5	7.0	NP	NP	NP	4	POORLY GRADED SAND(SP)
△	B-7	7.0	NP	NP	NP	13	SILTY SAND(SM)
⊗	B-8	2.0	NP	NP	NP	11	POORLY GRADED SAND with SILT(SP-SM)
⊕	B-9	4.0	NP	NP	NP	30	SILTY SAND(SM)
□	B-10	14.0	45	24	21	81	LEAN CLAY with SAND(CL)
⊛	B-11	4.0	NP	NP	NP	5	POORLY GRADED SAND with SILT(SP-SM)
◕	B-12	4.0	NP	NP	NP	37	SILTY SAND(SM)
☆	B-15	9.0	NP	NP	NP	14	SILTY SAND(SM)
⊠	B-16	9.0	NP	NP	NP	5	POORLY GRADED SAND with SILT(SP-SM)

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GRAIN SIZE DISTRIBUTION

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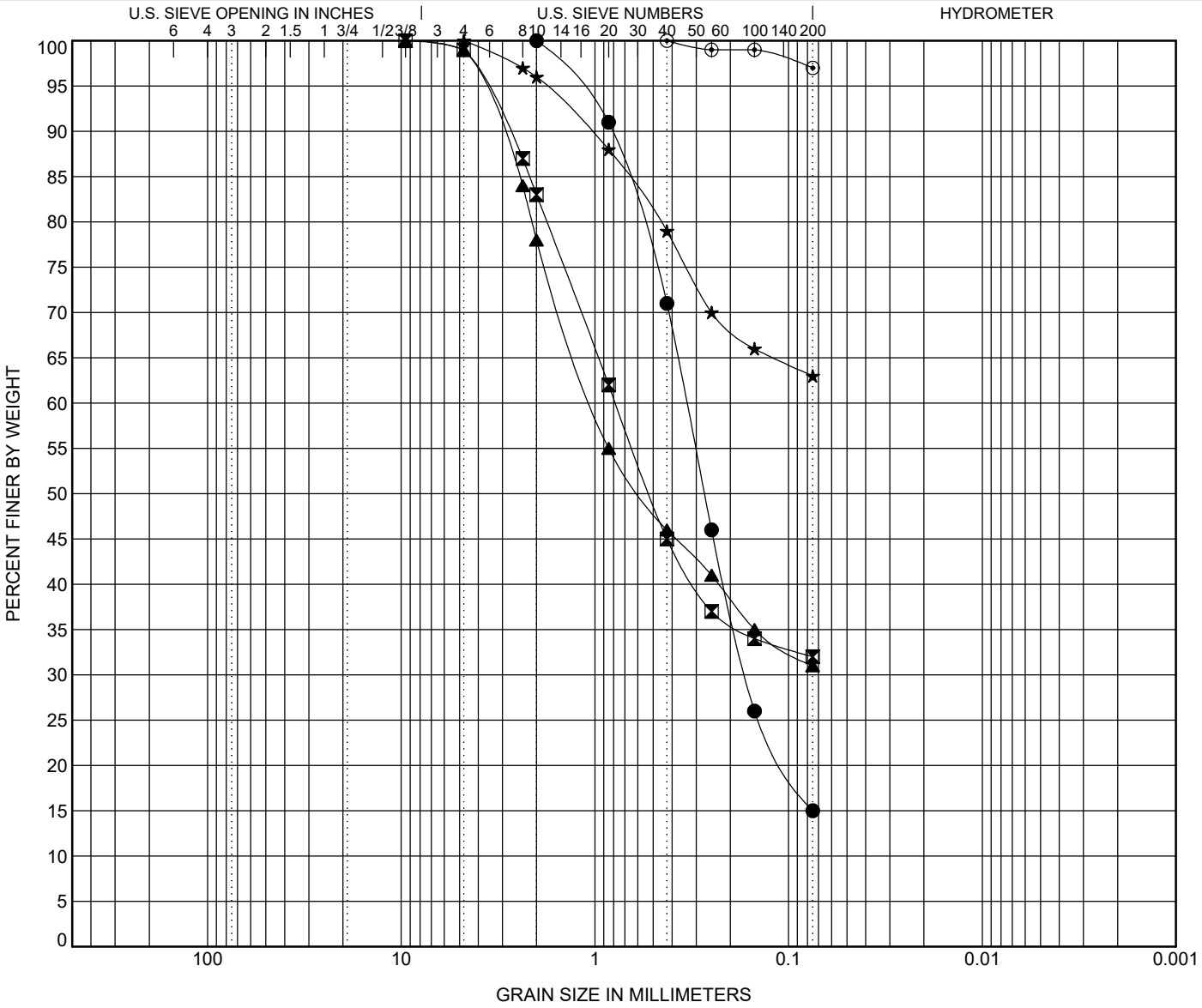
PROJECT NUMBER D24-2-759

PROJECT LOCATION Peyton, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-1	4.0	SILTY SAND(SM)	24	22	2		
⊠	B-1	7.0	CLAYEY SAND(SC)	37	21	16		
▲	B-2	19.0	CLAYEY SAND(SC)	34	20	14		
★	B-3	4.0	SANDY LEAN CLAY(CL)	48	21	27		
⊙	B-3	7.0	FAT CLAY(CH)	57	28	29		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	4.0	2	0.337	0.166		0.0	85.0	15.0	
⊠	B-1	7.0	9.5	0.783			1.0	67.0	32.0	
▲	B-2	19.0	9.5	1.024			1.0	68.0	31.0	
★	B-3	4.0	4.75				0.0	37.0	63.0	
⊙	B-3	7.0	0.425				0.0	3.0	97.0	

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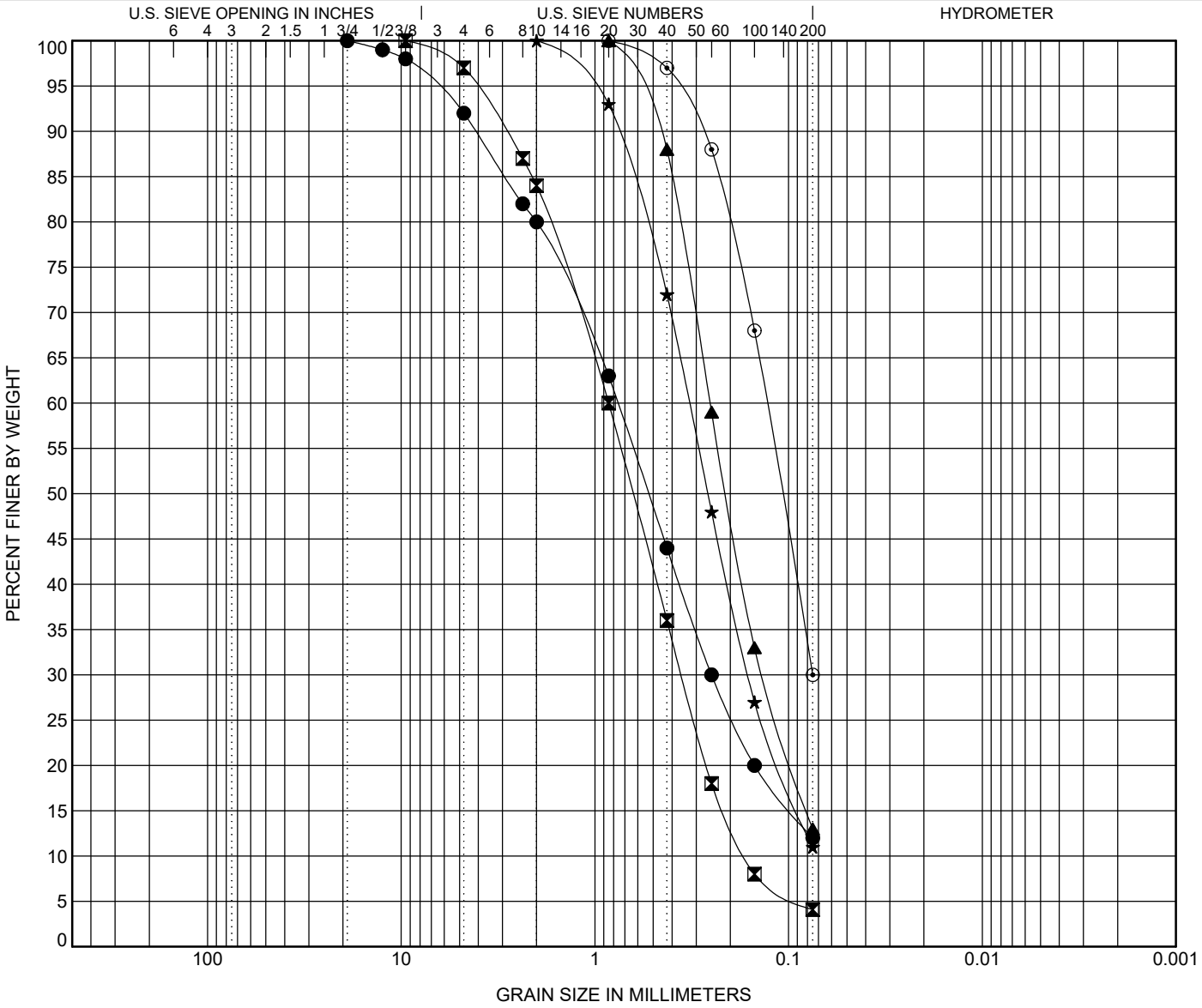
PROJECT NUMBER D24-2-759

