Structural
Geotechnical

Materials Testing
Forensic

SOIL AND GEOLOGY STUDY

Antlers Range Subdivision
NE Corner of Meridian Road and Ayer Road
El Paso County, Colorado

PREPARED FOR:

Antler Range, LLC
PO Box 38939
Colorado Springs, CO 80937

JOB NO. 198281

January 28, 2025

Respectfully Submitted,
RMG – Rocky Mountain Group

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Project Geologist

Reviewed by,
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1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project lies in the NW¼ of Section 36, Township 13 South, Range 64 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located south and east of the intersection of Jones Road and Slocum Road. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Proposed Land Use and Project Description

The total calculated area of the included parcel, as recorded on the El Paso County (EPC) Assessors website, is currently 244.38 acres. The proposed site development is to consist of rezoning and subdividing the parcel into 84 lots. The included parcel is:

- **EPC Schedule No. 4218000022**, contains 244.38 acres, currently labeled as N. Meridian Rd, and zoned A-35 – Agricultural.

It is our understanding that the parcel is to be subdivided into 84 2.5 acre lots. The subdivision is to be accessed from Ayer Road, east of Meridian Road. Each lot is to be serviced by an individual wastewater treatment system and well. Preliminary grading plans were still in process at the time of this study, but it is our understanding that grading is anticipated to be minor, with construction occurring near the existing grades. The Proposed Lot Layout, Figure 2, outlines the proposed subdivision and the general boundaries of our investigation.

An existing FEMA (Zone A) floodplain is mapped along the northern property boundary, within Black Squirrel Creek. The banks of the creek contain steep potentially unstable slopes. Three broad shallow drainages traverse the site from the south to the north. Two earthen dams are present on the site. Water was not present in the drainages or in the two earthen dams observed at the time of our site visit on December 23, 2024. It is our understanding the earthen dams are to be demolished, and the areas filled in and regraded. There are no structures on the property. This report presents the results of our geologic evaluation and provides our conclusions and recommendations regarding the geologic conditions which could potentially affect the proposed development.

2.0 QUALIFICATIONS OF PREPARERS

This *Soil and Geology Study* was prepared by a professional geologist as defined by Colorado Revised Statures section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42)

The principle investigators for this study are Kelli Zigler, P.G. and Tony Munger, P.E. Ms. Zigler is a Professional Geologist as defined by State Statute (C.R.S 34-1-201) with over 24 years of experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in

experience in the geological and geotechnical engineering field. Ms. Kelli Zigler holds a B.S. in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations throughout Colorado.

Tony Munger is a licensed professional engineer with over 24 years of experience in the construction engineering (residential) field. Mr. Munger holds a Bachelor of Science in Architectural Engineering from the University of Wyoming. Mr. Munger has supervised and performed numerous geological and geotechnical field investigation programs in Colorado.

3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical and geologic site conditions, and present our opinions of the potential effect of these conditions on the proposed development to include single-family within the referenced proposed development. As such, our services exclude evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

This study has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC) specifically Chapter 8 last updated August 27, 2019 applicable sections include 8.4.8 and 8.4.9. and the Engineering Criteria Manual (ECM), specifically Appendix C last updated July 9, 2019.

This report presents the findings of the study performed by RMG relating to the geotechnical and geologic conditions of the above-referenced site. Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

3.1 Scope and Objective

The scope of this study included a physical reconnaissance of the site and a review of pertinent, publically available documents including (but not limited to) previous geologic and geotechnical reports, overhead and remote sensing imagery, published geology and/or hazard maps, design documents, etc. Our services exclude the evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

The objectives of our study are to:

- Identify geologic conditions that are present on this site,
- Analyze the potential negative impacts of these conditions on the proposed site development,
    - Analyze the potential negative impacts to the surrounding properties and/or public services resulting from the proposed site development as it relates to existing geologic hazards,
    - Provide our opinion of suitable techniques that may be utilized to mitigate the potential negative impacts identified herein.

This report presents the findings of the study performed by RMG relating to the geologic conditions of the above-referenced site. Revisions and modifications to this report may be issued subsequently by RMG, based upon:

- Additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report,
- Review of pertinent documents (development plans, plat maps, drainage reports/plans, etc.) not available at the time of this study,
- Comments received from the governing jurisdiction and/or their consultants subsequent to submission of this document.

3.2 Site Evaluation Techniques

The information included in this report has been compiled from:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent engineering reports by RMG and others
- Available aerial photographs
- Exploratory soil test borings and test pits by RMG
- Laboratory testing of representative site soil and rock samples
- Geologic research and analysis
- Site development plans prepared by others

Geophysical investigations were not considered necessary for characterization of the site geology. Monitoring programs, which typically include instrumentation and/or observations for changes in groundwater, surface water flows, slope stability, subsidence, and similar conditions, are not known to exist and were considered applicable for the scope of this report.

3.3 Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site were available for our review and are listed below:

1. *Wastewater Study, Antler Range, El Paso County, Colorado,* prepared by RMG Engineers, dated January 28, 2024
2. *Soils and Geology Study, Meridian-Ayer Road Development, El Paso County, Colorado,* prepared by Kumar & Associates, Project No. 042-174, June 17, 2004.
3. *Geologic and Soil Report, The Trails Subdivision, El Paso County, Colorado, Project No. 1100,* prepared by MVE, Inc., dated November 28, 1984.

The findings, conclusions and recommendations contained in those reports and the reports referenced within Appendix A were considered during the preparation of this report.

3.4 Additional Documents

Additional documents reviewed during the performance of this study are included in Appendix A.

4.0 SITE CONDITIONS

4.1 Existing Site Conditions

The subject site is currently vacant, fairly undisturbed land that has historically been used for cattle grazing. The site is bound to the north by a residential subdivision known as Latigo Country Estates, to the east by The Trails, Filing No. 2, to the south by Ayers Road, and to the west by Meridian Road.

Topographically, the site consists of undulating to gently rolling hills that generally slope down to the north towards Black Squirrel Creek. The banks of Black Squirrel Creek appeared to have a combination of stables slopes (sandstone exposed) and unstable slopes (sloughing of sands). The bottom of the creek contained a steady flow of water and is heavily eroded in areas. The banks, where sandstone cliffs were not exposed, generally are heavily vegetated with mature vegetation and deciduous trees. Black Squirrel Creek lies within the FEMA floodplain.

Vegetation across the remainder of the site consists of grasses, weeds, yuccas, and trees. Three broad shallow drainages traverse the site from the south to the north. Water was not present in the drainages. Two earthen dams are present on the site. Water was not present in the drainages or in the two earthen dams observed at the time of our site visit on December 23, 2024. It is our understanding the earthen dams are to be demolished, and the areas filled in and regraded. There are no structures on the property. Elevations across the property range between approximately 100 to 150 feet in elevation difference from the southern property boundary to the northern property boundary.

4.2 Aerial photographs and remote-sensing imagery

Personnel of RMG reviewed aerial photos available through Google Earth Pro dating back to 1999, and historical photos by historicaerials.com dating back to 1947. 1947 shows the site and surrounding area as undisturbed land with defined drainages. The residence and barn to the north of the site were constructed prior to 1947. Depending on the time of the year and the lighting, the broad drainages appear fairly defined, and water does not appear to be flowing freely outside the defined drainageways. Prior to 1983, the earthen dams on the property were constructed. The ponds created by the earthen dams have historically contained water, but were dry at the time of the site visit on December 23, 2024. Overall, the site has undergone minor surficial changes.

5.0 FIELD INVESTIGATION AND LABORATORY TESTING

Once the subdivision is approved, it is our understanding that each lot is to contain a single-family residence, well, and On-site Wastewater Treatment System (OWTS).

5.1 RMG Drilling

The subsurface conditions across the site were explored by RMG by drilling sixteen (16) exploratory borings. The test borings were performed on December 23, 2024 and extended to 20 to 35 feet below the existing ground surface. Additionally, seventeen (17) test pits were also observed on December 23, 2024. The approximate locations of the test borings and test pits are presented on the Test Pit/Boring Location Plan, Figure 3.

The test borings were drilled with a power-driven, continuous-flight auger drill rig. Samples were obtained during drilling of the test boring in general accordance with ASTM D-1586 and D-3550, utilizing a 2-inch O.D. Split Barrel Sampler and a 2½-inch O.D. California sampler, respectively. An Explanation of Test Boring Logs is presented in Figure 4. The Test Boring Logs are presented in Figures 5 through 12.

5.2 RMG Laboratory Testing

The moisture content for the recovered samples was obtained in the laboratory. Grain-size analysis, Atterberg Limits, and Denver Swell/Consolidation tests were performed on selected samples for purposes of classification and to develop pertinent engineering properties. A Summary of Laboratory Test Results is presented in Figure 13. Soil Classification Data are presented in Figure 14-17. The Denver Swell/Consolidation tests are presented in Figure 18.

5.3 Test Pit Excavations: OWTS Visual and Tactile Evaluation

The 17 test pits noted above were performed to explore the subsurface soils surrounding the existing On-site Wastewater Treatment Systems. The number of test pits is in accordance with Regulations of the El Paso County Board of Health, Chapter 8, On-site Wastewater Treatment Systems (OWTS) as required by 8.5.D.3.a. Visual and tactile evaluations were performed in conjunction with this investigation. The soils were evaluated to determine the soil types and structures.

The test pits were excavated to approximately 3.5 to 8 feet below the existing ground surface. Shallower termination depths (less than 8 feet) indicate a limiting/restrictive layer of bedrock was encountered. Bedrock was observed in 6 of the 17 test pits at depths between 3.5 and 7 feet below the ground surface. Bedrock is considered a restrictive layer for the OWTS. Evidence of seasonally fluctuating surface water and/or perched groundwater was observed in five of test pits. Groundwater is also considered a restrictive layer for the OWTS.

Observations of a true groundwater table was not observed in the test pits. However, three of the test pits (TP-4, TP-5, TP-7) had indications of redoximorphic features (*color patterns in soil that are caused by the oxidation and reduction of iron and manganese*), underlying the topsoil. It is our opinion the upper redoximorphic features were indicating the surface water has historically filtered through the topsoil and becomes perched atop the underlying sandstone and/or claystone bedrock. This observation coincided with the test pits located within the lower lying areas that appear to have contained standing surface water prior to our site visit, as the top 8 to 12 inches of soil were "frozen". The remainder of the test pits did not contain frozen soil at the surface.

TP-7 and TP-13 exhibited indications of redoximorphic features near the bottom of the 7 to 8-foot depth of the test pits, this seemed indicative of the soil texture changing to a dense cemented clay soil that would retain moisture. Additional information is provided in Section 9.0, On-site Disposal of Wastewater. The test pit logs and soil descriptions are presented in the Wastewater Study, included in Appendix C.

5.4 Groundwater

Water was encountered in seven of the test borings at the time of drilling. Due to the grazing cattle on the site, the test borings were immediately backfilled subsequent to drilling, and follow-up water checks could not be performed. The depth of water ranged between 7 and 34 feet below the ground surface in the test borings.

6.0 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

6.1 Geologic Conditions

The site physiographically lies in the western portion of the Great Plains Physiographic Province south of the Palmer Divide. Approximately 6 miles to the west is a major structural feature known as the Rampart Range Fault. The fault marks the boundary between the Great Plains Physiographic and Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. The bedrock underlying the site consists of the Dawson Arkose Formation. Overlying this formation are unconsolidated deposits of residual soils and alluvial soils of the upper Cretaceous and Paleocene Age. The residual soils are produced by the in-situ action of weathering of the bedrock.

6.2 Subsurface Soil Conditions

The subsurface soils encountered in the test borings performed by RMG were classified using the Unified Soil Classification System (USCS). The laboratory testing performed revealed the on-site soils and bedrock classified as sandy clay (CL), clayey sand (SC), silty sand (SM), and well graded sand with silt (SW-SM). Siltstone (anticipated to classify as ML) was also encountered in our test borings.

The subsurface soils encountered in the test pit excavations were classified using the United States Department of Agriculture (USDA) soil classification system. The on-site soils classified as into 11 different varieties of soil, including a combination of sand and gravel, silty to clayey sand, loamy sand, silty to sandy clay, and clay loam.

6.3 Bedrock Conditions

Bedrock was encountered in the majority of the test borings and approximately half the test pit excavations used for this investigation. In general, the bedrock (as defined by Colorado Geologic Survey) beneath the site is considered to be part of the Dawson Formation which consists of about half silty sandstone and conglomerate, and half interbedded layers of shale, claystone, and

siltstone. The Dawson formation is thick-bedded to massive, generally light colored arkose, pebbly, and pebble conglomerate. The sandstones are poorly sorted with high clay contents. The sandstone is generally semi-permeable, somewhat well drained, and has good foundation characteristics. The Dawson formation is generally considered a restrictive layer for OWTS.

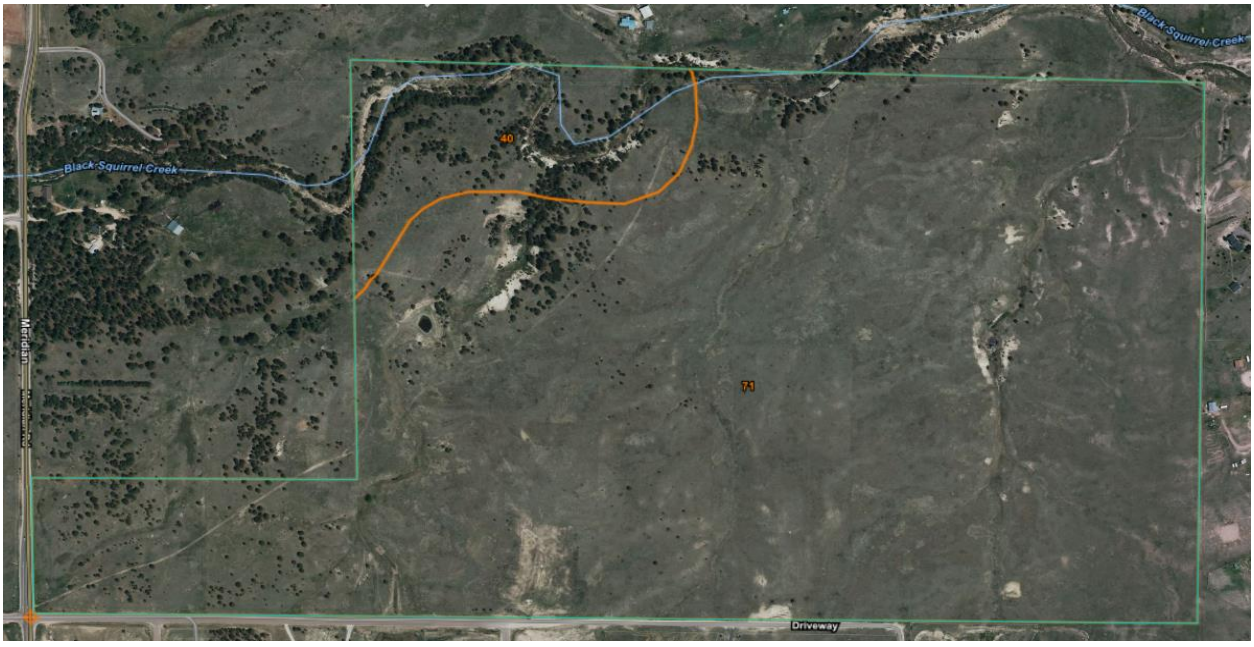
The sandstone was encountered in the majority of the test borings at depths ranging between 3 and 7 feet below the surface, but was deeper than 20 feet in two of the borings. Based on our observations, the sandstone generally increases in depth as the surface topography increases in surface elevation.