PROJECT LOCATION Peyton, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-4	4.0	WELL-GRADED SAND with SILT(SW-SM)	NP	NP	NP	1.30	12.08
⊠ B-5	7.0	POORLY GRADED SAND(SP)	NP	NP	NP	0.90	5.12
▲ B-7	7.0	SILTY SAND(SM)	NP	NP	NP		
★ B-8	2.0	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.11	4.54
⊙ B-9	4.0	SILTY SAND(SM)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-4	4.0	19	0.762	0.25		8.0	80.0	12.0	
⊠ B-5	7.0	9.5	0.85	0.356	0.166	3.0	92.9	4.1	
▲ B-7	7.0	0.85	0.255	0.135		0.0	87.0	13.0	
★ B-8	2.0	2	0.326	0.161		0.0	89.0	11.0	
⊙ B-9	4.0	0.85	0.13	0.075		0.0	70.0	30.0	

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GRAIN SIZE DISTRIBUTION

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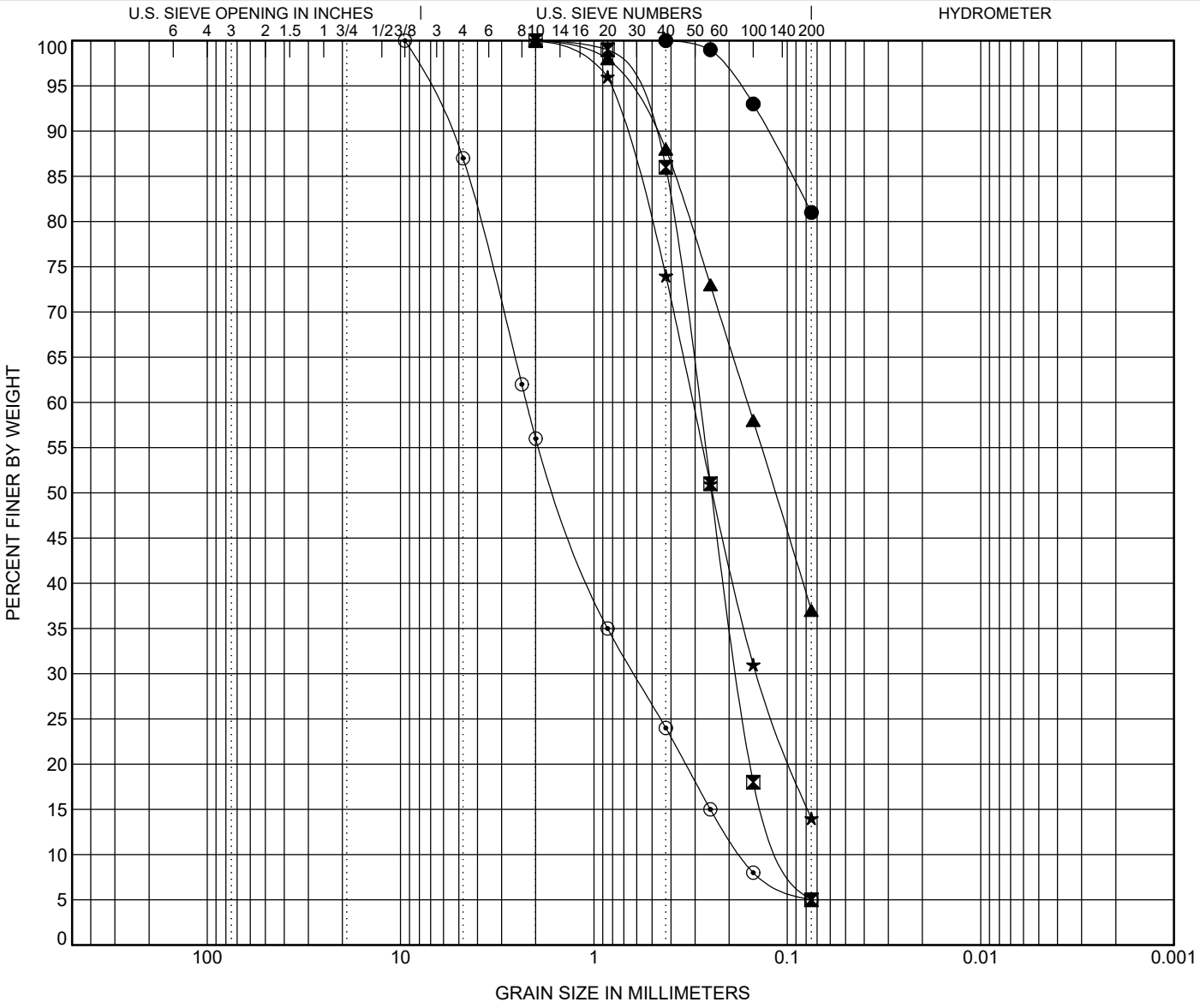
PROJECT NUMBER D24-2-759

PROJECT LOCATION Peyton, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

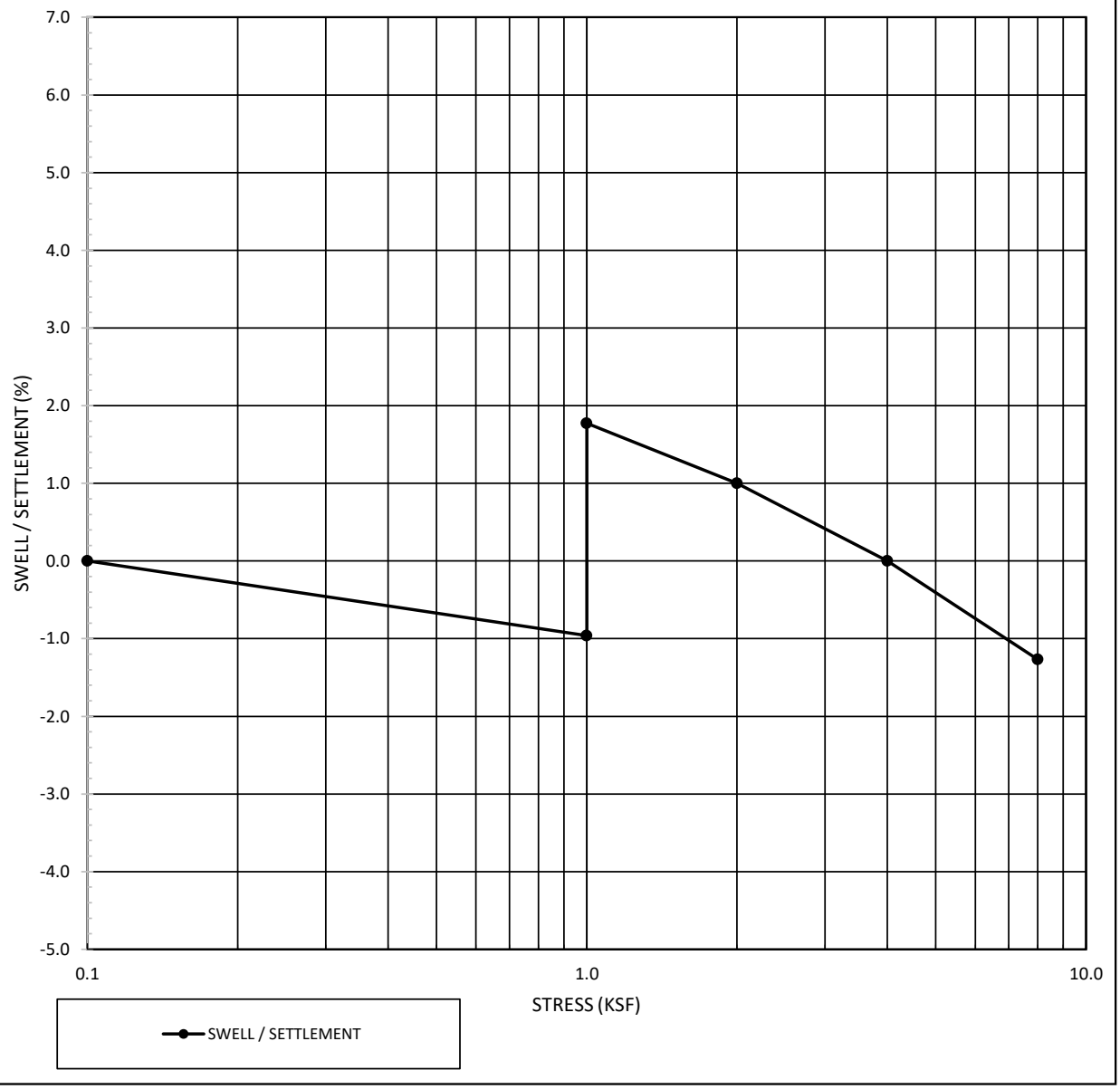
BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-10	14.0	LEAN CLAY with SAND(CL)	45	24	21		
⊠ B-11	4.0	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.16	2.93
▲ B-12	4.0	SILTY SAND(SM)	NP	NP	NP		
★ B-15	9.0	SILTY SAND(SM)	NP	NP	NP		
⊙ B-16	9.0	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	0.99	12.87

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-10	14.0	0.425				0.0	19.0	81.0	
⊠ B-11	4.0	2	0.287	0.181	0.098	0.0	95.0	5.0	
▲ B-12	4.0	2	0.161			0.0	63.0	37.0	
★ B-15	9.0	2	0.308	0.144		0.0	86.0	14.0	
⊙ B-16	9.0	9.5	2.233	0.62	0.174	13.0	82.0	5.0	

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/19/2024
Project No.:	D24-2-759		
Boring ID.:	B-1	**Sample Depth (ft)**	14
Sample Description:	CLAYSTONE, gray, moist		

	%
Swell @ Wetting Weight:	**2.7**

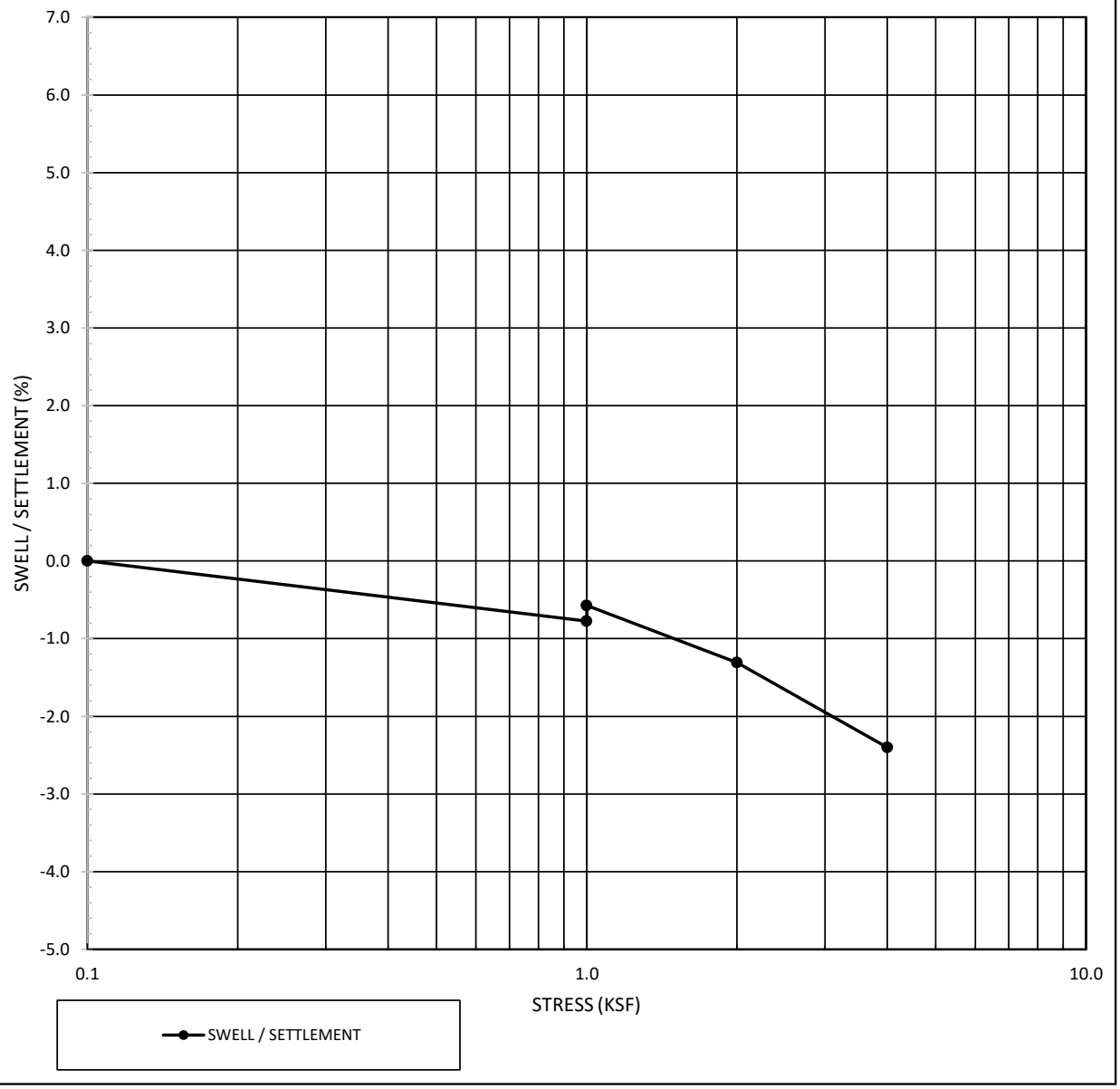


Initial Condition	
Moisture Content %	**17.6**
Dry Density (pcf)	**112.0**
Post-Swell Condition	
Moisture Content %	**20.5**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	7/1/2024
Project No.:	D24-2-759		
Boring ID.:	B-2	**Sample Depth (ft)**	9
Sample Description:	Weathered CLAYSTONE, yellowish-brown, moist		