6.4 U.S. Soil Conservation Service

The U.S. Soil Conservation Service along with USDA has identified the soils on the property as:

- 41 – Kettle gravelly loamy sand, 8 to 40 percent slopes. The Kettle gravelly loamy sand was mapped by the USDA to be located near the northwest portion of the property. The. Properties of the Kettle gravelly loamy sand include, somewhat excessively drained soil, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms are depressions.
- 71 – Pring coarse sandy loam, 3 to 8 percent slopes. The Pring coarse sandy loam encompasses the majority of the property. Properties of the Pring coarse sandy loam include, well-drained soil, depth of the water table is anticipated to be more than 80 inches, runoff is anticipated to be low, frequency of flooding is none and ponding is none. Landforms include hills.

The USDA Soil Survey Map is presented below.



6.5 General Geologic Conditions

Based on our field observations and review of relevant geologic maps, a geologic map was prepared which identifies the geologic conditions affecting the development. The geologic units present on the site are presented in the Engineering and Geology Map, Figure 19.

The site generally consists of silty to clayey sand and clay overlying the Dawson Formation. The silty sand is generally permeable, well drained, and has good foundation characteristics. As the clay content increases, the permeability and foundation characteristics decline. The sandstone will likely be encountered across the site at various depths is considered less permeable and not as well drained, but generally suitable for foundations. The geologic units mapped at the site were as follows:

- *Tkdw – Dawson Formation, (Upper Cretaceous and Paleocene)* – the unit is generally drab colored; which includes shades of grey, yellow and brown. Pebbles are mostly granitic, quarts, feldspar, with pebbles ranging up to 2 inches in diameter. This unit is approximately 1,350 feet thick in this area. The sandstone was encountered in the test borings at depths as shallow as 2 feet and deeper than 25 feet.
- *fw – floodway* as designated by FEMA. This area is to be designated a "No Build Area". No construction is to occur within the FEMA floodway.
- *sw – seasonally wet areas* – low lying areas that may contain surface water during heavy precipitation events (rain, snow melt).
- *Af – Artificial fill* – disturbed soil that has been reworked by man, e.g the earthen dams.
- *iss – isolated steep slopes* – slopes along the banks of the broad drainageways that are approximately 30 percent or greater. These slopes, if disturbed can be regraded.
- *Ss – steep slopes* – slopes along Black Squirrel Creek that are potentially unstable. These slopes lie within the FEMA floodplain and should not be disturbed by the proposed development. It is recommended a 50-foot setback be maintained from the top of the creek banks unless slope stability analyses and/or scour analyses performed along the banks of the creek demonstrate adequate factors of safety. This setback area is to be designated as a "No Build Area".

6.6 Structural Features

Structural features such as schistocity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed on the site, or in the surrounding area.

6.7 Surficial (Unconsolidated) Deposits

Swamp accumulations, sand dunes, marine terrace deposits, talus accumulations, creep, or slope wash were not observed on the site. Slump and slide debris were also not observed on the site. The alluvial deposits are non-marine terrace deposits that have been reworked from conglomerates in the Dawson Formation up-valley along nearby creeks.

6.8 Groundwater

The site contains no existing structures. Topographically, the site is lowest near the floodplain boundaries and the earthen dams. Elevations gradually increase to the south and east with gentle rolling terrain.

Water was encountered in seven of the test borings at the time of drilling. Due to the grazing cattle on the site, the test borings were immediately backfilled subsequent to drilling, and follow-up water checks could not be performed. The depth of water ranged between 7 and 34 feet below the ground surface in the test borings.

6.9 Engineering Geology

One environmental engineering unit is discussed below:

- 7A - Physiographic flood plain where erosion and deposition presently occurs and is generally subject to recurrent flooding. Includes the 100-year flood plain along major streams where flood plain studies have been conducted.

The engineering and geology is presented in the Engineering and Geology Map, Figure 19.

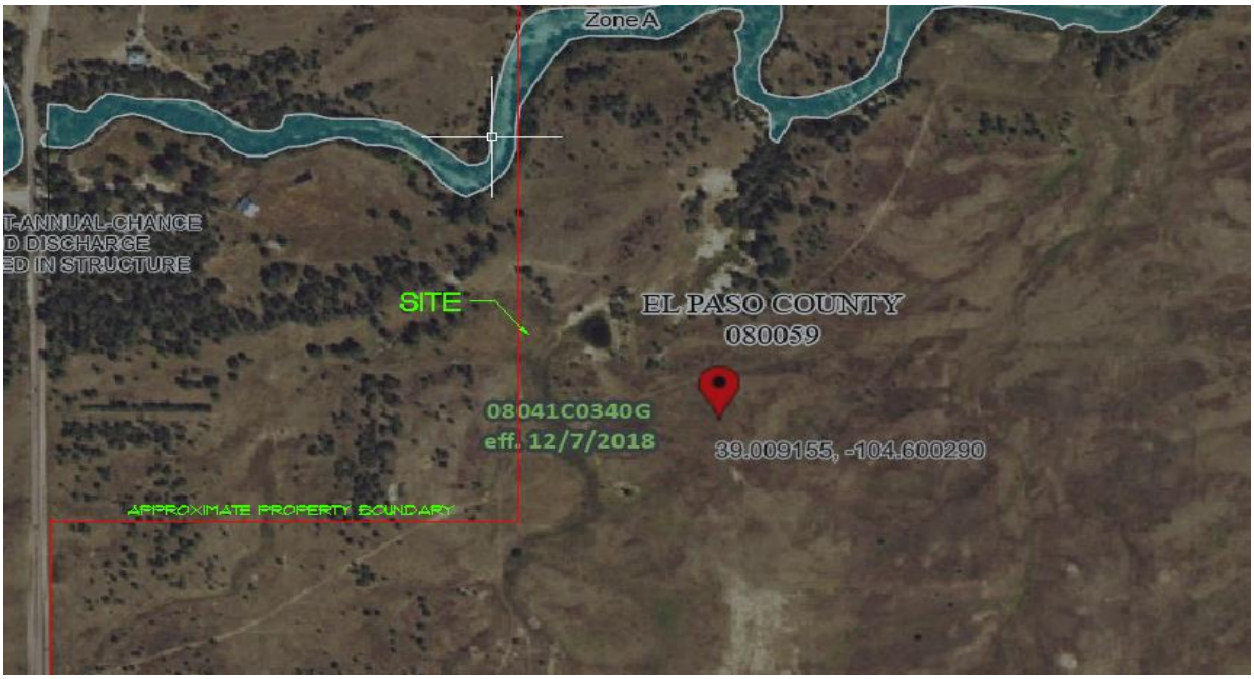
6.10 Features of Special Significance

Features of special significance such as accelerated erosion, (advancing gully head, badlands, or cliff reentrants) were observed within Black Squirrel Creek, on the northern portion of the property. Features indicating settlement or subsidence such as fissures, scarplets, and offset reference features were not observed on the property or surrounding areas.

Features indicating creep, slump, or slide masses in bedrock and surficial deposits were observed within and along the boundaries of Black Squirrel Creek but were not observed on the remainder of the site.

6.11 Flooding and Surface Drainage

Based on our review of the Federal Emergency Management Agency (FEMA) Community Panel No. 08041C0340G the online ArcGIS Pikes Peak Regional Floodplain Map, Black Squirrel Creek lies in the FEMA Floodway. A LOMR was completed by Kiowa Engineering (2006), which did not contain Base Flood Elevations (BFE). The lots containing (or adjacent to) the creek range in elevation from 15 to 50 feet higher than the bottom of creek. The remainder of the site lies outside the 100-year or 500-year floodplains. The FEMA Map is presented below.



7.0 ECONOMIC MINERAL RESOURCES

Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *El Paso Aggregate Resource Evaluation Map, Master Plan for Mineral Extraction*, *Map 1* indicates the site is identified as eolian deposits, windblown sands. Extraction of the sand resource is not considered to be economical compared to materials available elsewhere within the county.

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 area of the site has been mapped "Poor" for coal resources, no active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on the site.

8.0 IDENTIFICATION AND MITIGATION OF POTENTIAL GEOLOGIC CONDITIONS

The El Paso County Engineering Criteria Manual recognizes and delineates the difference between hazards and constraints. A geologic hazard is one of several types of adverse geologic conditions capable of causing significant damage or loss of property and life. Geologic hazards are defined in Section C.2.2 Sub-section E.1 of the ECM. A geologic constraint is one of several types of adverse geologic conditions capable of limiting or restricting construction on a particular site. Geologic constraints are defined in Section C.2.2 Sub-section E.2 of the ECM (1.15 Definitions of Specific Terms and Phrases). The following geologic conditions were considered in the preparation of this report, and are not anticipated to pose a significant risk to the existing development:

- Avalanches
- Debris Flow-Fans/Mudslides
- Ground Subsidence
- Landslides
- Rockfall
- Steeply Dipping Bedrock

The following section presents the geologic conditions that have been identified on the property:

8.1 Expansive Soils and Bedrock - *constraint*

Based on the laboratory testing performed by RMG and on the results presented in the previous investigations, referenced herein, the sandy clay and claystone generally possesses low to moderate swell potential. Expansive clay soils and bedrock were encountered on this site and may require mitigation prior to construction of the existing residences.

Mitigation

Localized overexcavation below the proposed foundations and replacement with structural fill is anticipated to be the preferred mitigation for expansive soils. Expansive soils and/or bedrock were encountered at depths expected to affect foundation components and/or floor slabs. Expansive soils (if encountered) may require overexcavation up to depths of 3 to 4 feet where encountered. Moisture-conditioning and recompacting the on-site clays (if desired) may also be considered for mitigation of expansive materials, but may result in differing overexcavation depths and foundation design parameters. Floor slabs bearing directly on expansive material should be expected to experience a higher degree of movement. Overexcavation and replacement below the floor slabs has been successful in reducing slab movement. If slab movement cannot be tolerated, drilled straight-shaft piers below foundation components is an alternative to the overexcavation and replacement.

The final determination of mitigation alternatives and foundation design criteria were determined in site-specific subsurface soil investigations for each lot. Provided that appropriate mitigations and/or foundation design adjustments were implemented, the presence of expansive soils is not considered to pose a risk to the structures.

8.2 Compressible Soils

Compressible soils include both compressive and collapsible soils. Compressible soils are prone to volumetric change when subjected to a mechanical load. Collapsible soils are metastable in that they are prone to volumetric change (collapse) on wetting and loading. The surficial soils are known to exhibit these characteristics. Based on our investigation, the surficial soils generally possess low compressibility potential.

Mitigation

If loose soils are encountered beneath the foundations, mitigation will be required. Due to the variability of the soil/bedrock conditions across the site and the anticipated 2.19 to 5.88-acre lot sizes, “mass” subexcavation of very loose to loose materials is not currently proposed, nor are we proposing it at this time.

Localized overexcavation below the proposed foundations and replacement with structural fill is anticipated to be the preferred mitigation. If very loose to loose soils are encountered during the open excavation observation, they may require removal and recompaction of up to 2 to 3 feet of loose soil. The use of track-mounted excavation equipment, or other low ground pressure equipment, is recommended on loose soils to reduce the likelihood of loss of stability during excavation.

The final determination of mitigation alternatives and foundation design criteria are to be determined in site-specific subsurface soil investigations for each lot. Provided that appropriate mitigations and/or foundation design adjustments are implemented, the presence of compressible soils is not considered to pose a risk to the proposed structures.

8.3 FEMA Floodway - *hazard*

Based on our review of the FEMA map and the online ArcGIS El Paso County Risk Map, Black Squirrel Creek, located along the northern portion of the property, lies within the 100-year floodplain. However, the majority of the site does lie outside the Regulatory Floodway.

Mitigation

For the lots that lie adjacent to Black Squirrel Creek, the contractor will need to take the floodway into consideration when determining the location of the proposed residences. With the 2.5 acre lots, the proposed residences and any detached structures can remain outside the designated Regulatory Floodway. The boundaries of the floodplain are presented on Figure 19, Engineering and Geology Map. Currently we are proposing the Regulatory Floodway of Black Squirrel Creek be considered a "No Build Area". No construction should occur within this area. Currently, future construction north of Black Squirrel Creek is not considered plausible due to access restraints.

Additionally, the banks of Black Squirrel Creek are steep and considered unstable in areas. Scour, erosion, and accelerated erosion along the creek banks is also concern. Without additional slope stability analysis or scour and erosion studies, it is recommended the residences and detached structures maintain a minimum of 50 feet from the banks of the creek. Due to access restraints to the areas north of the creek, we are anticipating all construction of new residences is to remain south of the creek. The designated "No Build Area" should include the creek, the areas north of the creek, and the 50-foot setback south of the creek.

Per the latest approved edition of the Pikes Peak Regional Building Code, the lowest finished floor elevation (including basement together with attendant utility and sanitary facilities) shall be elevated one-foot or more above the BFE, as designated by FEMA.

Provided that the recommendations presented herein, as well as any requirements stipulated by the governing regulatory agencies, are followed, the presence of the revised floodplain/floodway is not anticipated to preclude the proposed construction.

8.4 Springs and High Groundwater– *constraint*

Based on our site observations and review of the Eastonville Quadrangle Geologic Map, El Paso and Elbert Counties, Colorado and Google Earth images dating back to September 1999, springs do not appear to originate on the subject site.

Water was encountered in seven of the test borings at the time of drilling. Due to the grazing cattle on the site, the test borings were immediately backfilled subsequent to drilling, and follow-up water checks could not be performed. The depth of water ranged between 7 and 34 feet below the ground surface in the test borings.

However, only two of the test borings (TB-6 and TB-7) had water shallower than 18 feet, and in both of those the water was encountered at the top of a sandstone layer. In one case, the water was encountered at the interface between the upper sand soil and the sandstone bedrock. In the other, the water was encountered at the interface between two differing layers of bedrock. Based on our review, these two are suggestive of localized amounts of subsurface water perched atop the sandstone bedrock in two differing layers of the subsurface profile. They do not appear to be interconnected, nor do they appear to be part of a larger subsurface water system. It is our opinion that the water encountered in our test borings TB-6 and TB-7 is not indicative of a subsurface "groundwater" condition with sufficient source water to significantly impact basement foundations.

We do understand surface and subsurface water elevations will fluctuate throughout the year. We also reviewed various soil reports by RMG from the surrounding subdivisions to the north, south, east, and west of Meridian Road, completed between January 2003 and October 2019 and referenced in Appendix A, in conjunction with the reports (by others) referenced above. Overall, the borings for the referenced investigations were drilled at various times throughout the year, and groundwater has been encountered in all four seasons at depths of 13 feet or greater. Only one of the reviewed reports (Kumar's 2004 study for the subdivision to the south, referenced above) reportedly encountered subsurface water shallower than 13 feet (at 7 feet), and that was also only in a single test boring. The overall data in those other reports is consistent with our findings in this report.

It should be noted that perched water conditions may still be encountered during (or after) construction, due to the variable permeability of the subsurface soil/bedrock. Isolated sand and gravel layers within the soil, even those of limited thickness and width, can convey subsurface water. Subsurface water may also flow within the upper sand soils, atop the underlying bedrock.

Builders and planners should be cognizant of the potential for the occurrence of subsurface water conditions, in order to evaluate and mitigate each individual problem as necessary. Fluctuations in groundwater and subsurface moisture conditions will occur due to variations in rainfall, irrigation,

changes in surface drainage patterns, and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

Mitigation
Future construction for the proposed foundations must have a minimum 30-inch depth for frost protection. Perimeter drains are recommended around portions of the structures which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable. Perimeter drains are recommended for portions of the structures which will have below-grade spaces to help reduce the intrusion of water into areas below grade. A typical perimeter drain detail is presented in Figure 20.

Future construction will need to account for localized perched water conditions, where encountered. Additionally, if subsurface water shallower than 15 feet is encountered in future subsurface soil investigations or in the excavations during construction, it is our opinion that they can be readily mitigated using typical construction practices common to this region. If subsurface water is encountered within 6 feet below the bottom of foundation components at the time of the site-specific subsurface soil investigation, additional drains, (e.g underslab drainage layers) may also be required.