	%
Swell @ Wetting Weight:	**0.2**

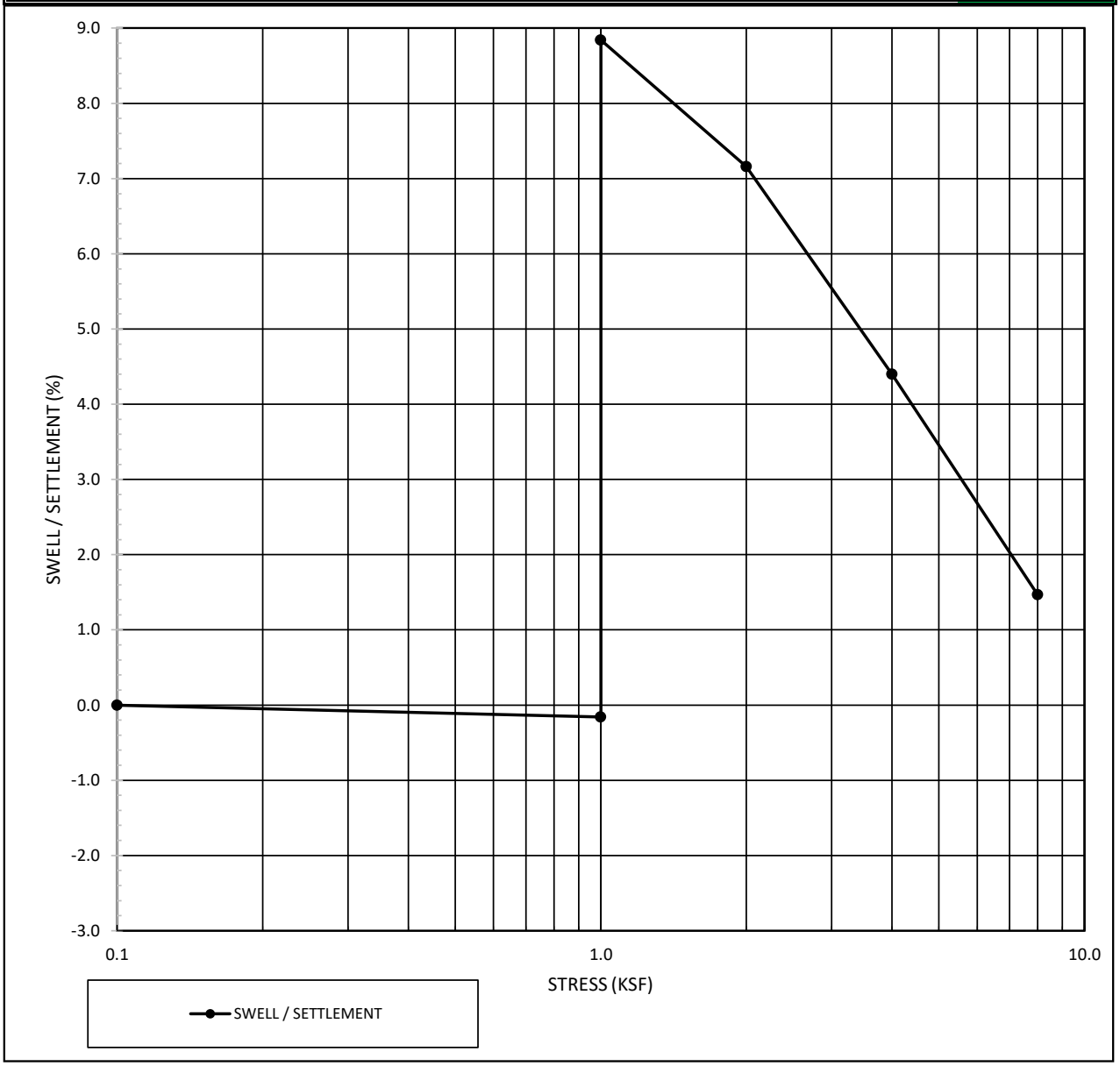


Initial Condition	
Moisture Content %	**19.3**
Dry Density (pcf)	**108.3**
Post-Swell Condition	
Moisture Content %	**21.7**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-3	**Sample Depth (ft)**	14
Sample Description:	CLAYSTONE, medium brown, moist		

	%
Swell @ Wetting Weight:	**9.0**

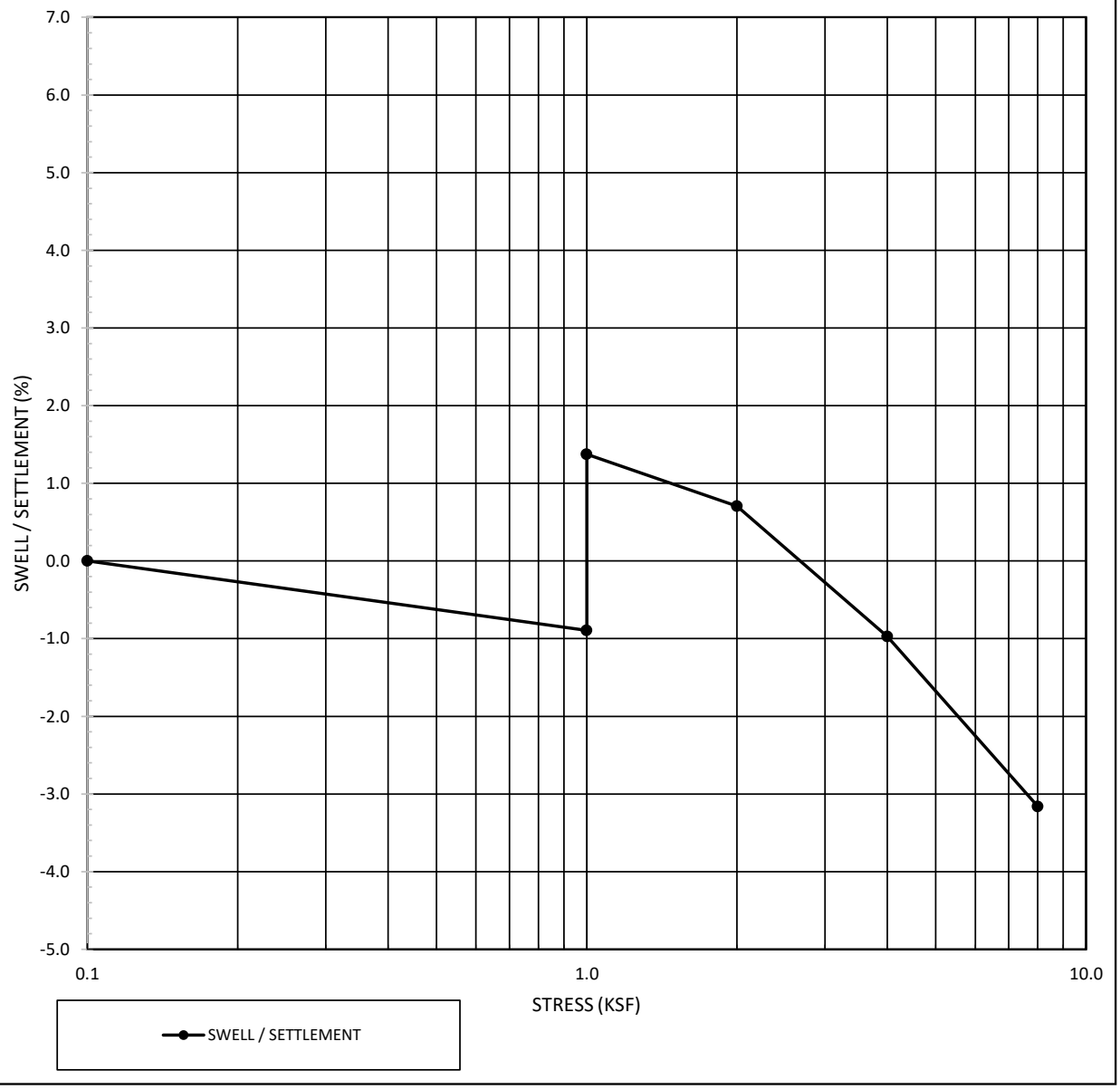


Initial Condition	
Moisture Content %	**16.7**
Dry Density (pcf)	**110.7**
Post-Swell Condition	
Moisture Content %	**22.3**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-4	**Sample Depth (ft)**	9
Sample Description:	Weathered CLAYSTONE, yelloish-brown, moist		

	%
Swell @ Wetting Weight:	**2.3**

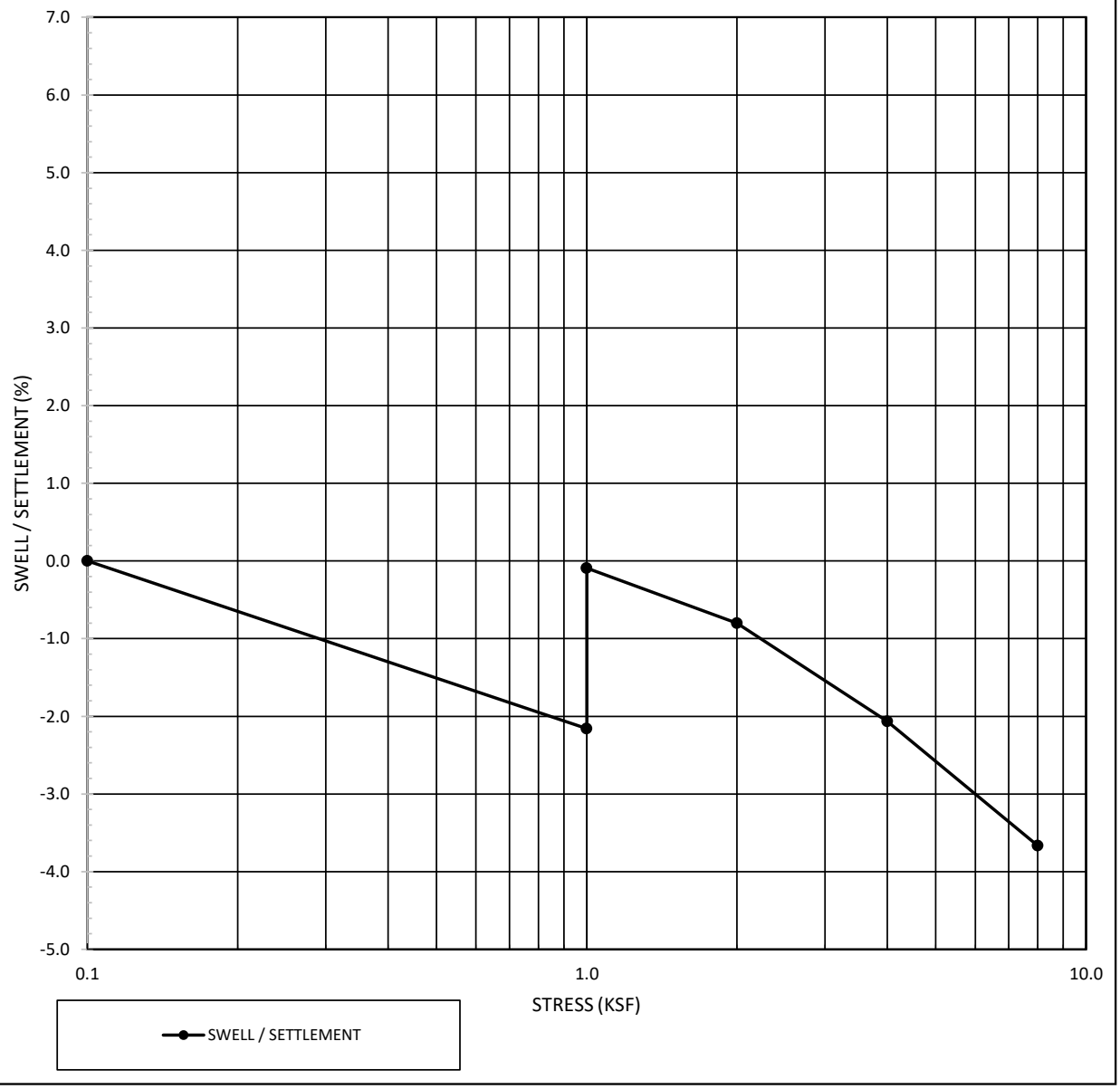


Initial Condition	
Moisture Content %	**23.9**
Dry Density (pcf)	**101.2**
Post-Swell Condition	
Moisture Content %	**25.3**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	7/1/2024
Project No.:	D24-2-759		
Boring ID.:	B-4	**Sample Depth (ft)**	19
Sample Description:	CLAYSTONE, gray, moist		

	%
Swell @ Wetting Weight:	**2.1**

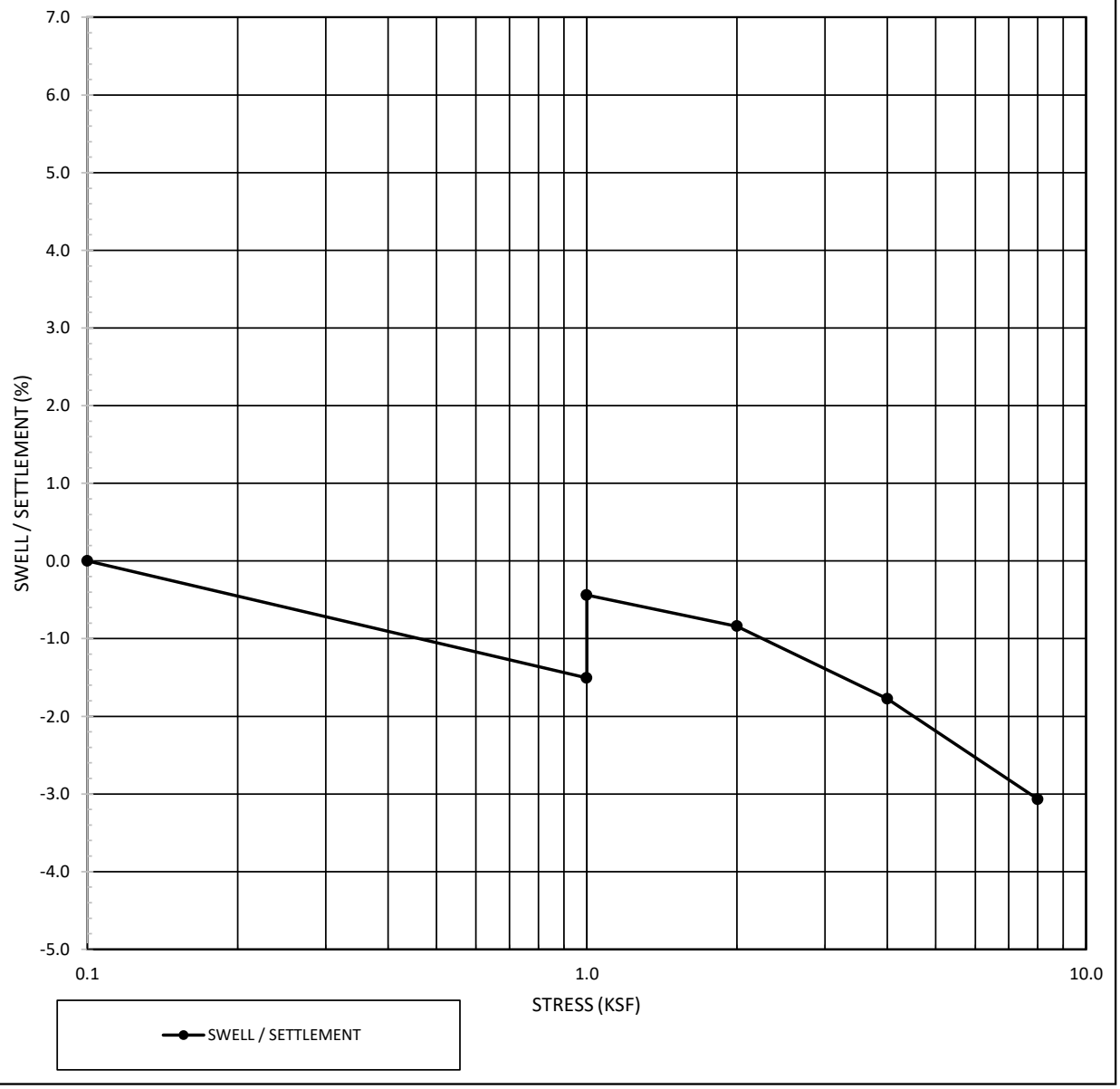


Initial Condition	
Moisture Content %	**23.5**
Dry Density (pcf)	**100.9**
Post-Swell Condition	
Moisture Content %	**25.9**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-6	**Sample Depth (ft)**	24
Sample Description:	CLAYSTONE, dark yellowish-brown, moist		