Provided that the recommendations presented herein are complied with, the subsurface water conditions encountered in our test borings is not anticipated to pose a risk to the proposed structures. We do not recommend that basement construction be restricted at this time.

8.5 Unstable or Potentially Unstable Slopes - *hazard*

Steep slopes exist along the banks of Black Squirrel Creek. These slopes can be avoided by maintaining the recommended 50-foot setback from the banks of Black Squirrel Creek. The remainder of the site, outside the floodway, does contain a few isolated slopes at or near 30%. These slopes are generally located along the banks of the drainageways traversing the site from south to north and near the man-made earthen berms. It is our understanding the earthen dams are to demolished, and the areas filled in and regraded to a maximum slope of 3:1 (horizontal to vertical).

Mitigation
Isolated slopes encountered on the lots can either be avoided or regraded. The majority of the isolated slopes across the site are comprised of sandstone bedrock. The sandstone of the Dawson formation is generally considered stable up to a 1:1 (horizontal to vertical) cut. Interbedded claystone seams may be present within the sandstone but they are generally encountered in 1- to 2-foot layers within the sandstone and generally do not affect the overall slope stability.

The rolling terrain and slopes across the site create a natural walkout basement configuration for future residences. If a foundation were to be placed atop these slopes, the slope could be replaced with a concrete foundation. Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

Additionally, the banks of Black Squirrel Creek are steep and considered unstable in areas. Scour, erosion, and accelerated erosion along the creek banks is also concern. Without additional slope stability analysis or scour and erosion studies, it is recommended the residences and detached structures maintain a minimum of 50 feet from the banks of the creek. Due to access restraints to the areas north of the creek, we are anticipating all construction of new residences is to remain south of the creek. The designated "No Build Area" should include the creek, the areas north of the creek, and the 50-foot setback south of the creek.

8.6 Surface Drainage - *constraint*

Since portions of the northern property lie within a designated Regulated Floodway of Black Squirrel Creek, its drainageway should be taken into consideration when considering the placement of any future structures, particularly the lots adjacent to the creek.

Mitigation
Black Squirrel Creek should and can be avoided by construction. Structures should not encroach within 50 feet of the creek. Any site grading should be done in a manner to avoid ponding of water around the structures and treatment area.

All construction should remain outside the Black Squirrel Creek drainageway. It is recommended Black Squirrel Creek be identified as a "No Build Area". These areas are shown on Figure 19.

8.7 Undocumented/Uncontrolled Fill - *constraint*

Fill soils resulting from the man-made earthen dams are to be considered undocumented fill and unsuitable for bearing of new foundations. Uncontrolled fill has generally not be compacted property or all at, and may contain expansive clays.

Mitigation
The fill soils are limited to the areas immediately surrounding the earthen dams. These areas are to be regraded, which would improve the soil in these areas. During the site grading for the lots that contain the earthen dams and ponds, the fill should be removed, replaced, and recompacted in a controlled manner.

Provided that the recommendations presented herein are complied with, the undocumented fill is not anticipated to pose a risk to the proposed structures.

8.8 Faults and Seismicity - *hazard*

Based on review of the Earthquake and Late Cenozoic Fault and Fold Map Server provided by CGS located at http://dnrwebmapgdev.state.co.us/CGSOnline/ and the recorded information dating back to November of 1900, Colorado Springs has not experienced a recorded earthquake with a magnitude greater than 1.6 during that time period. The nearest recorded earthquakes over 1.6 occurred in December of 1995 in Manitou Springs, which experienced magnitudes ranging between 2.8 to 3.5. Additional earthquakes over 1.6 occurred between 1926 and 2001 in Woodland

Park, which experienced magnitudes ranging from 2.7 to 3.3. Both of these locations are in the vicinity of the Ute Pass Fault, which is greater than 15 miles from the subject site.

Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith, which includes pull from minor movements along faults found in the Denver basin. It is our opinion that ground motions resulting from minor earthquakes may affect structures (and the surrounding area) at this site if minor shifting were to occur.

Mitigation

The Pikes Peak Regional Building Code, 2017 Edition, indicates maximum considered earthquake spectral response accelerations of 0.183g for a short period (S_s) and 0.056g for a 1-second period (S_1). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class D, with average shear wave velocities ranging from 2,500 to 5,000 feet per second for the materials in the upper 100 feet.

8.9 Radon - *constraint*

Radon is a gas that can move feely within the soil and air but can become trapped in structures constructed on the soil. Radon is a byproduct of the natural decay of uranium and radium. Trace amounts of radioactive nuclides are common in the soils and bedrock that underlie this region and site.

***"Radon Act 51** passed by Congress set the natural outdoor level of radon gas (0.4 pCi/L) as the target radon level for indoor radon levels.*

El Paso County has an EPA assigned Radon Zone of 1. A radon zone of 1 predicts an average indoor radon screening level greater than 4 pCi/L, which is above the recommended levels assigned by the EPA. Black Forest is located in a high risk area of the country. *The EPA recommends you take corrective measures to reduce your exposure to radon gas.*

Most of Colorado is generally considered to have the potential of high levels of radon gas, based on the information provided at: http://county-radon.info/CO/El_Paso.html. There is not believed to be unusually hazardous levels of radon from naturally occurring sources at this site.

Mitigation

Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards.

Measures that can be taken after the residence is enclosed include installing a blower connected to the foundation drain and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, it is recommended that the residence be tested after it is enclosed and commonly utilized techniques are in place to minimize the risk.

9.0 ON-SITE DISPOSAL OF WASTEWATER

It is our understanding that On-site Wastewater Treatment Systems (OWTS) are proposed for each lot. The site was evaluated by observing 17 profile pits across the entire site, to obtain a general understanding of the soil and bedrock conditions. The Test Pit Logs are presented in the Wastewater Study included in Appendix C.

9.1 Subsurface Materials

The subsurface materials encountered in the test pit excavations were classified using Table 10-1 Soil Treatment Area Long-term Acceptance Rates from the EPCDHE Chapter 8, OWTS Regulations and the USDA Soil Structure Shape and Grade. The materials were grouped into a variety of soils types to include the following general categories:

- 35% Rock (Soil Type R)
- Sand (Soil Type 1)
- Loamy Sandy (Soil Type 1)
- Sandy Loam (Soil Type 2)
- Clay Loam (Soil Type 4)
- Sandy Clay (Soil Type 4)
- Silty Clay (Soil Type 4)
- Sandy Clay Loam (Soil Type 4)
- Clay (Soil Type 4)
- Loam (Soil Type 1)
- Silty Loam (Soil Type 2)

Limiting layers were encountered in 6 of the test pits. The long term acceptance rate (LTAR) associated with the most restrictive soils observed in the test pits was 0.40 gallons per day per square foot (gpd/sf) for the sandy clay loam (Soil Type 4). Neither groundwater nor indications of seasonally shallow groundwater were observed in the test pit excavations at the time of the field observation. Additional discussions based on our site visit was discussed in **5.3 Test Pit Excavations: OWTS Visual and Tactile Evaluation.**

Bedrock (as defined by USDA Soil Structure and Grade) was encountered in five of the test pits observed by RMG. In general, the bedrock (as defined by Colorado Geologic Survey) beneath the site is considered to be part of the Dawson formation. The Dawson formation is generally considered a restrictive layer for OWTS. The shallow depth of this formation and the required separation from the bottom of the OWTS treatment areas may result in limitations on the depth of the treatment areas across the majority of the site. In some cases, mounded systems may be required.

9.2 Treatment Areas

Treatment areas at a minimum must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018, amended May 23, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCDHE);
- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCDHE;
- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches;
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, cut banks and fill areas (from the crest);
- The lots are laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways, No Build Areas). Based on the test pit observations, the parcel has a minimum of two locations for the OWTS on each lot.

Contamination of surface and subsurface water resources should not occur provided the OWTS is installed according to the El Paso County Guidelines and property maintained.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. It should be noted that the LTAR values stated above are for the test pit locations performed only, for the purpose of demonstrating suitability of the proposed systems. The final OWTS systems shall be designed based on an LTAR determined at the time of the OWTS Site Evaluation. This does not constitute an OWTS design. An OWTS is proposed for each individual lot and OWTS design will need to be completed prior to construction of each new residence.

10.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in Section 8.0 of this report) that were found to be present at this site include radon and faults/seismicity. Geologic constraints (also as described in section 8.0 of this report) include expansive and compressible soils/bedrock, undocumented fill soil, FEMA Floodway, seasonally fluctuating subsurface water, and potentially unstable slopes. It is our opinion that the existing geologic and engineering conditions can be satisfactorily mitigated through proper engineering and design contraction practices and avoidance when deemed necessary.

11.0 ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for future development. Unless indicated otherwise, the test borings, laboratory test results, conclusions and recommendations presented in this report are intended for use for design and construction.

A site-specific Subsurface Soil Investigation for all proposed future structures and/or a site-specific OWTS Site Evaluation and OWTS Design for any future proposed on-site wastewater systems will need to be prepared for future development.

12.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. The geologic conditions identified herein are not considered unusual for the Front Range region of Colorado. Mitigation of geologic conditions is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic conditions should be mitigated by implementing appropriate planning, engineering, and local construction practices.

In addition to the previously identified mitigation alternatives, surface and subsurface drainage systems should be implemented. Exterior, perimeter foundation drains should be installed around below-grade habitable or storage spaces. Surface water should be efficiently removed from the building area to prevent ponding and infiltration into the subsurface soil.

The foundations and floor slabs of the structures should be designed using the recommendations provided in a lot-specific subsurface soil investigations performed for each lot. In addition, appropriate surface drainage should be established during construction and maintained by the homeowner.

All construction should remain outside the FEMA Floodway. It is recommended the area within the Floodway and Black Squirrel Creek along the northern property boundary be identified as a "No Build Area" unless additional studies are performed, in conjunction with the drainage/civil engineer, prior to any new construction. The designated "No Build Area" should include the creek, the areas north of the creek, and the 50-foot setback south of the creek.

We believe the surficial sand soils will classify as Type C materials and the clay soils will classify as Type B as defined by OSHA in 29CFR Part 1926, date January 2, 1990. OSHA requires temporary slopes made in Type C materials be laid back at ratios no steeper than 1.5:1 (horizontal to vertical) and slopes made in Type B materials be laid back at ratios no steeper than 1:1 (horizontal to vertical) unless the excavation is shored or braced.

Long term cut slopes in the upper soil should be limited to no steeper than 3:1 (horizontal to vertical). Flatter slopes will likely be necessary should groundwater conditions occur. It is recommended that long term fill slopes be no steeper than 3:1 (horizontal to vertical).

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

It is important for the Owner(s) of these properties read and understand this report, as well as the previous reports referenced above, and to carefully to familiarize themselves with the geologic hazards associated with construction in this area. This report only addresses the geologic constraints contained within the boundaries of the site referenced above.

13.0 CLOSING

This report is for the exclusive purpose of providing geologic hazards information and preliminary geotechnical engineering recommendations. The scope of services did not include, either specifically or by implication, evaluation of wild fire hazards, environmental assessment of the site, or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to, biological or toxicological issues, are beyond the scope of this report. If the owner is concerned about the potential for such contamination or conditions, other studies should be undertaken.

This report has been prepared for **Antler Range, LLC** in accordance with generally accepted geotechnical engineering and engineering geology practices. The conclusions and recommendations in this report are based in part upon data obtained from review of available topographic and geologic maps, review of available reports of previous studies conducted in the site vicinity, a site reconnaissance, and research of available published information, soil test borings, soil laboratory testing, and engineering analyses. The nature and extent of variations may not become evident until construction activities begin. If variations then become evident, RMG should be retained to re-evaluate the recommendations of this report, if necessary.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers and engineering geologists practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied, is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

FIGURES

NOT TO SCALE

Architecture
Structural
Geotechnical

RMG

Materials Testing
Forensics
Civil / Planning

Engineers / Architects

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SITE VICINITY MAP

ANTLERS RANGE
NE CORNER OF MERIDIAN RD
AND AYERS RD
EL PASO COUNTY, CO
ANTLERS RANGE. LLC

JOB No. 198281

FIG No. 1

DATE 1-28-2025

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RMG Engineers / Architects

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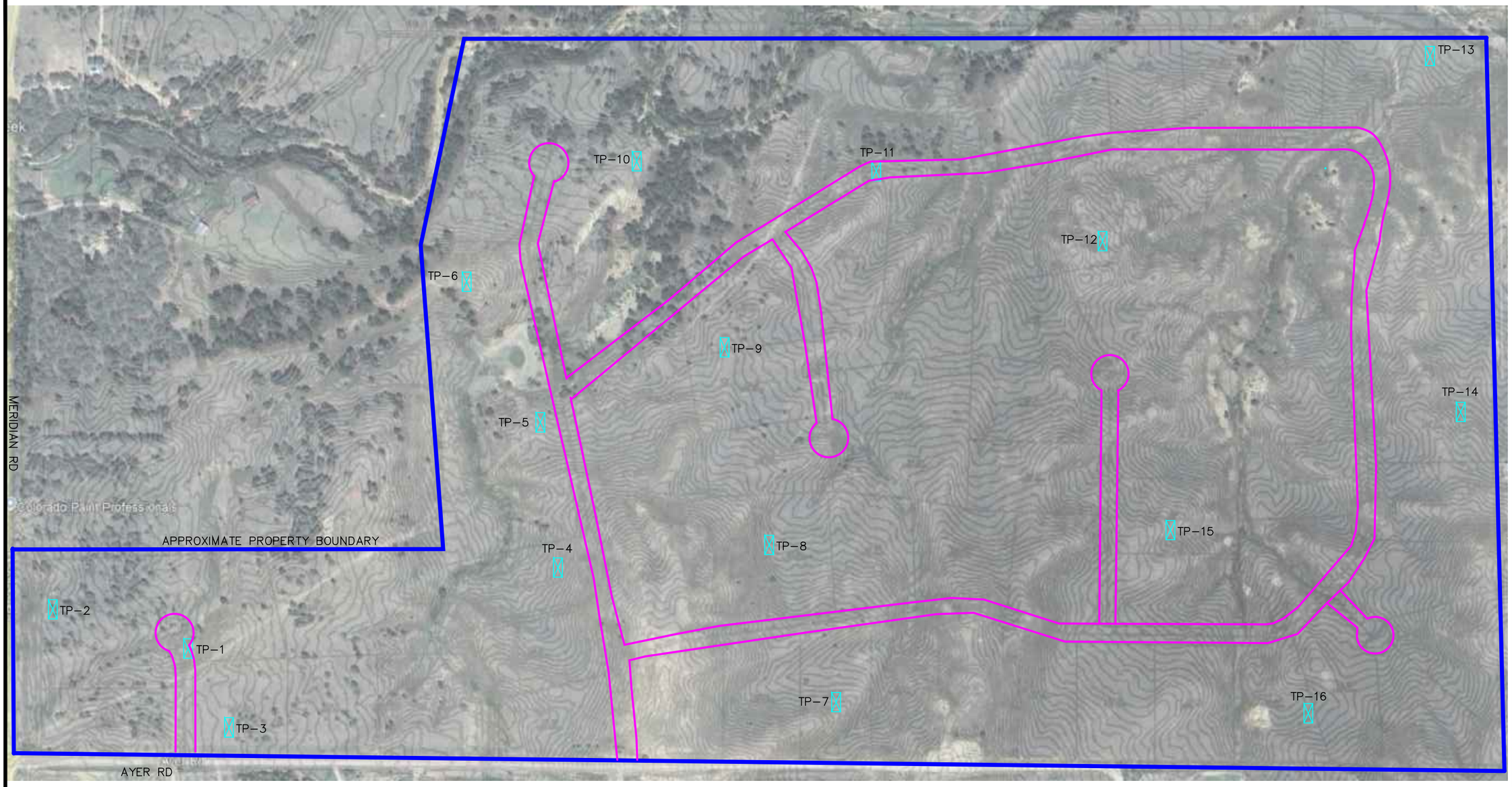
ANTLER RANGE
NE MERIDIAN RD AND AYERS RD
EL PASO COUNTY, CO

ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

PROPOSED LOT LAYOUT

SHEET No.
FIG-2



DENOTES APPROXIMATE LOCATION OF TEST PITS

NOT TO SCALE

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EL PASO COUNTY, CO

ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

TEST PIT LOCATION PLAN

SHEET No.
FIG-3

SOILS DESCRIPTION


CLAYEY SAND


CLAYSTONE


SANDSTONE


SANDY CLAY


SILTSTONE


TOPSOIL

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
5085 LIST DRIVE, SUITE 200
COLORADO SPRINGS, COLORADO

SYMBOLS AND NOTES


XX — STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


XX — UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


FREE WATER TABLE


DEPTH AT WHICH BORING CAVED


BULK — DISTURBED BULK SAMPLE


AUG — AUGER "CUTTINGS"

4.5 — WATER CONTENT (%)

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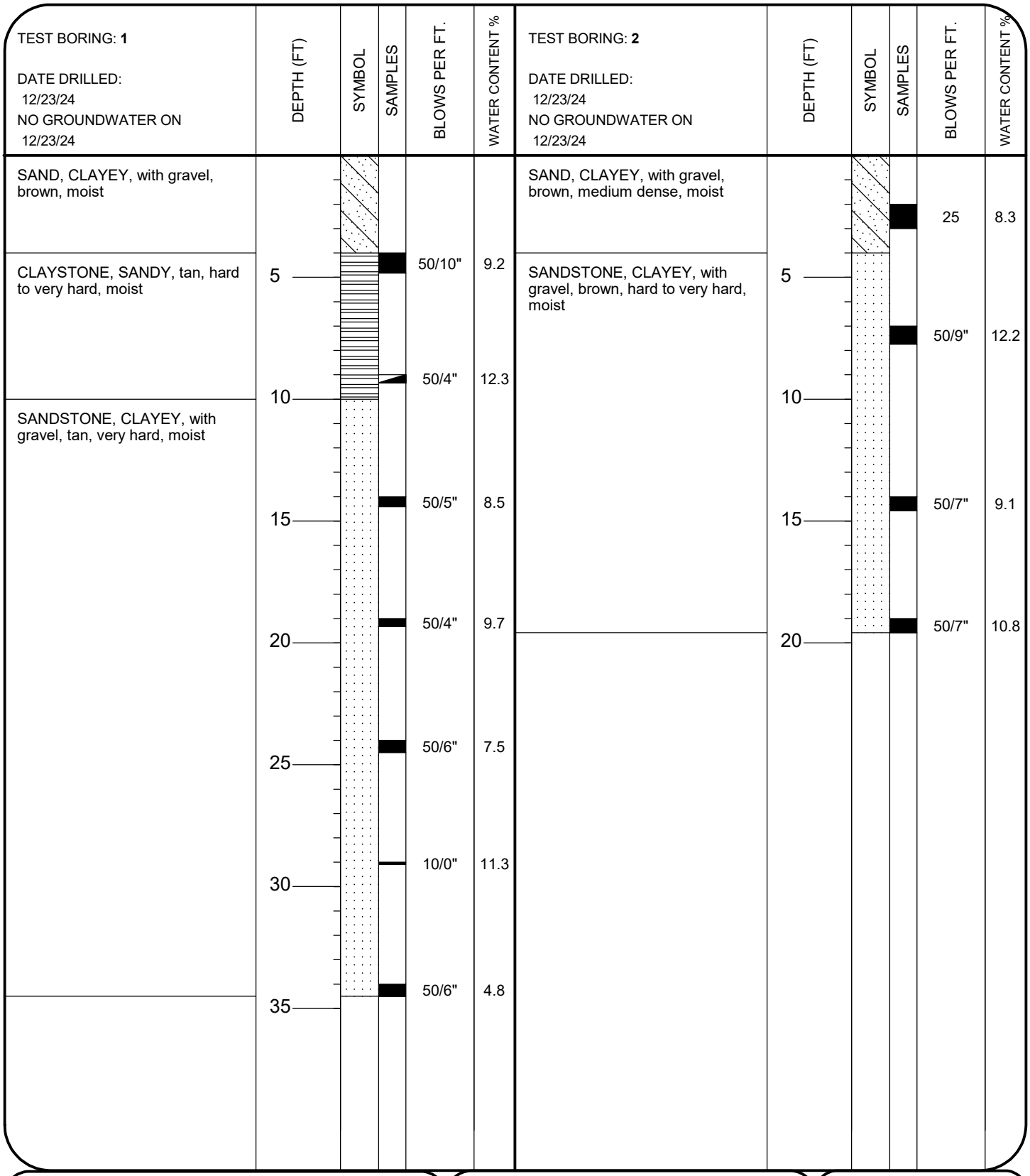
EXPLANATION OF TEST BORING LOGS

JOB No. 198281

FIGURE No. 4

DATE Jan/28/2025



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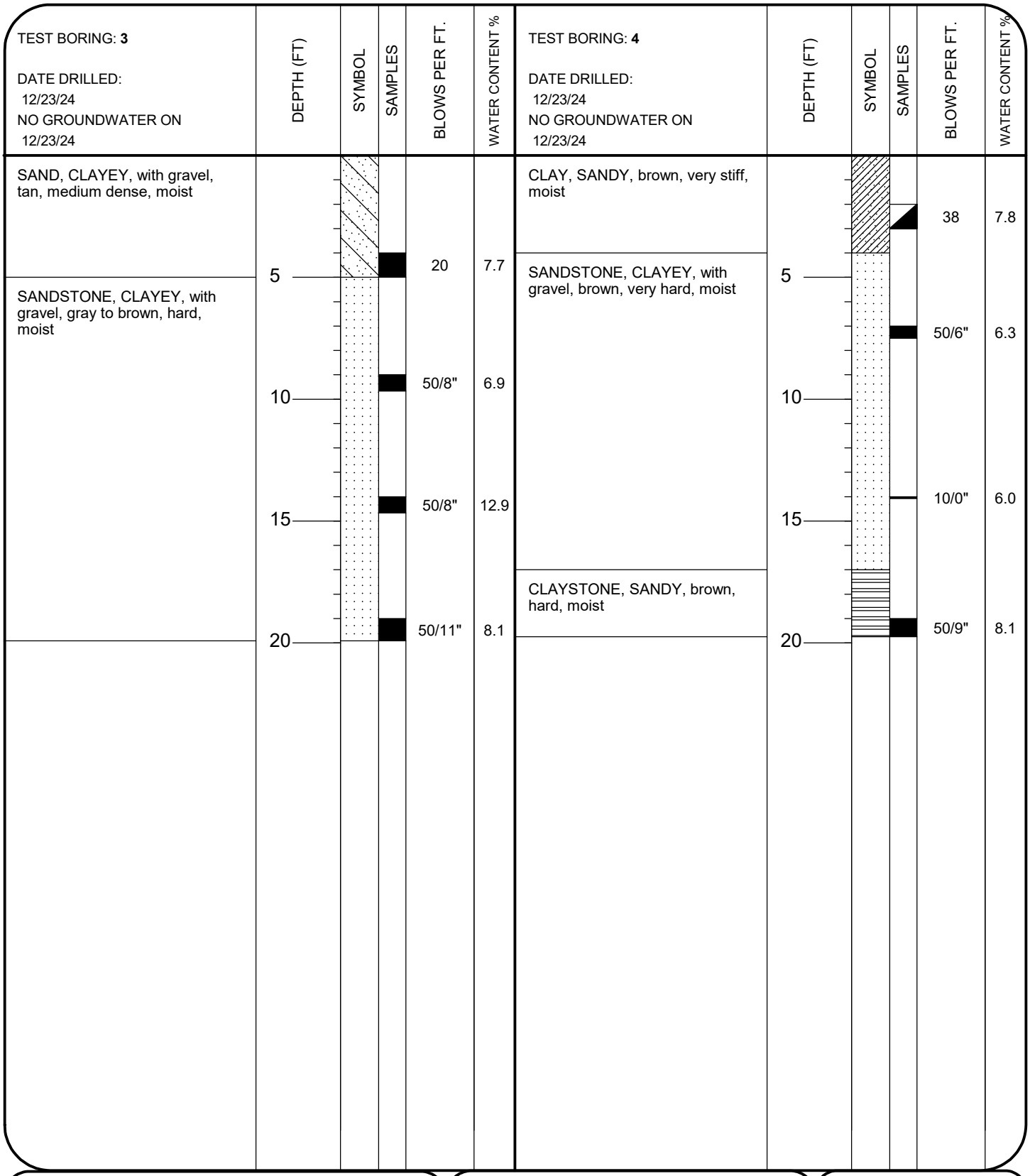
TEST BORING LOG

JOB No. 198281

FIGURE No. 5

DATE Jan/28/2025



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TEST BORING LOG

JOB No. 198281

FIGURE No. 6

DATE Jan/28/2025

TEST BORING: **5**

DATE DRILLED:
12/23/24
GROUNDWATER @ 22.0 '
12/23/24

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
TOPSOIL, SAND, CLAYEY, dark brown, moist				
SAND, CLAYEY, with gravel, brown, dense, moist				
5			35	8.8
SANDSTONE, SILTY, with gravel, tan to gray, hard to very hard, moist to wet				
10			50/5"	6.5
15			50/10"	13.8
20			50/6"	11.3
▽				
25			50/7"	11.3
CLAYSTONE, SANDY, gray to brown, very hard, moist to wet				
30			50/7"	13.4
SANDSTONE, CLAYEY, brown, very hard, moist to wet			50/6"	12.5
35				

TEST BORING: **6**

DATE DRILLED:
12/23/24
GROUNDWATER @ 13.0 '
12/23/24

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
TOPSOIL, SAND, CLAYEY, dark brown, moist				
SAND, CLAYEY, brown to dark brown, loose, moist			7	3.8
SANDSTONE, CLAYEY, with gravel, tan, moist				
5				
SILTSTONE, SANDY, tan, hard, moist to wet			50/9"	8.6
10				
▽				
SANDSTONE, SILTY, tan, hard, moist to wet			50/8"	15.8
15				
CLAYSTONE, SANDY, tan, moist to wet				
SANDSTONE, CLAYEY, with gravel, tan, hard to very hard, moist to wet			50/6"	20.3
20				
25			50/8"	16.3
30				
35			50/4"	17.1

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TEST BORING LOG

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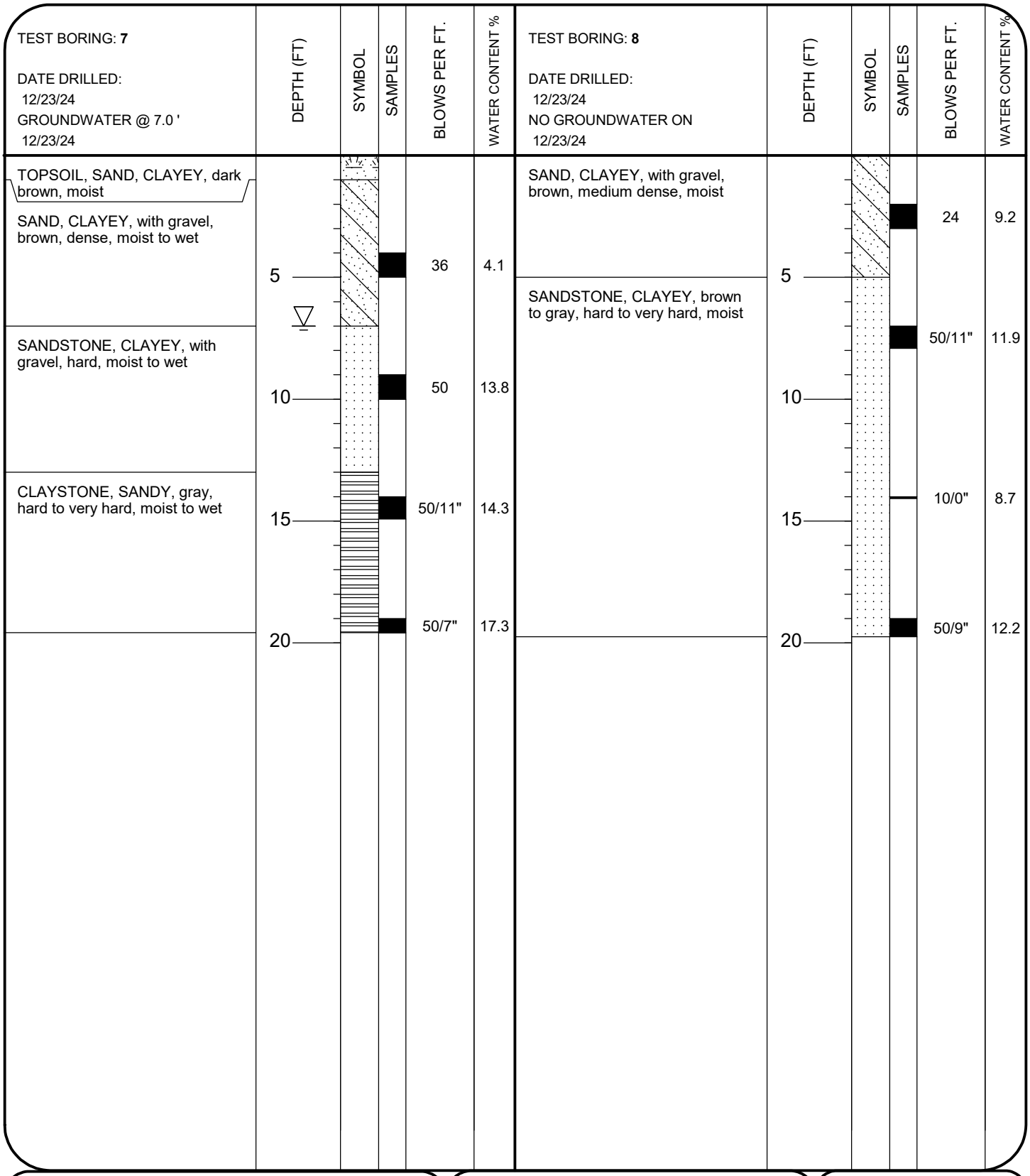
FIGURE No. 7