	%
Swell @ Wetting Weight:	**1.1**

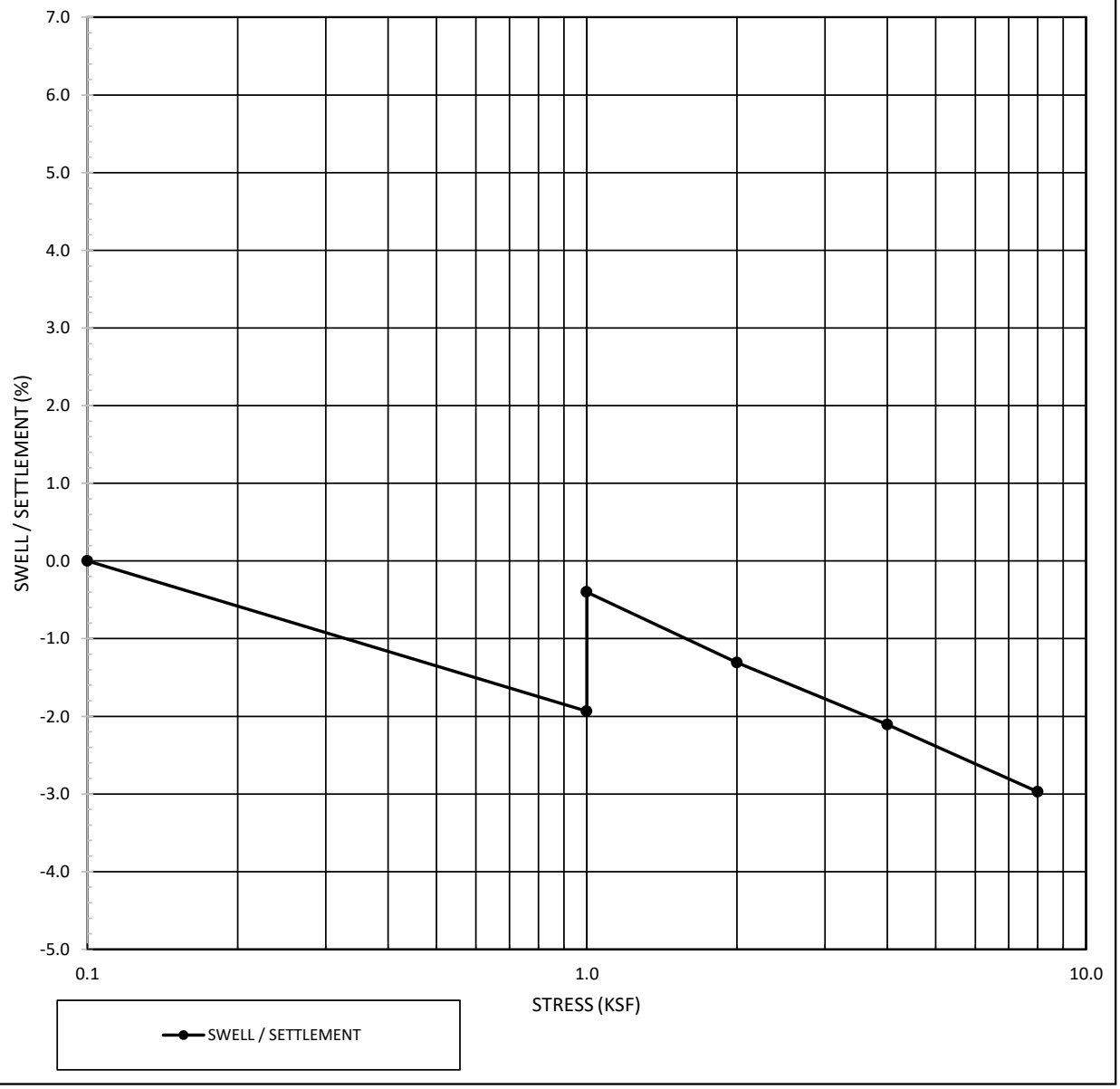


Initial Condition	
Moisture Content %	**19.5**
Dry Density (pcf)	**112.5**
Post-Swell Condition	
Moisture Content %	**19.8**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-9	**Sample Depth (ft)**	14
Sample Description:	Weathered CLAYSTONE greenish-brown, moist		

	%
Swell @ Wetting Weight:	**1.5**

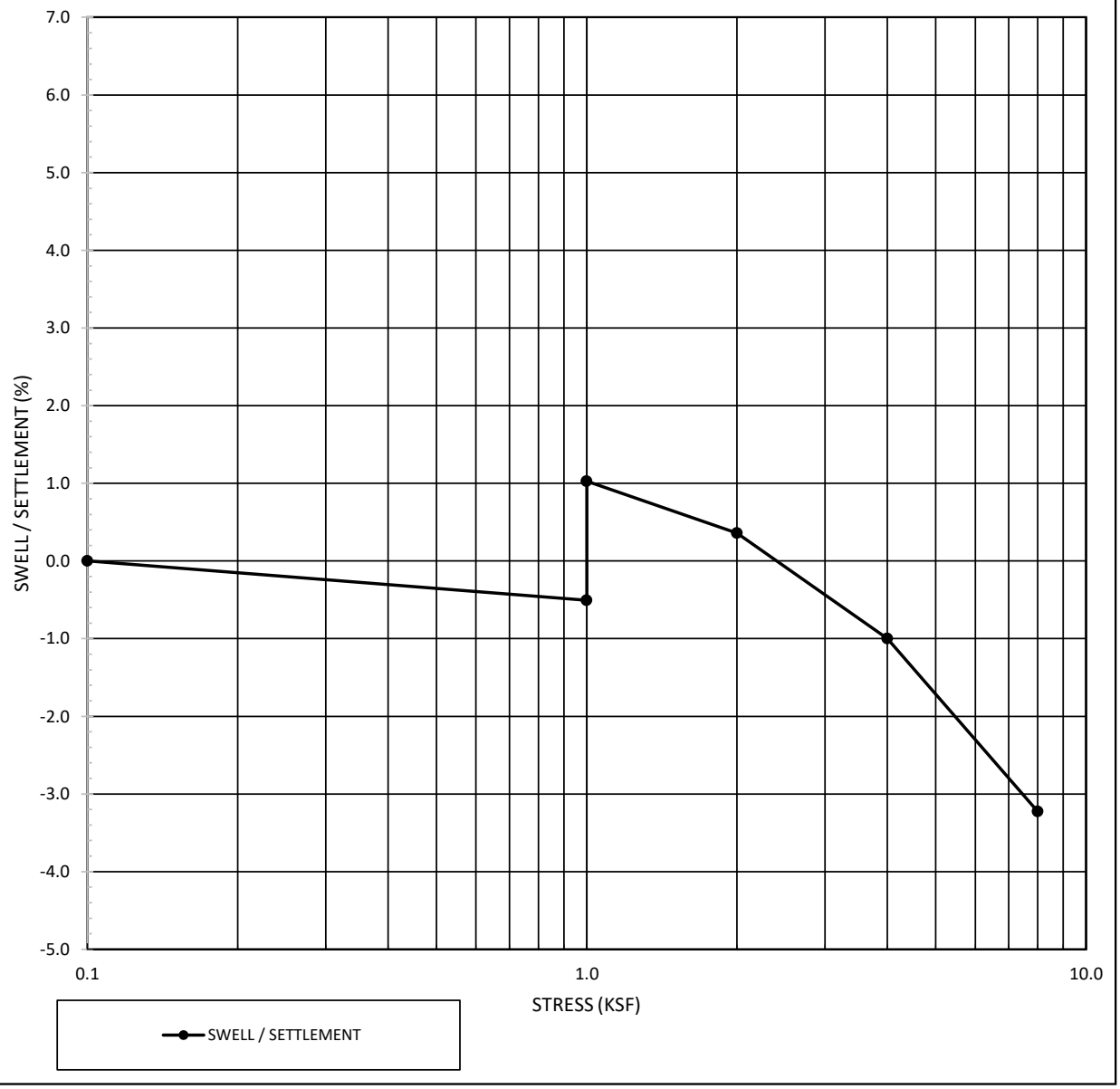


Initial Condition	
Moisture Content %	**21.5**
Dry Density (pcf)	**109.4**
Post-Swell Condition	
Moisture Content %	**22.1**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-11	**Sample Depth (ft)**	19
Sample Description:	Sandy CLAYSTONE, yellowish-brown, moist		