DATE Jan/28/2025



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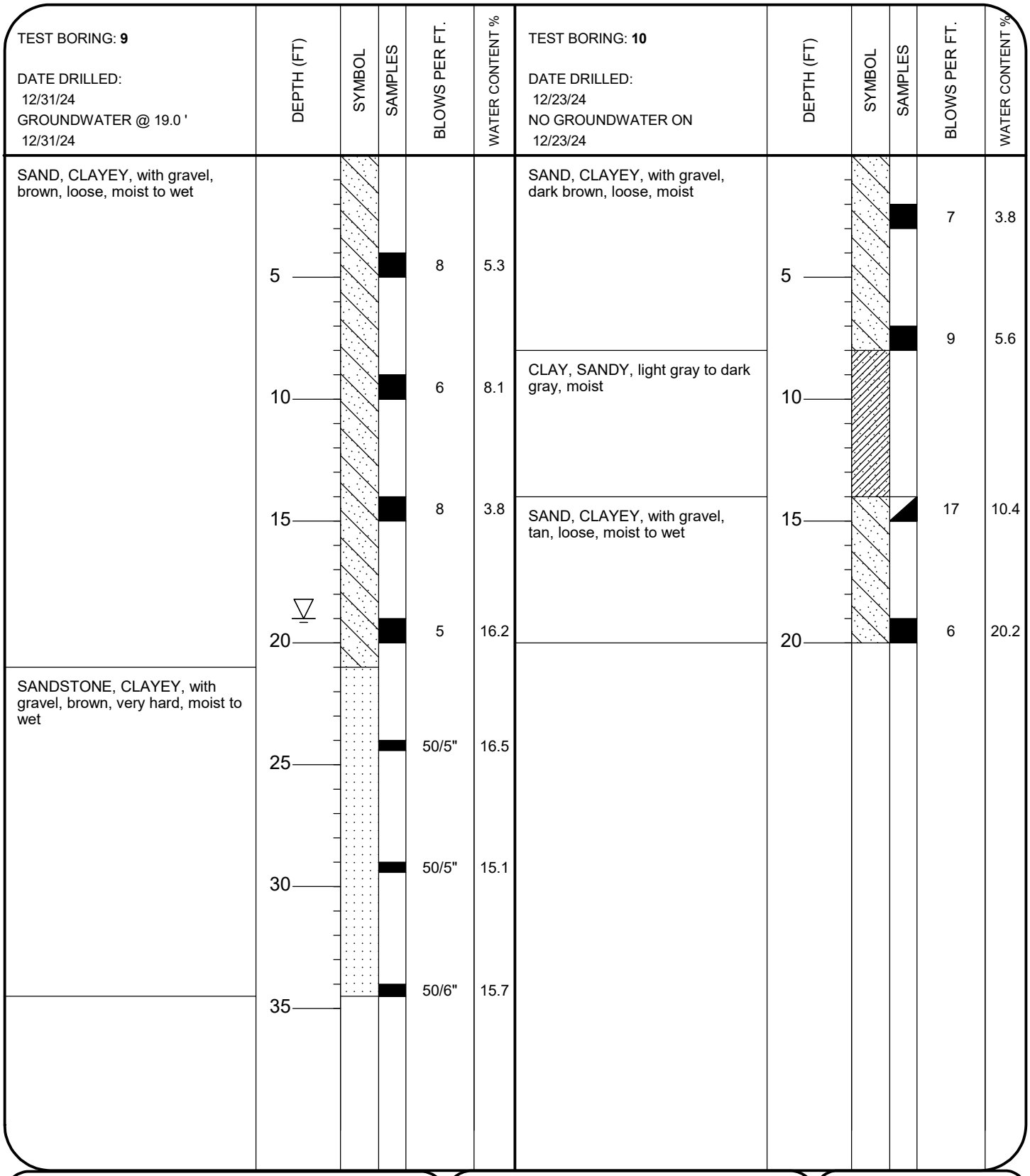
TEST BORING LOG

JOB No. 198281

FIGURE No. 8

DATE Jan/28/2025



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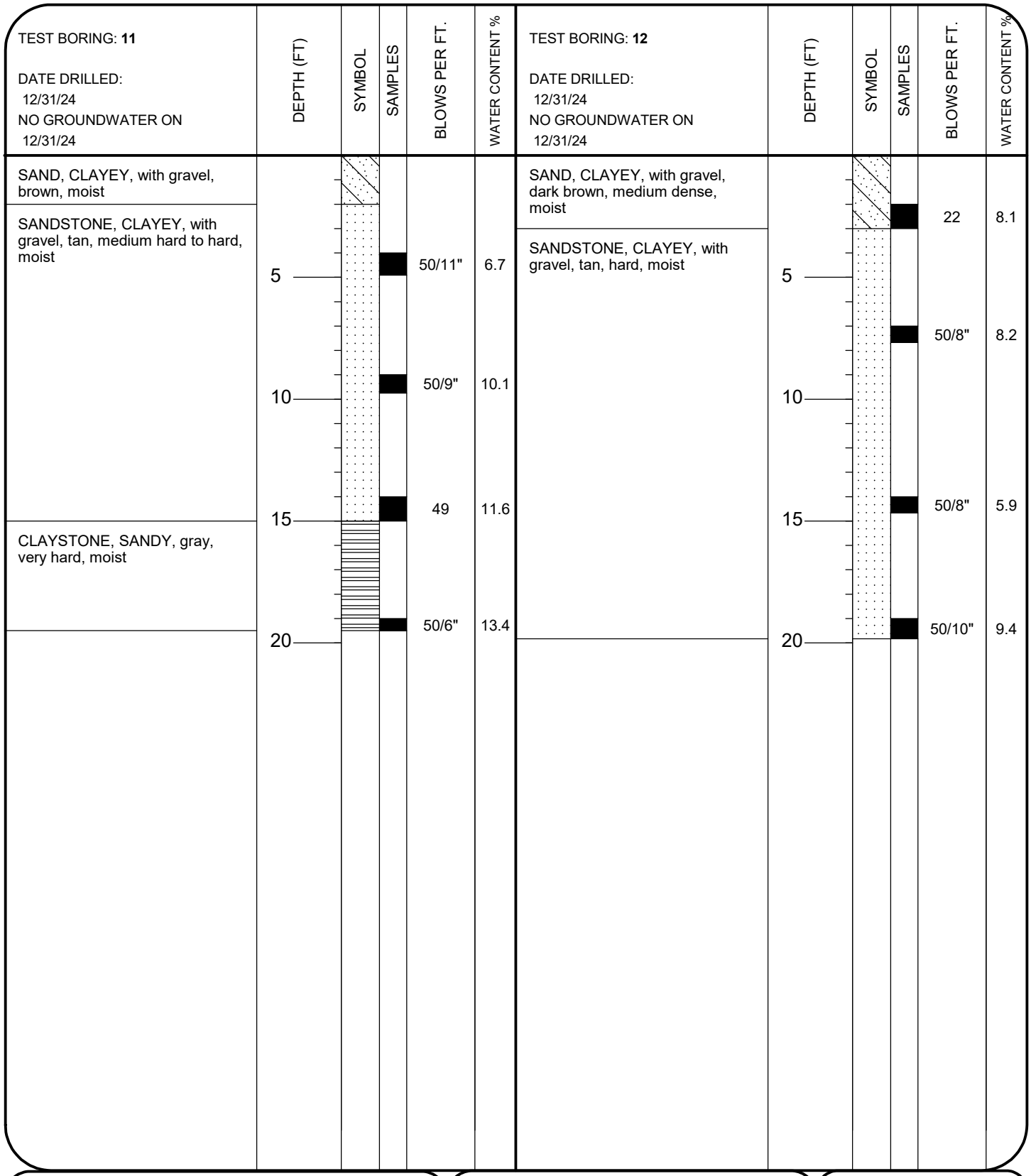
TEST BORING LOG

JOB No. 198281

FIGURE No. 9

DATE Jan/28/2025



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TEST BORING LOG

JOB No. 198281

FIGURE No. 10

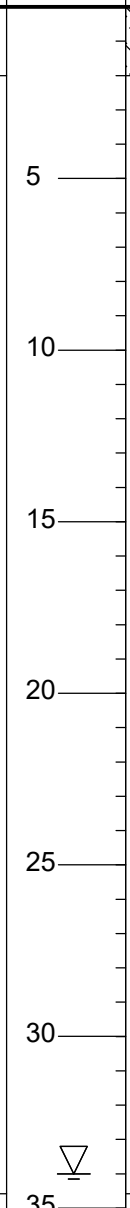
DATE Jan/28/2025

TEST BORING: **13**

DATE DRILLED:
12/31/24
GROUNDWATER @ 34.0 '
12/31/24

SAND, CLAYEY, tan, moist

SANDSTONE, CLAYEY, with gravel, tan, firm to very hard, moist to wet



DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
5		47	5.9
10		25	13.1
15		10/0"	8.3
20		50/6"	9.6
25		50/6"	11.3
30		50/4"	9.2
35		50/7"	16.2

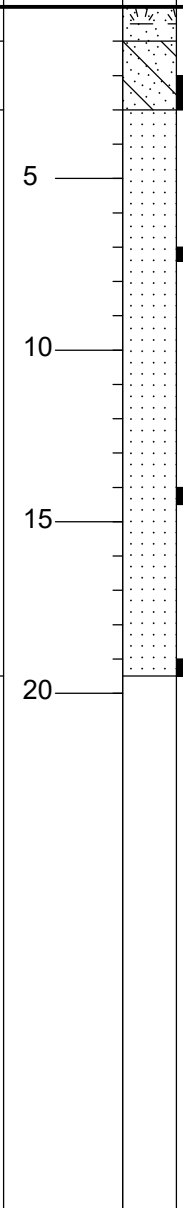
TEST BORING: **14**

DATE DRILLED:
12/31/24
NO GROUNDWATER ON
12/31/24

TOPSOIL, SAND, CLAYEY, dark brown, moist

SAND, CLAYEY, with gravel, brown to tan, dense, moist

SANDSTONE, CLAYEY, with gravel, tan to brown, very hard, moist



DEPTH (FT)	SAMPLES	BLOWS PER FT.	WATER CONTENT %
		40	3.1
5		50/5"	8.2
10			
15		50/6"	6.3
20		50/6"	6.9

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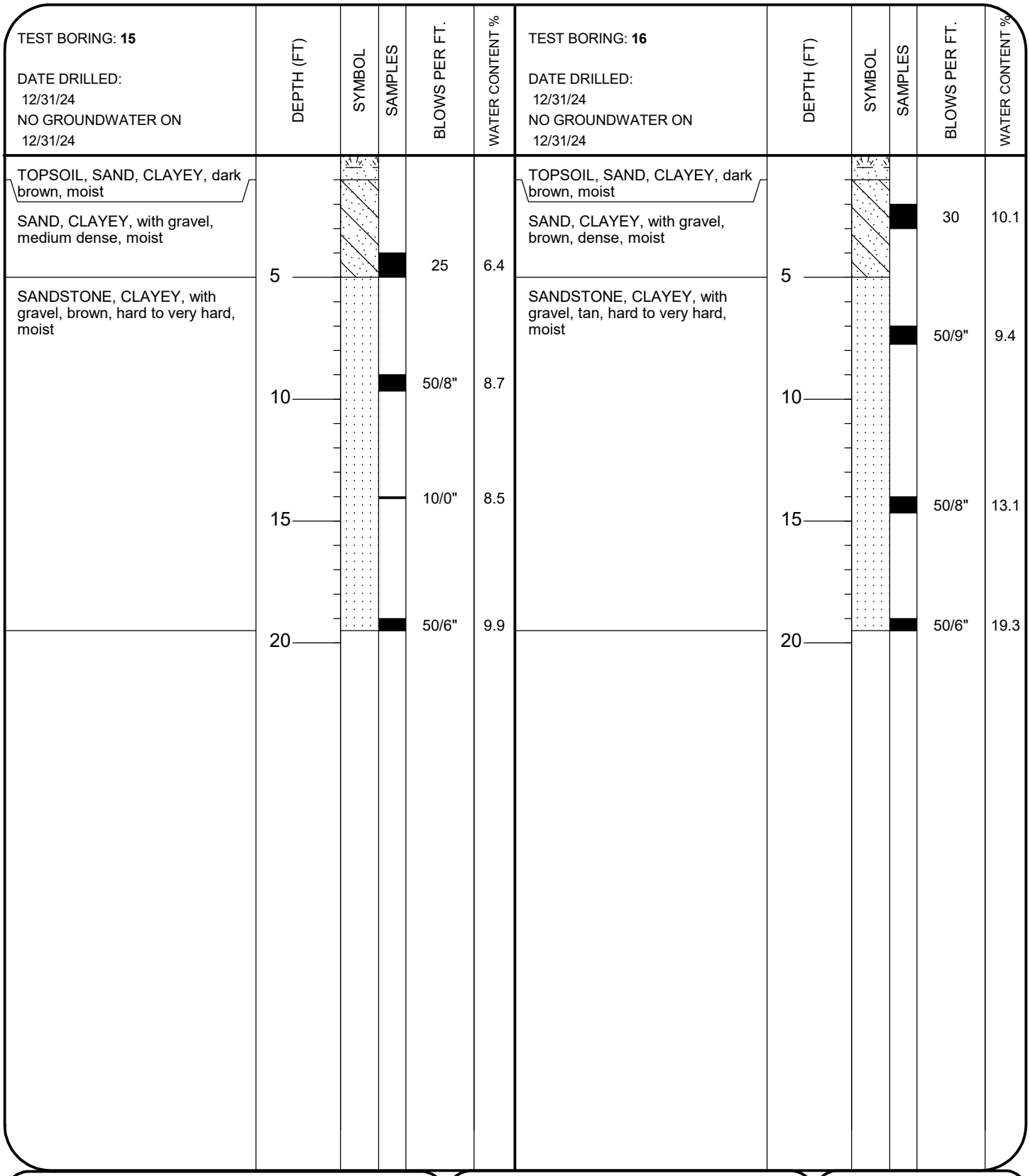
TEST BORING LOG

JOB No. 198281

FIGURE No. 11

DATE Jan/28/2025



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TEST BORING LOG

JOB No. 198281

FIGURE No. 12

DATE Jan/28/2025

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load (psf)	% Swell @ 1000 psf	USCS Classification
1	4.0	9.2								
1	9.0	12.3	111.6	28	12				- 1.5	
1	14.0	8.5								
1	19.0	9.7								
1	24.0	7.5								
1	29.0	11.3								
1	34.0	4.8		34	12					
2	2.0	8.3								
2	7.0	12.2		NP	NP	6.4	16.6			SM
2	14.0	9.1								
2	19.0	10.8								
3	4.0	7.7								
3	9.0	6.9								
3	14.0	12.9		NP	NP	5.1	22.4			SM
3	19.0	8.1								
4	2.0	7.8	120.7	33	16				1.3	
4	7.0	6.3								
4	14.0	6.0								
4	19.0	8.1								
5	4.0	8.8								
5	9.0	6.5								
5	14.0	13.8								
5	19.0	11.3				4.2	18.6			
5	24.0	11.3								
5	29.0	13.4		38	14					
5	34.0	12.5								
6	2.0	3.8								
6	7.0	8.6								
6	14.0	15.8								
6	19.0	20.3		NP	NP	8.1	25.9			SM
6	24.0	16.3		NP	NP	5.3	10.4			SW-SM
6	34.0	17.1								
7	4.0	4.1								
7	9.0	13.8								

ROCKY MOUNTAIN GROUP

Structural
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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 198281
FIGURE No. 13
PAGE 1 OF 3
DATE Jan/28/2025

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load (psf)	% Swell @ 1000 psf	USCS Classification
7	14.0	14.3		37	17					
7	19.0	17.3								
8	2.0	9.2								
8	7.0	11.9		34	16		55.1			CL
8	14.0	8.7								
8	19.0	12.2								
9	4.0	5.3								
9	9.0	8.1		NP	NP	10.7	16.3			SM
9	14.0	3.8								
9	19.0	16.2								
9	24.0	16.5				10.0	13.5			
9	29.0	15.1								
9	34.0	15.7		34	11					
10	2.0	3.8								
10	7.0	5.6		NP	NP		13.7			SM
10	14.0	10.4								
10	19.0	20.2								
11	4.0	6.7								
11	9.0	10.1								
11	14.0	11.6					38.3			
11	19.0	13.4								
12	2.0	8.1								
12	7.0	8.2								
12	14.0	5.9								
12	19.0	9.4				8.2	12.6			
13	4.0	5.9								
13	9.0	13.1				0.9	34.7			
13	14.0	8.3								
13	19.0	9.6								
13	24.0	11.3								
13	29.0	9.2		NP	NP	3.6	25.8			SM
13	34.0	16.2		35	17					
14	2.0	3.1								
14	7.0	8.2				4.2	22.0			

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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 198281
FIGURE No. 13

DATE Jan/28/2025

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load (psf)	% Swell @ 1000 psf	USCS Classification
14	14.0	6.3								
14	19.0	6.9								
15	4.0	6.4				8.3	16.9			
15	9.0	8.7								
15	14.0	8.5								
15	19.0	9.9								
16	2.0	10.1		NP	NP	1.3	27.2			SM
16	7.0	9.4								
16	14.0	13.1								
16	19.0	19.3								

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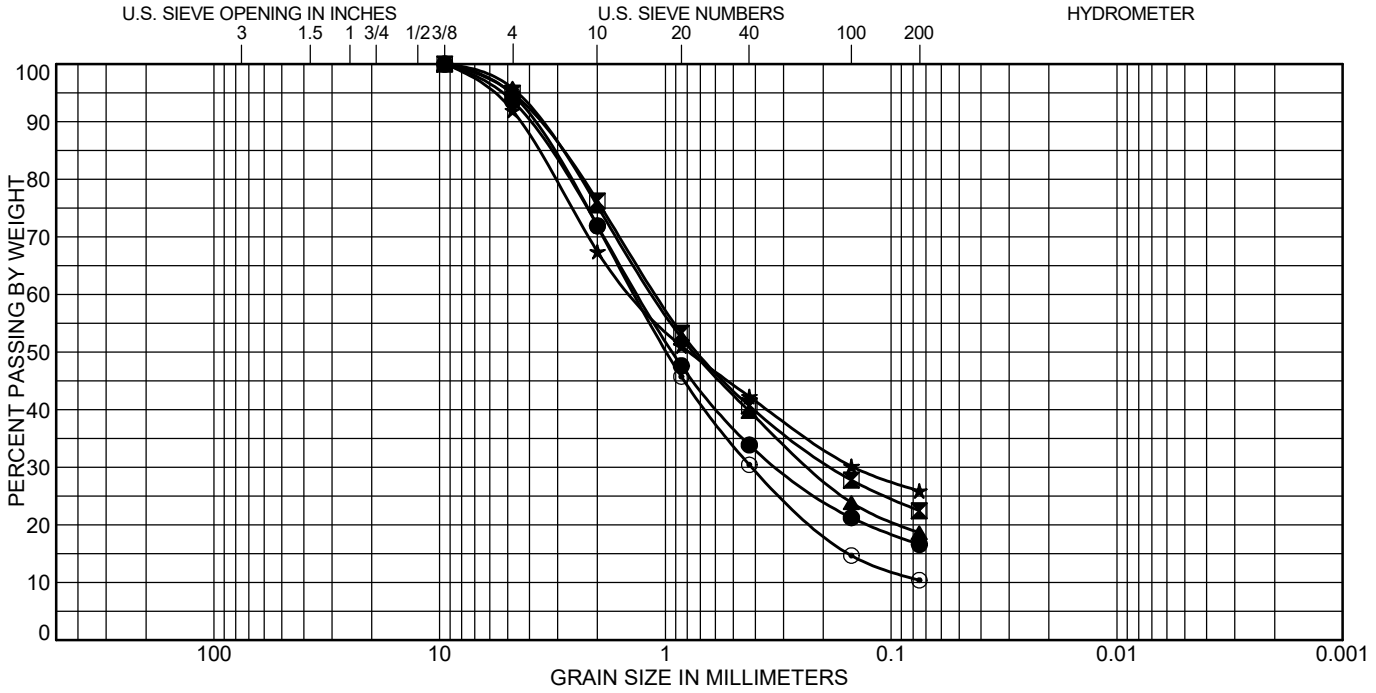
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 198281
FIGURE No. 13

DATE Jan/28/2025



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	2	7.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊠	3	14.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
▲	5	19.0				
★	6	19.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊙	6	24.0	**WELL-GRADED SAND with SILT(SW-SM)**	**NP**	**NP**	**NP**

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	2	7.0	6.4	77.0	16.6	
⊠	3	14.0	5.1	72.5	22.4	
▲	5	19.0	4.2	77.1	18.6	
★	6	19.0	8.1	66.0	25.9	
⊙	6	24.0	5.3	84.3	10.4	

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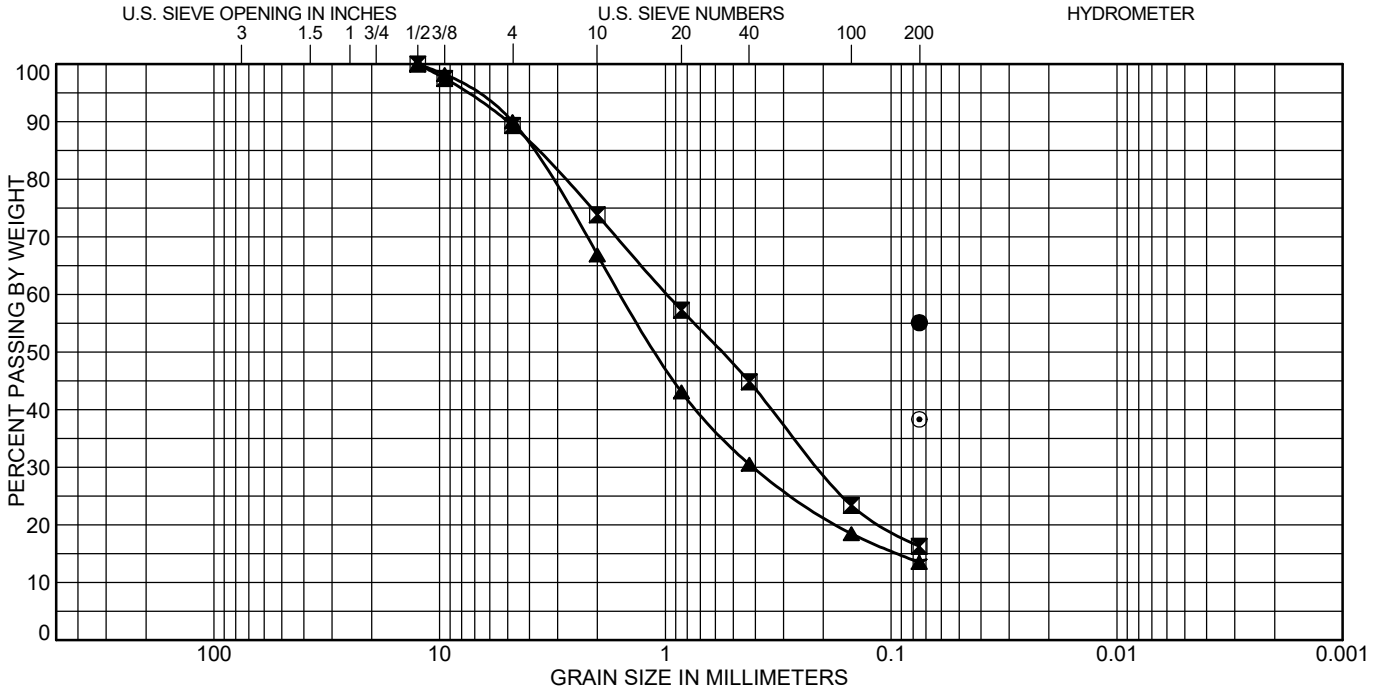
SOIL CLASSIFICATION DATA

JOB No. 198281

FIGURE No. 14

DATE Jan/28/2025



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	8	7.0	SANDY LEAN CLAY(CL)	34	18	16
⊠	9	9.0	SILTY SAND(SM)	NP	NP	NP
▲	9	24.0				
★	10	7.0	SILTY SAND(SM)	NP	NP	NP
⊙	11	14.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	8	7.0			55.1	
⊠	9	9.0	10.7	73.0	16.3	
▲	9	24.0	10.0	76.5	13.5	
★	10	7.0			13.7	
⊙	11	14.0			38.3	

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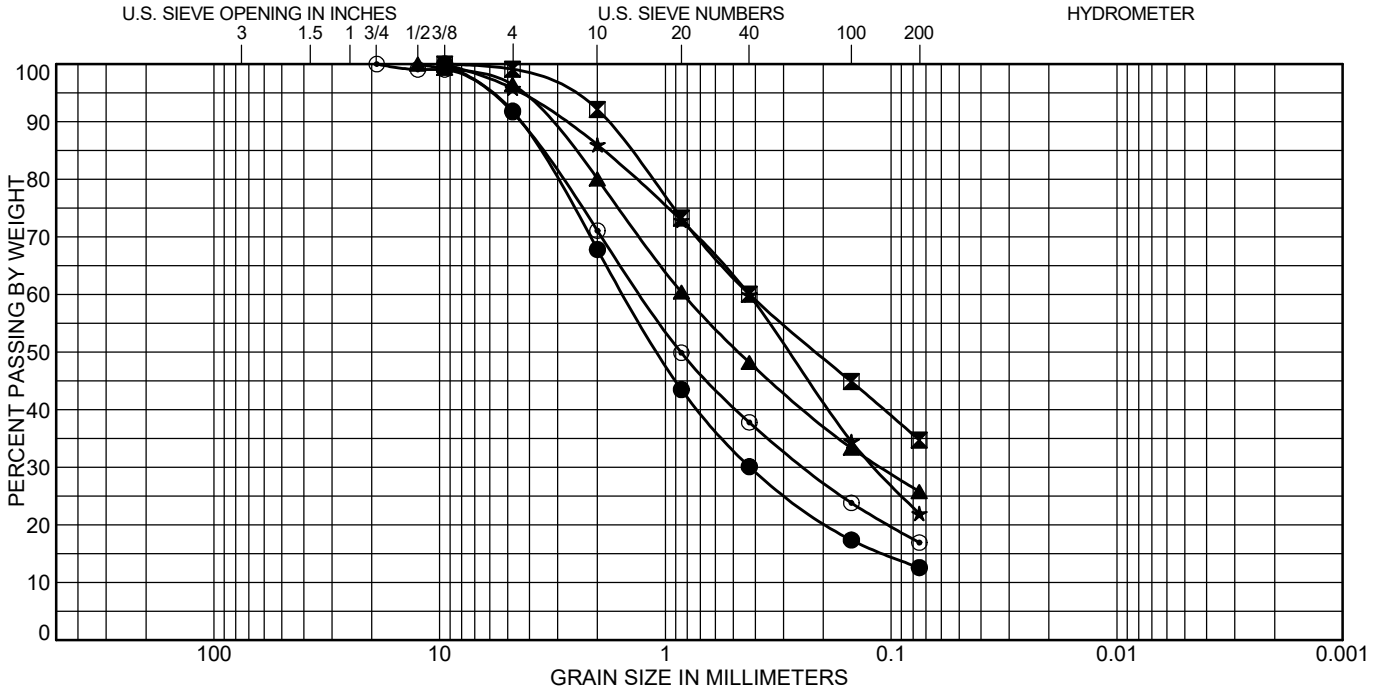
SOIL CLASSIFICATION DATA

JOB No. 198281

FIGURE No. 15

DATE Jan/28/2025



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	12	19.0				
⧓	13	9.0				
▲	13	29.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
★	14	7.0				
⊙	15	4.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	12	19.0	8.2	79.2	12.6	
⧓	13	9.0	0.9	64.4	34.7	
▲	13	29.0	3.6	70.6	25.8	
★	14	7.0	4.2	73.8	22.0	
⊙	15	4.0	8.3	74.7	16.9	

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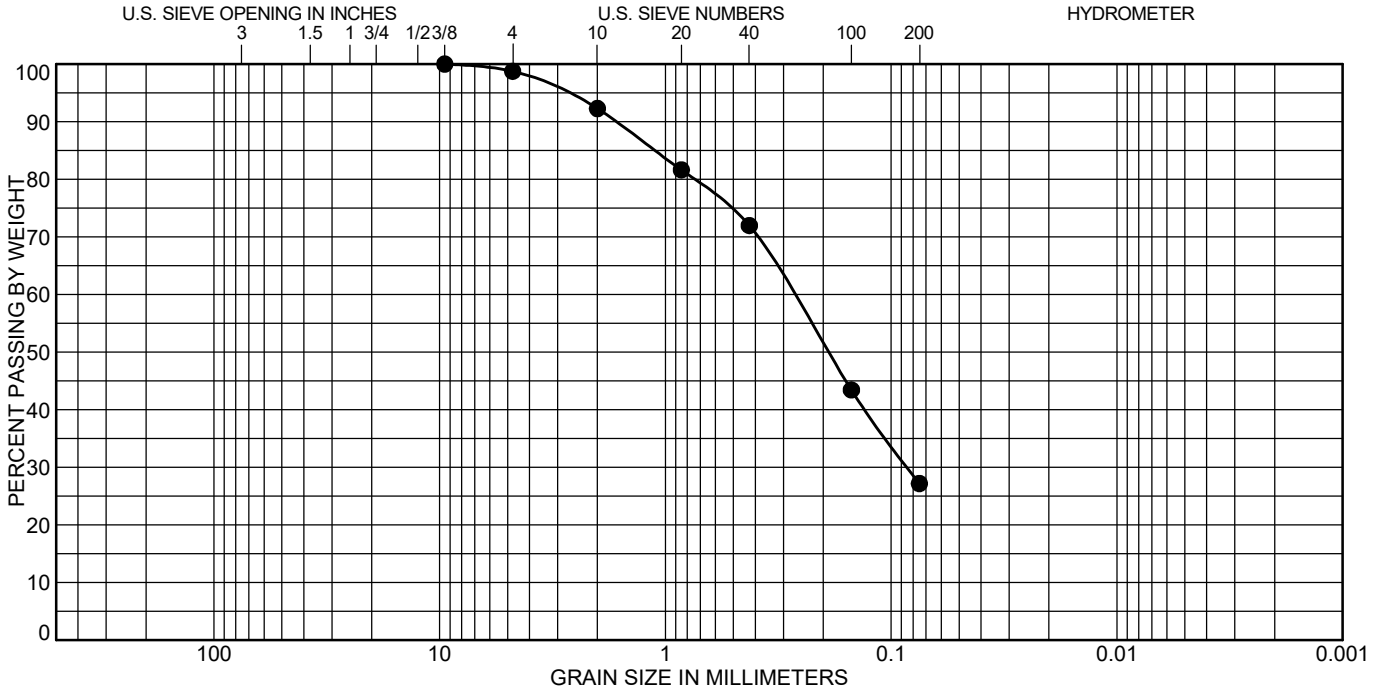
SOIL CLASSIFICATION DATA

JOB No. 198281

FIGURE No. 16

DATE Jan/28/2025



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	**16**	**2.0**	**SILTY SAND(SM)**	**NP**	**NP**	**NP**

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	**16**	**2.0**	**1.3**	**71.6**	**27.2**	

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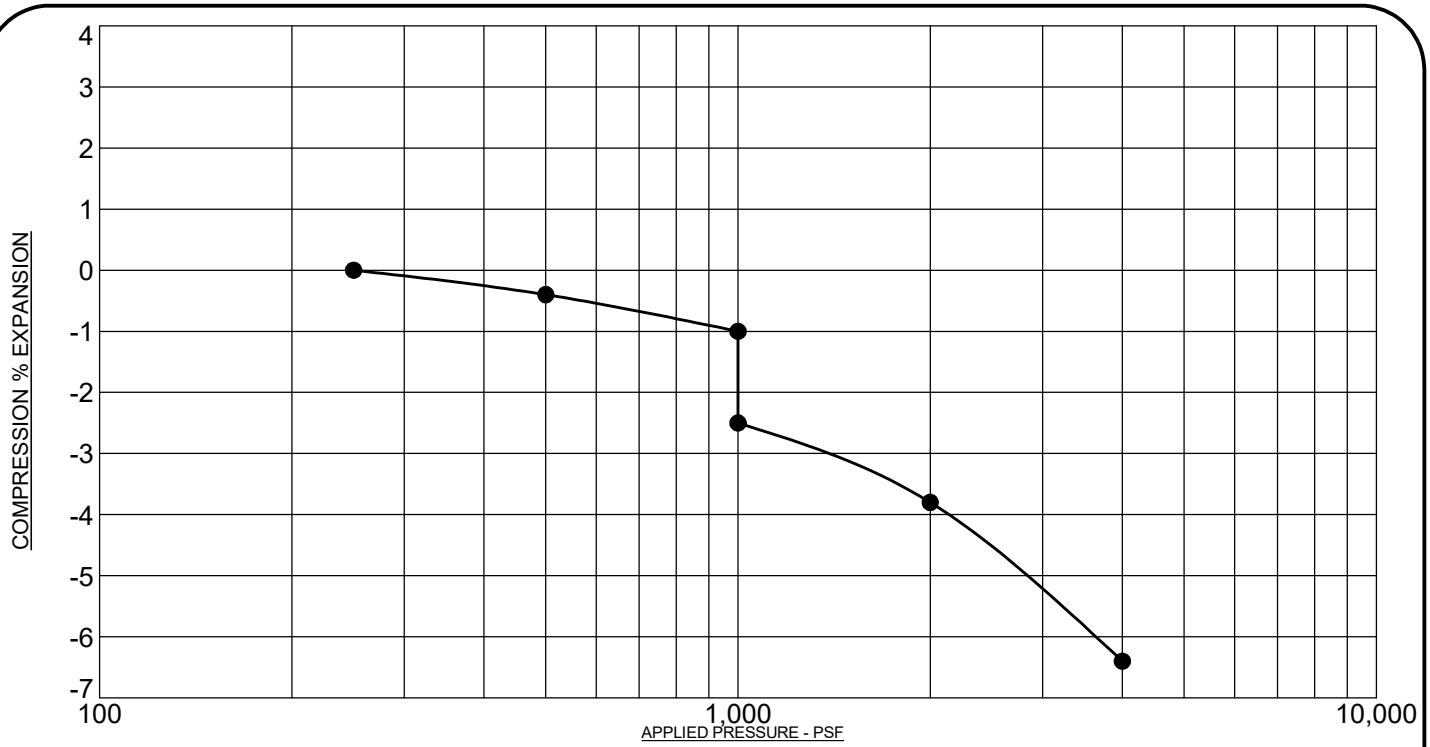
SOIL CLASSIFICATION DATA