	%
Swell @ Wetting Weight:	**1.5**

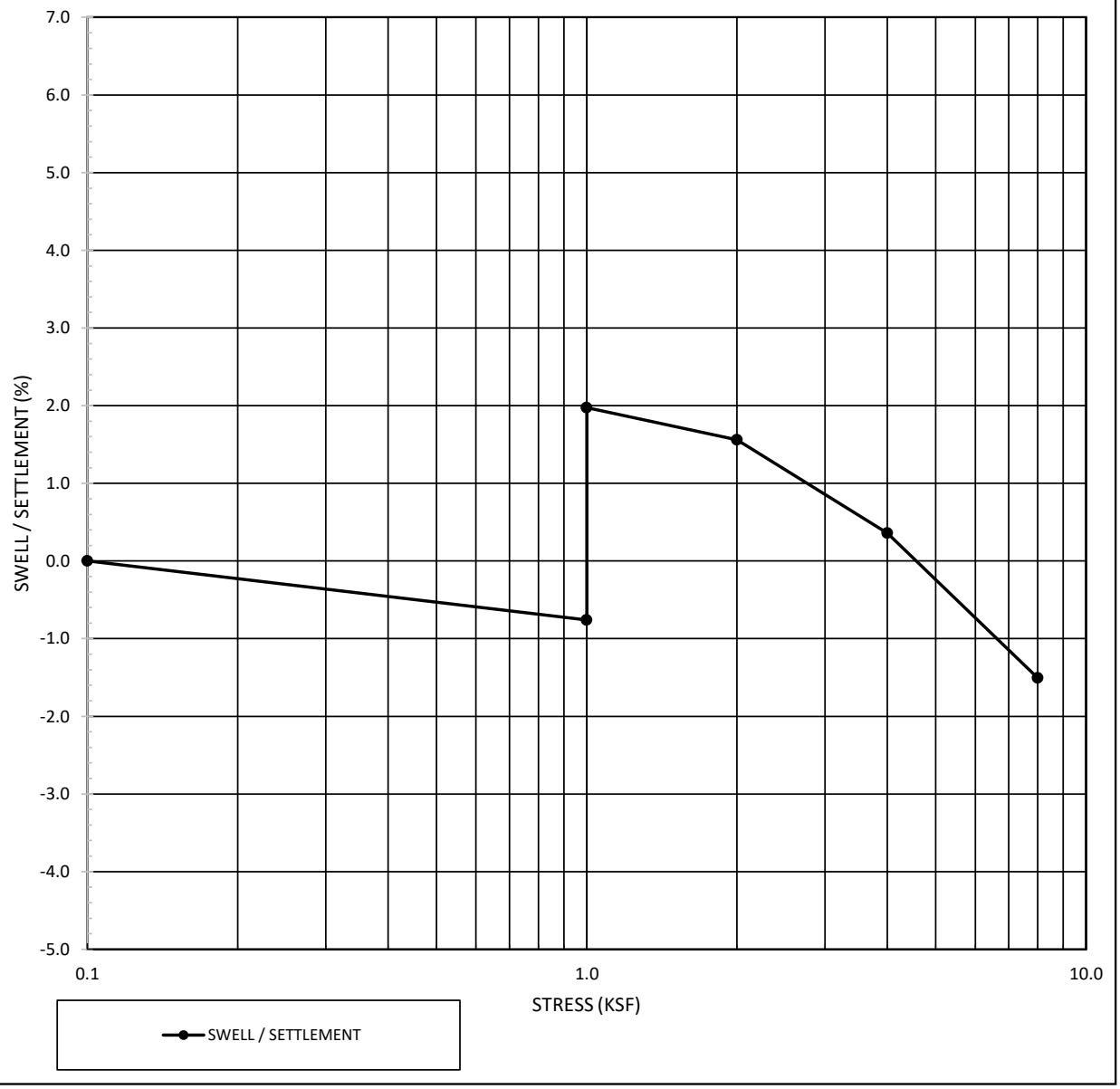


Initial Condition	
Moisture Content %	**21.1**
Dry Density (pcf)	**106.3**
Post-Swell Condition	
Moisture Content %	**22.3**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-12	**Sample Depth (ft)**	9
Sample Description:	Weathered CLAYSTONE, dark gray, moist		

	%
Swell @ Wetting Weight:	**2.7**

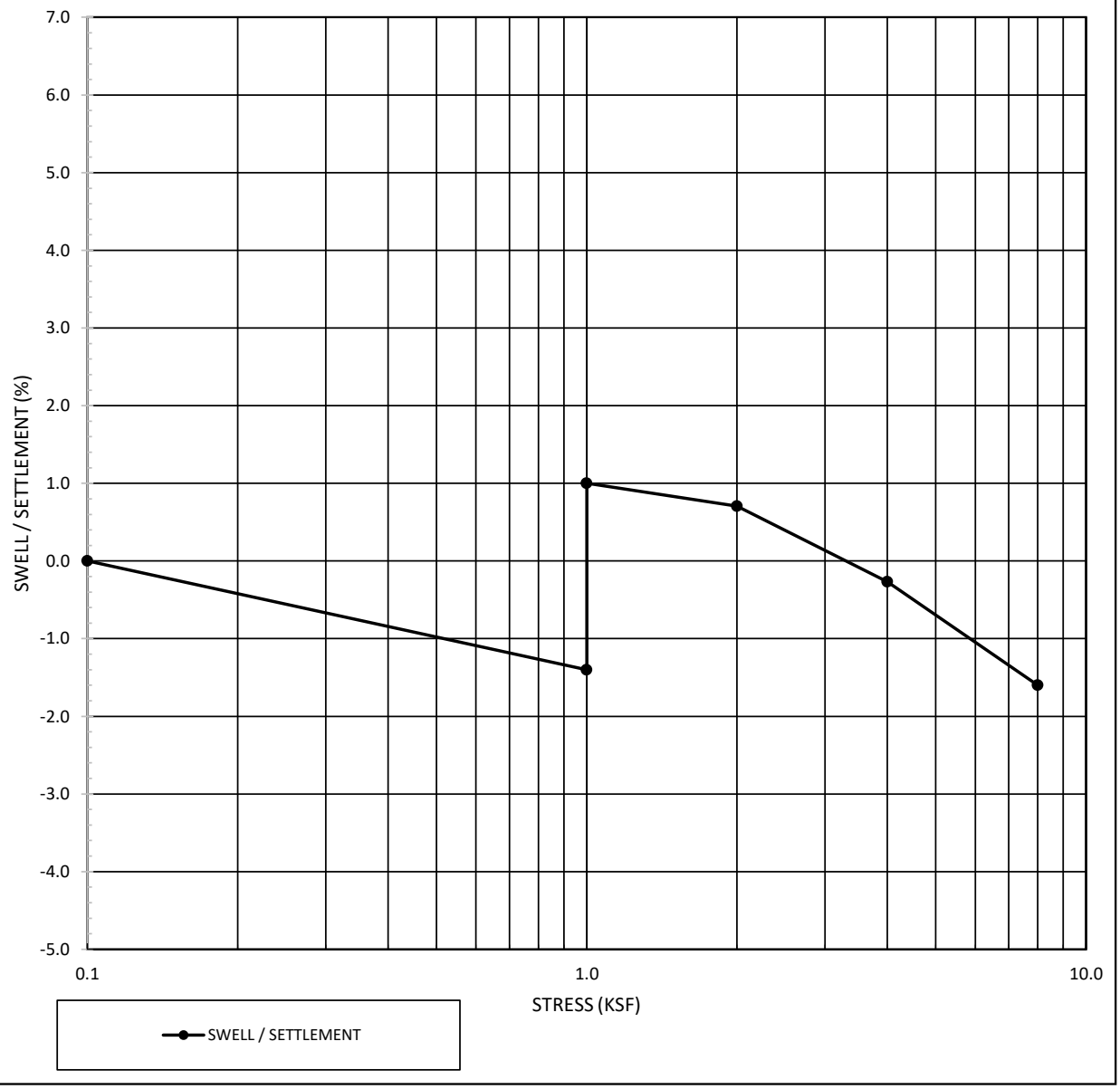


Initial Condition	
Moisture Content %	**29.3**
Dry Density (pcf)	**93.1**
Post-Swell Condition	
Moisture Content %	**31.4**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-12	**Sample Depth (ft)**	14
Sample Description:	CLAYSTONE, dark gray, moist		

	%
Swell @ Wetting Weight:	**2.4**

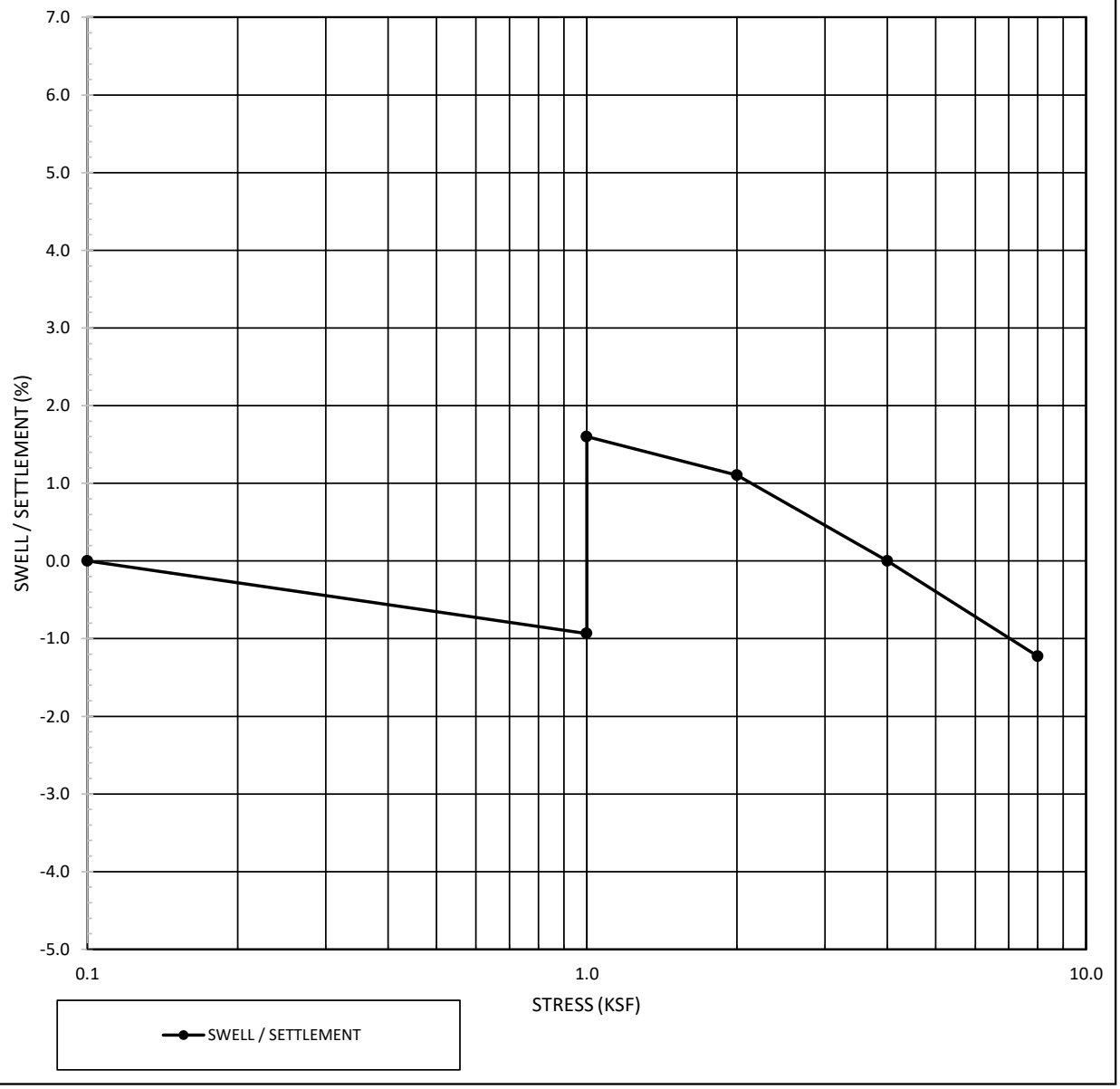


Initial Condition	
Moisture Content %	**23.5**
Dry Density (pcf)	**100.0**
Post-Swell Condition	
Moisture Content %	**25.6**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-12	**Sample Depth (ft)**	19
Sample Description:	CLAYSTONE, gray, moist		

	%
Swell @ Wetting Weight:	**2.5**

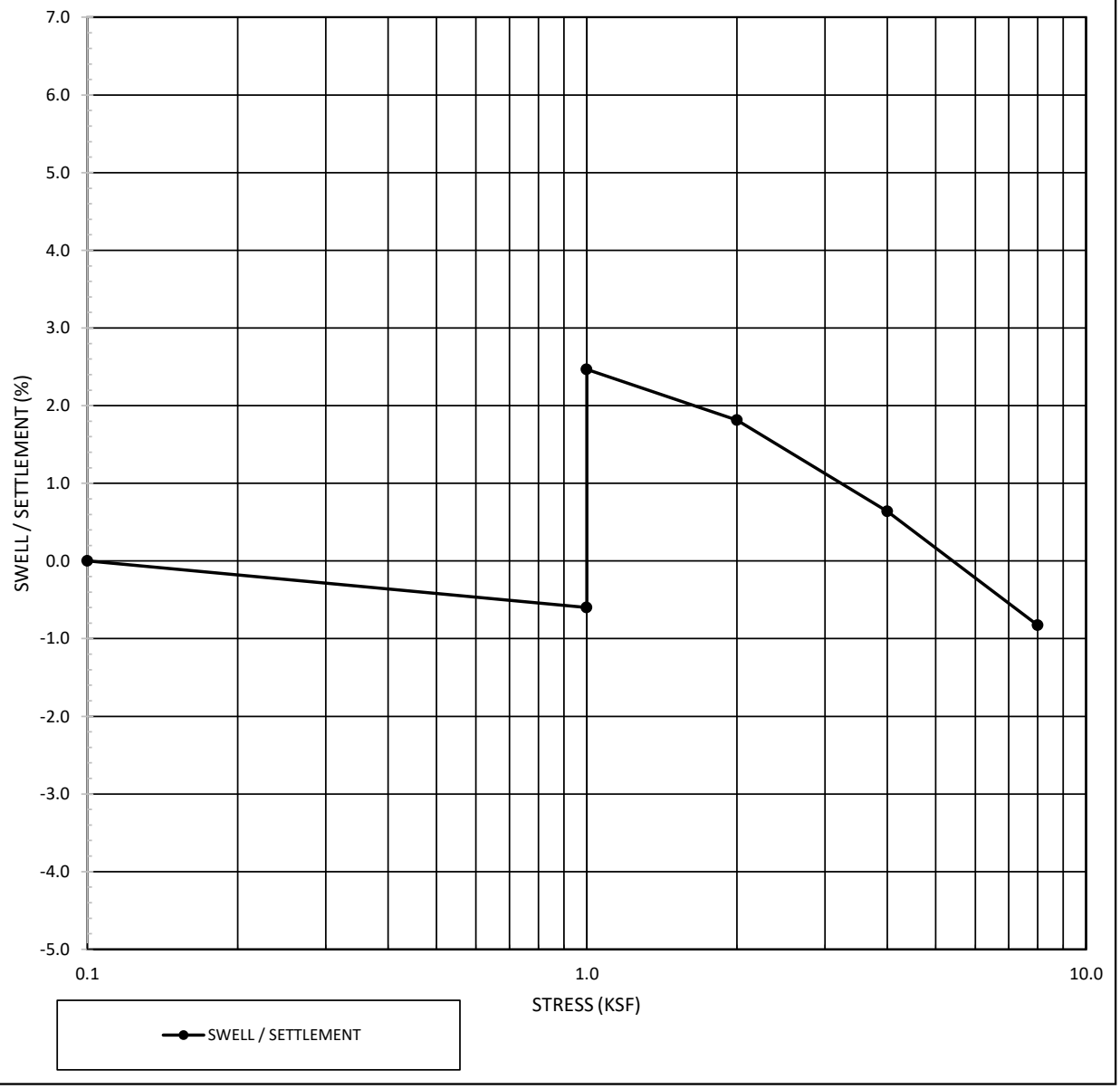


Initial Condition	
Moisture Content %	**26.8**
Dry Density (pcf)	**94.7**
Post-Swell Condition	
Moisture Content %	**30.1**

VIVID Engineering Group, Inc.

Project Name:	Pikes Peak BOCES Soils & Geology Evaluation	**Date**	6/20/2024
Project No.:	D24-2-759		
Boring ID.:	B-15	**Sample Depth (ft)**	19
Sample Description:	CLAYSTONE, gray, moist		

	%
Swell @ Wetting Weight:	**3.1**



Initial Condition	
Moisture Content %	**17.1**
Dry Density (pcf)	**112.0**
Post-Swell Condition	
Moisture Content %	**20.1**

Appendix C

Analytical Laboratory Test Results

Corrosion Test Results

Project Name:	PP BOCES Soils & Geology Evaluation	Tested By:	TA
Project No.	D24-2-759	Date Sampled:	7/3/2024
		Date Tested:	7/11/2024

Sample ID: **B-3 @ 9' + 19'** Matrix: Soil

Test	Results		Method
Chloride - Water Soluble	0.009	%	AASHTO T291-91/ASTM D4327
pH	7.9	units	AASHTO T289-91
Redox Potential	58.2	mv	ASTM D1498
Electrical Resistivity	1100	ohm-cm	AASHTO T288-91
Sulfate - Water Soluble	<0.001	%	CDOT CP-L 2103/ASTM D4327
Sulfide	Positive	-	AWWA C105

Sample ID: **B-9 @ 0-4'** Matrix: Soil

Test	Results		Method
Chloride - Water Soluble	0.004	%	AASHTO T291-91/ASTM D4327
pH	7.5	units	AASHTO T289-91
Redox Potential	55.8	mv	ASTM D1498
Electrical Resistivity	23000	ohm-cm	AASHTO T288-91
Sulfate - Water Soluble	<0.001	%	CDOT CP-L 2103/ASTM D4327
Sulfide	Trace	-	AWWA C105

Appendix D

Site Photos

SITE CONDITIONS AT BORING B-1 - LOOKING SOUTHEAST

SITE CONDITIONS AT BORING B-2 - LOOKING WEST

VIVID Engineering Group	Project No: D24-2-759	**SITE PHOTOS**	**FIGURE**
	Date: 7/2/2024	Pikes Peak BOCES Educational Park	
	Drawn by: SAM	Soils & Geology Evaluation	**D-1**
	Reviewed by: MBR	Northeast of Judge Orr Road and Elbert Road Peyton, Colorado	

SITE CONDITIONS AT BORING B-5 - LOOKING SOUTHEAST

SITE CONDITIONS AT BORING B-11 - LOOKING NORTH

VIVID Engineering Group	Project No: D24-2-759	**SITE PHOTOS**	**FIGURE**
	Date: 7/2/2024	Pikes Peak BOCES Educational Park	
	Drawn by: SAM	Soils & Geology Evaluation	**D-2**
	Reviewed by: MBR	Northeast of Judge Orr Road and Elbert Road Peyton, Colorado	