JOB No. 198281

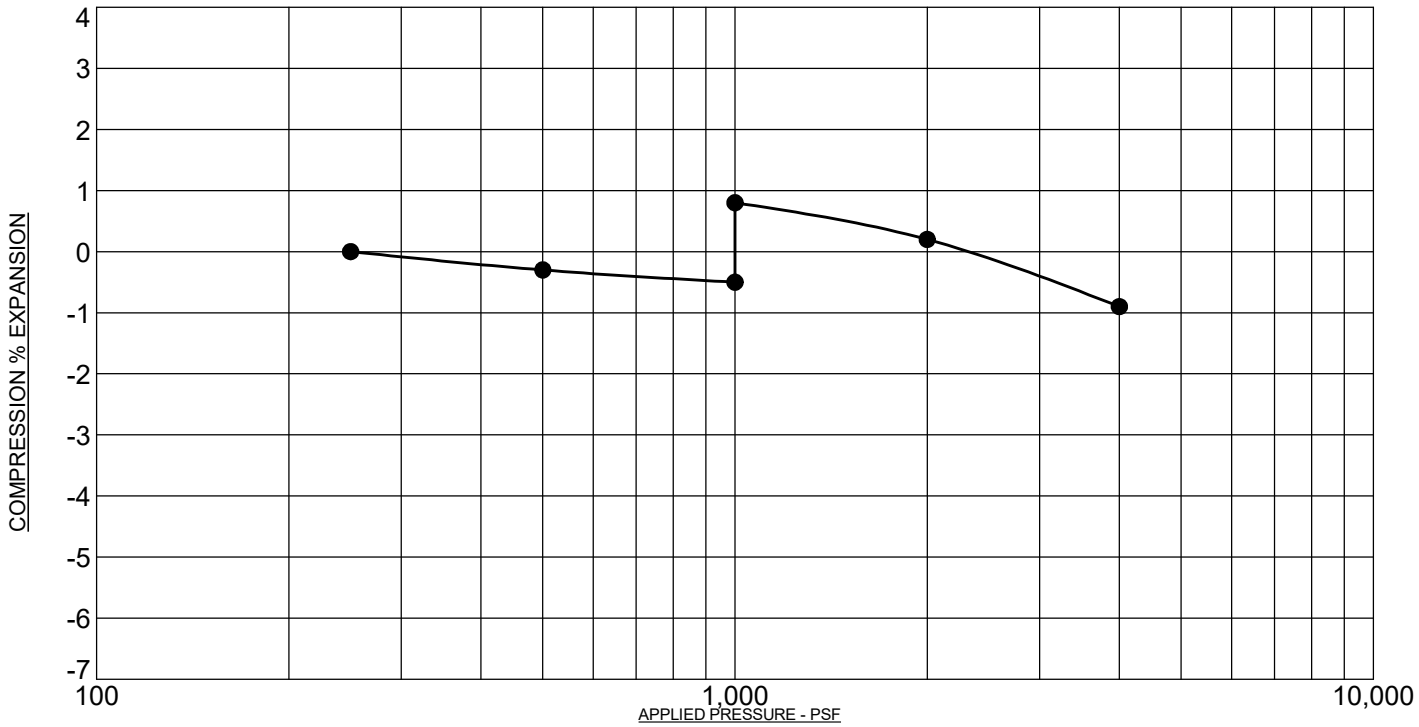
FIGURE No. 17

DATE Jan/28/2025



PROJECT: **N Meridian Rd El Paso County, Colorado**
SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **1 @ 9 FT**
NATURAL DRY UNIT WEIGHT: **111.6 PCF**
NATURAL MOISTURE CONTENT: **12.3%**
PERCENT SWELL/COMPRESSION: **- 1.5**



PROJECT: **N Meridian Rd El Paso County, Colorado**
SAMPLE DESCRIPTION: **CLAY, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **4 @ 2 FT**
NATURAL DRY UNIT WEIGHT: **120.7 PCF**
NATURAL MOISTURE CONTENT: **7.8%**
PERCENT SWELL/COMPRESSION: **1.3**

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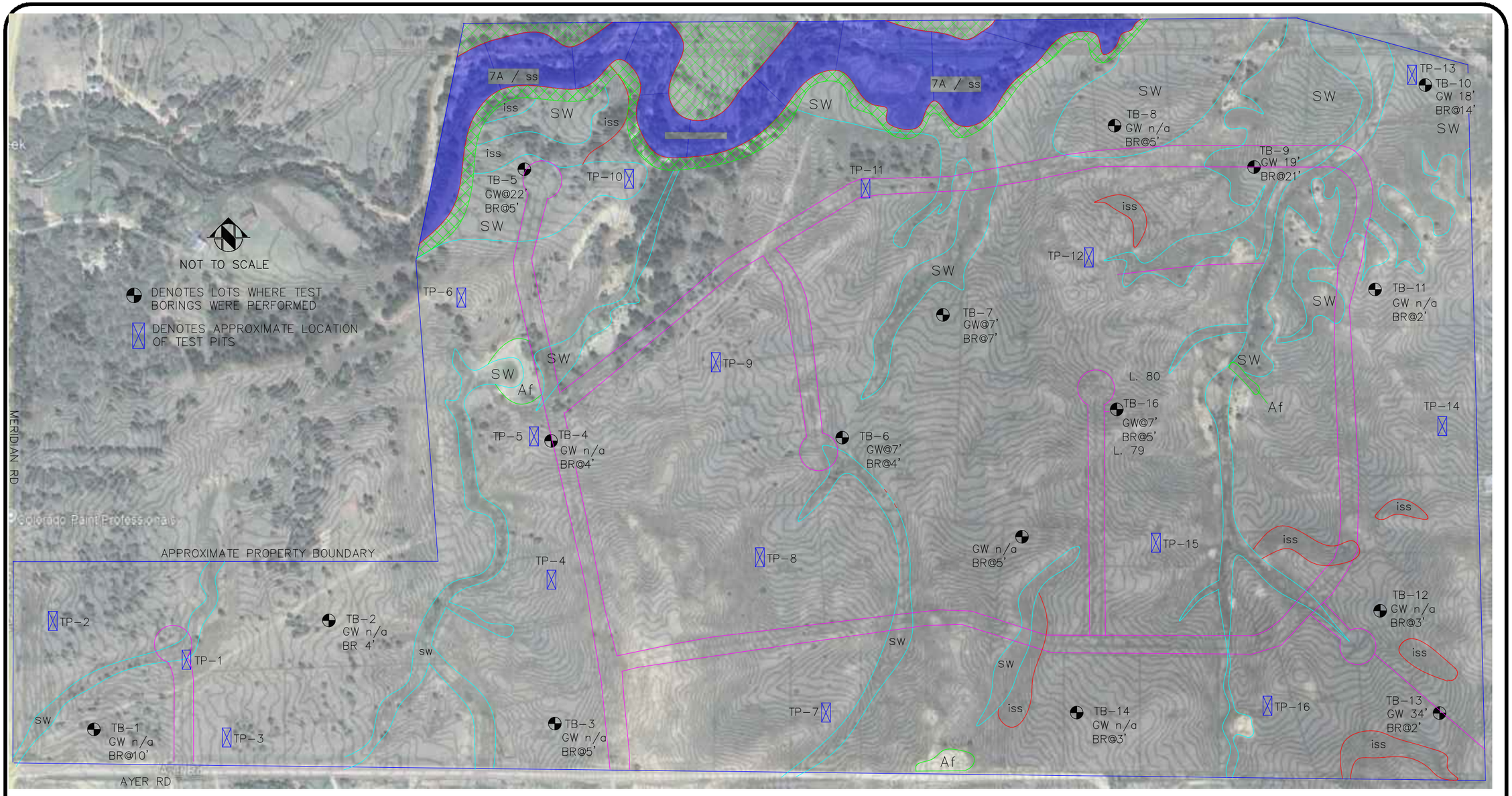
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 198281

FIGURE No. 18

DATE Jan/28/2025



GEOLOGIC CONDITIONS

- *Tkdw - Dawson Formation, (Upper Cretaceous and Paleocene)* - consists of sandstone with interbedded claystone. This unit is approximately 1,350 feet thick in this area. The sandstone was encountered in the test borings at depths ranging between 4 and 21 feet.
- *fw - Regulatory floodway* as designated by FEMA. This area is to be designated a "No Build Area" until further investigations are completed.
- *sw* - seasonally wet - areas that may collect surface water during heavy precipitation events
- *Af* - Artificial fill - disturbed soil that has been reworked by man, limited to the areas of the earthen damns
- iss - isolated steep slopes that can be regarded as needed during construction of the individual residences
- ss - steep slopes within the FEMA Floodplain that are not to be disturbed

AREA TO BE CONSIDERED A NO BUILD AREA

ENGINEERING GEOLOGY

- 7A - Physiographic flood plain where erosion and deposition presently occurs and is generally subject to recurrent flooding. Includes the 100-year flood plain along major streams where flood plain studies have been conducted.

JOB No. 198281

RMG
Materials Testing
Forensics
Civil / Planning
Architecture
Structural
Geotechnical
Engineers / Architects
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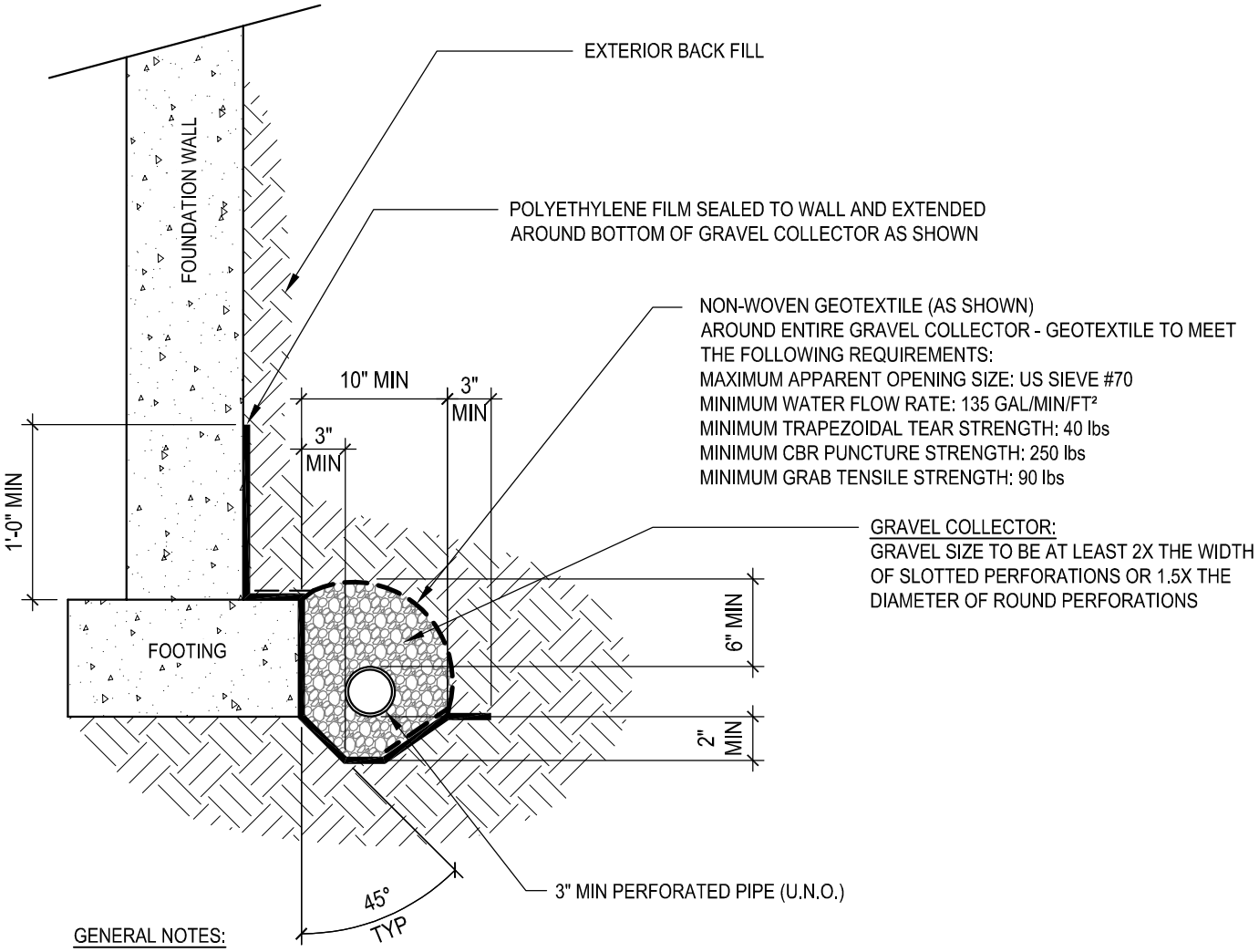
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

ANTLER RANGE
NE MERIDIAN RD AND AYERS RD
EL PASO COUNTY, CO
ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

ENGINEERING AND GEOLOGY MAP

SHEET No.
FIG-19



GENERAL NOTES:

1. BOTTOM OF DRAIN PIPE SHALL BE AT OR BELOW BOTTOM OF FOOTING AT ALL LOCATIONS
2. ALL DRAIN PIPE SHALL BE PERFORATED PLASTIC, WITH THE EXCEPTION OF THE DISCHARGE PORTION WHICH SHALL BE SOLID, NON-PERFORATED PIPE.
3. DRAIN PIPE SHALL HAVE POSITIVE FALL THROUGHOUT.
4. DRAIN PIPE SHALL BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. IF A GRAVITY OUTFALL CANNOT BE ACHIEVED, THEN A SUMP PIT AND PUMP SHALL BE USED. THE OUTFALL SHOULD EXTEND PAST BACKFILL ZONES AND DISCHARGE TO A LOCATION THAT IS GRADED TO DIRECT WATER OFF-SITE.
5. ALL DRAIN COMPONENTS SHALL BE RATED/APPROVED BY THE MANUFACTURER FOR THE INSTALLED DEPTH AND APPLICATION
6. DRAIN SYSTEM, INCLUDING THE OUTFALL OF THE DRAIN, SHALL BE OBSERVED BY QUALIFIED PERSONNEL PRIOR TO BACKFILLING TO VERIFY INSTALLATION.
7. A VERTICAL SEGMENT OF PERFORATED DRAIN PIPE, CAPPED AT THE TOP, SHALL EXTEND TO FINISH GRADE WITHIN ALL WINDOW WELLS.

RMG
Engineers / Architects

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Central Office:
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(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

PERIMETER DRAIN

FIG No. 20

APPENDIX A

Additional Reference Documents

1. *Subsurface Soil Investigation, 11670 Sir Galahad Drive, Lot 28, Camelot, Filing No. 1. Colorado Springs, Colorado*, prepared by RMG – Rocky Mountain Group, Job No. 172918, dated October 25, 2019.
2. *Subsurface Soil Investigation, 11755 Sir Galahad Dr., Lot 22, Camelot Sub. El Paso County, Falcon, Colorado,* prepared by RMG – Rocky Mountain Group, Job No. 161204, dated December 4, 2017.
3. *Subsurface Soil Investigation, Lot 11, El Paso County, Colorado,* prepared by RMG Engineers, Job No. 63762, dated January 20, 2003.
4. *Subsurface Soil Investigation, 12005 Broken Antlers Ct, Lot 10, Antlers Ridge Estates, El Paso County, Colorado,* prepared by RMG Engineers Group, Job No. 133220, dated March 23, 2013.
5. *Subsurface Soil Investigation, 11804 Broken Antler Ct., Lot 5, Antlers Ridge Estate, El Paso County, Colorado*, prepared by RMG Engineers Group, Job No. 130735, dated June 13, 2011.
6. *Subsurface Soil Investigation, 12100 Oregan Wagon Trail, Lot 1, Trails, Filing No. 7C, Elbert, Colorado,*
7. *Black Squirrel Creek and Upper Black Squirrel Creek-Moin Tributary and Snipe Creek, Letter of Map Revision*, prepared by Kiowa Engineering Corporation, Project No. 06002, dated April 2006.
8. *Flood Insurance Rate Map, El Paso County, Colorado and Unincorporated Areas, Community Panel No. 08041C0340G,* Federal Emergency Management Agency (FEMA), effective December 7, 2018. https://msc.fema.gov/portal/home.
9. *Geologic Map of the Corral Bluffs Quadrangle, El Paso County, Colorado,* by Soister, P.E. 1968, US Geological Survey, Geologic Quadrangle Map GQ-783.
10. *Environmental and Engineering Geologic Map for Land Use*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
11. *Map of Potential Geologic Hazards and Surficial Deposits*, compiled by Dale M. Cochran, Charles S. Robinson & Associates, Inc., Golden, Colorado, 1977.
12. *Reconnaissance Geologic Map of Colorado Springs and Vicinity, Colorado,* Department of the Interior United State Geologic Survey, prepared by Glenn R. Scott and Reinhord A. Wobus, Miscellaneous Field Studies, Map MF-482, Sheets 1 and 2, 1973.
13. *El Paso County, Master Plan for Mineral Extraction,* dated February 8, 1996.
14. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board,* prepared by Colorado Geological Survey, dated February 19, 2003, Open-file Report OF-03-07.
15. *USDA – Natural Resources Conservation Service, Web Soil Survey*
https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
16. *El Paso County Assessor, El Paso County, Colorado:*
https://property.spatialest.com/co/elpaso/#/property/4336000004
17. *Colorado Geological Survey, USGS Geologic Map Viewer*:
http://coloradogeologicalsurvey.org/geologic-mapping/6347-2/.
18. *Historical Aerials:* https://www.historicaerials.com/viewer, Images dated 1947, 1955, 1960, 1969, 1983, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, and 2021.
19. *USGS Historical Topographic Map Explorer:* http://historicalmaps.arcgis.com/usgs/ Images dated 1947, 1952, 1955, 1960, 1969, 1983-85, 1999, 2005, 2009, 2011, 2013, 2015, 2017, 2019, and 2021.

20. *Google Earth Pro*, Imagery dated 1999, 2003, 2004, 2005, 2006, 2011, 2015, 2017, 2019, 2022, and 2024.

Appendix B

Wastewater Study, prepared by RMG – Rocky Mountain Group

Structural
Geotechnical

RMG

Materials Testing
Forensic

Job No. 198281

January 28, 2025

Antler Range, LLC
PO Box 38939
Colorado Springs, CO 80937

Re: Wastewater Study
Antlers Range
NE Corner of N Meridian Rd and Ayer Rd
El Paso County, Colorado

Dear Mr. Langdon:

As requested, personnel of RMG – Rocky Mountain Group has performed a preliminary investigation and site reconnaissance at the above referenced address. It is our understanding the parcel included in this study is:

- **EPC Schedule No. 4218000022**, contains 244.38 acres, currently labeled as N. Meridian Rd, and zoned A-35 – Agricultural.

It is our understanding that the parcel is to be subdivided into 84 2.5 acre lots. The subdivision is to be accessed from Ayer Road, east of Meridian Road. Each lot is to be serviced by an individual wastewater treatment system and well. Preliminary grading plans were still in process at the time of this study, but it is our understanding that grading is anticipated to be minor, with construction occurring near the existing grades. The Proposed Lot Layout, Figure 2, outlines the proposed subdivision and the general boundaries of our investigation.

An existing FEMA (Zone A) floodplain is mapped along the northern property boundary, within Black Squirrel Creek. The banks of the creek contain steep potentially unstable slopes. Three broad shallow drainages traverse the site from the south to the north. Two earthen dams are present on the site. Water was not present in the drainages or in the two earthen dams observed at the time of our site visit on December 23, 2024. It is our understanding the earthen dams are to be demolished, and the areas filled in and regraded. There are no structures on the property. This report presents the results of our geologic evaluation and provides our conclusions and recommendations regarding the geologic conditions which could potentially affect the proposed development. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

This letter is to provide information for the on-site wastewater report per the On-Site Wastewater Treatment Systems (OWTS) Regulations of the El Paso County Board of Health pursuant to Chapter 8.

The following are also excluded from the scope of this report including (but not limited to) foundation recommendations, site grading/surface drainage recommendations, subsurface drainage recommendations, geologic, natural and environmental hazards such as landslides, unstable slopes, seismicity, snow avalanches, water flooding, corrosive soils, erosion, radon, wild fire protection, hazardous waste and natural resources.

Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site were available for our review and are listed below:

1. *Soil and Geology Study, Antler Range, El Paso County, Colorado,* prepared by RMG Engineers, dated January 28, 2024.
2. *Soils and Geology Study, Meridian-Ayer Road Development, El Paso County, Colorado,* prepared by Kumar & Associates, Project No. 042-174, June 17, 2004.
3. *Geologic and Soil Report, The Trails Subdivision, El Paso County, Colorado, Project No. 1100,* prepared by MVE, Inc., dated November 28, 1984.

The findings, conclusions and recommendations contained in those reports were considered during the preparation of this report.

SITE CONDITIONS

Personnel of RMG performed a reconnaissance visit on December 23, 2024. The purpose of the reconnaissance visit was to evaluate the site surface characteristics including landscape position, topography, vegetation, natural and cultural features, and current and historic land uses. Seventeen (17) 3.5 to 8-foot deep test pits were performed across the entire site, during our reconnaissance visit. A Test Pit Location Plan is presented in Figure 3.

Topographically, the site consists of undulating to gently rolling hills that generally slope down to the north towards Black Squirrel Creek. The banks of Black Squirrel Creek appeared to have a combination of stables slopes (sandstone exposed) and unstable slopes (sloughing of sands). The bottom of the creek contained a steady flow of water and is heavily eroded in areas. The banks, where sandstone cliffs were not exposed, generally are heavily vegetated with mature vegetation and deciduous trees. Black Squirrel Creek lies within the FEMA floodplain.

Vegetation across the remainder of the site consists of grasses, weeds, yuccas, and trees. Three broad shallow drainages traverse the site from the south to the north. Water was not present in the drainages. Two earthen dams are present on the site. Water was not present in the drainages or in the two earthen dams observed at the time of our site visit on December 23, 2024. It is our understanding the earthen dams are to be demolished, and the areas filled in and regraded. There are no structures on the property. Elevations across the property range between approximately 100 to 150 feet in elevation difference from the southern property boundary to the northern property boundary.

The following conditions were observed with regard to the 244.38-acre parcel:

- A well currently **does not** exist on the existing 244.38-acre site;
- No runoff or irrigation features anticipated to cause deleterious effects to treatment systems on the site were observed;
- A major waterway, Black Squirrel Creek, exists along the northern boundary of the property. The majority of the site lies outside of the designated floodway;
- Slopes greater than 20 percent **do** exist on the site; and
- Significant man-made cuts **do not** exist on the site. Minor man-made cuts are located near the two earthen dams.

Treatment Areas

Treatment areas at a minimum must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit;
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCDHE);
- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCDHE;
- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches;
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, cut banks and fill areas (from the crest);
- The new lots shall be laid out to ensure that the proposed OWTS does not fall within any restricted areas, (e.g. utility easements, right of ways). Based on the test pit observations, the parcel has a minimum of two locations for the OWTS on each lot.

Contamination of surface and subsurface water resources should not occur if the treatment areas are evaluated and installed according to El Paso County Health Department and State Guidelines in conjunction with proper maintenance.

DOCUMENT REVIEW

RMG has reviewed the preliminary site plan. We have identified the soil conditions anticipated to be encountered during construction of the proposed OWTS for the proposed lots. Our review included a review of documented Natural Resource Conservation Service (NRCS) data provided by websoilsurvey.nrcs.usda.gov. The Soil Survey Descriptions are presented below. A review of FEMA Map No. 08041C0340G, effective December 7, 2018 indicates that the proposed treatment areas are not located within an identified floodplain.

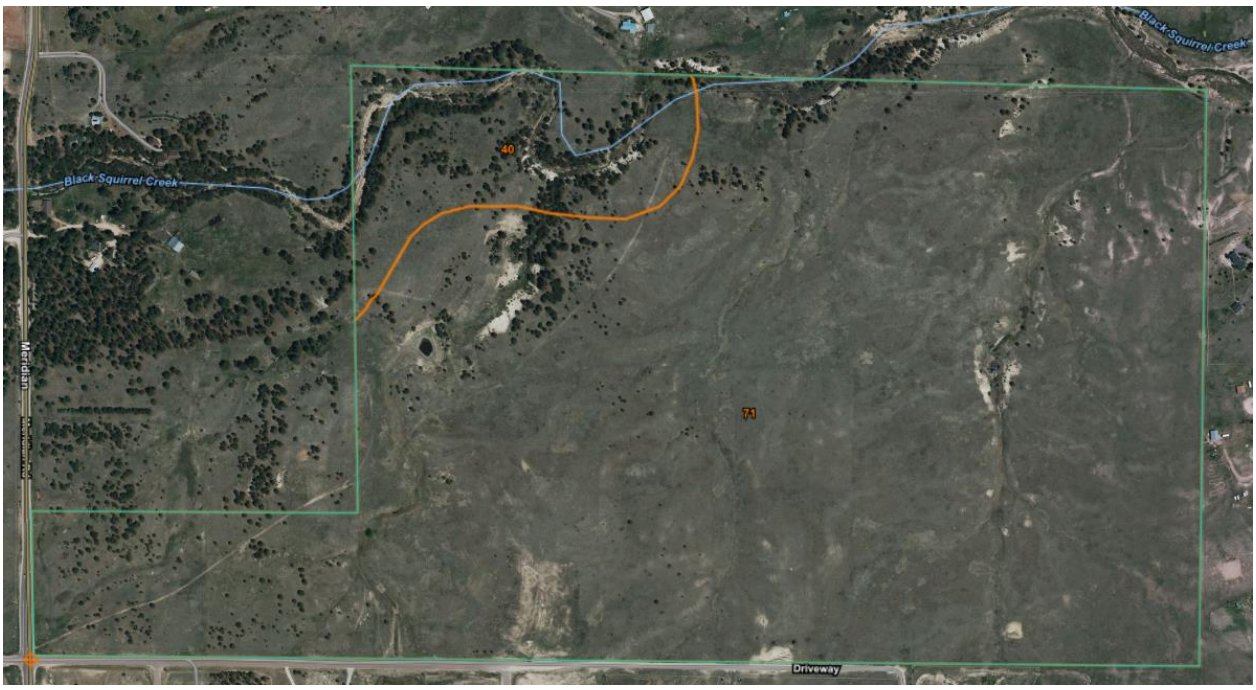
SOIL EVALUATION

Personnel of RMG performed soil evaluations in 17 test pits ranging in depths between 3.5 and 8 feet on December 23, 2024, utilizing the visual and tactile method for the evaluation of the site soils. The test pits were excavated in areas that appeared most likely to be problematic areas for future OWTS. The Explanation of Test Pit Logs and the Test Pit Logs are presented in Figures 3-13. A Septic Suitability map is presented in Figure 14.

The U.S. Soil Conservation Service along with USDA has identified the soils on the property as:

- 41 – Kettle gravelly loamy sand, 8 to 40 percent slopes. The Kettle gravelly loamy sand was mapped by the USDA to be located near the northwest portion of the property. The. Properties of the Kettle gravelly loamy sand include, somewhat excessively drained soil, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be medium, frequency of flooding and ponding is none, and landforms are depressions.
- 71 – Pring coarse sandy loam, 3 to 8 percent slopes. The Pring coarse sandy loam encompasses the majority of the property. Properties of the Pring coarse sandy loam include, well-drained soil, depth of the water table is anticipated to be more than 80 inches, runoff is anticipated to be low, frequency of flooding is none and ponding is none. Landforms include hills.

The USDA Soil Survey Map is presented below.



Bedrock was encountered in some of the test pits observed by RMG. Groundwater was not observed in the test pits. However, three of the test pits (TP-4, TP-5, TP-7) had indications of redoximorphic features (*color patterns in soil that are caused by the oxidation and reduction of iron and manganese),* underlying the topsoil. It is our opinion, the upper redoximorphic features

were indicating the surface water has historically filtered through the topsoil and becomes perched atop the underlying sandstone and/or claystone bedrock. This observation coincided with the test pits located within the lower lying areas that appear to have contained standing surface water prior to our site visit, as the top 8 to 12 inches of soil were "frozen", whereas the remainder of the test pits did not contain frozen soil at the surface.

TP-7 and TP-13 exhibited indications of redoximorphic features near the bottom of the 7 to 8-foot depth of the test pit. This seemed representative of the soil texture changing to a dense cemented clay soil that would retain moisture.

An OWTS is proposed for each lot and should conform to the recommendations of a future OWTS site evaluation, performed in accordance with the applicable health department codes prior to construction. This report may require additional test pits in the vicinity of the proposed treatment field. A minimum separation of 4 feet shall be maintained from groundwater and bedrock to the infiltrative surface.

CONCLUSIONS

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. There are no foreseeable or stated construction related issues or land use changes proposed at this time.

Soil and groundwater conditions at the site are suitable for individual treatment systems. It should be noted that the LTAR values stated above are for the test pit locations performed for this report only. The LTAR values may change throughout the site. If an LTAR value of less than 0.35 (soil types 3A to 5) or greater than 0.80 (soil type 0 or the Type "R" soils) is encountered at the time of the site specific OWTS evaluation, an "engineered system" will be required.

Additionally, based on the depth of the limiting layers (subsurface water and/or bedrock) encountered in the test pits, the maximum depth of the OWTS components may be limited in some cases, or mound systems (above finished ground surface) may be required. It is anticipated the majority if not all of the OWTS on the subject site will need to be "engineered".

LIMITATIONS

The information provided in this report is based upon the subsurface conditions observed in the profile pit excavations and accepted engineering procedures. The subsurface conditions encountered in the excavation for the treatment area may vary from those encountered in the test pit excavations. Therefore, depth to limiting or restrictive conditions, bedrock, and groundwater may be different from the results reported in this letter.

An OWTS site evaluation will need to be performed in accordance with the applicable health department codes prior to construction.

I hope this provides the information you have requested. Should you have questions, please feel free to contact our office.

Cordially,	Reviewed by,
RMG – Rocky Mountain Group	RMG – Rocky Mountain Group
Kelli Zigler Project Geologist	Tony Munger, P.E. Sr. Geotechnical Project Manager

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Engineers / Architects

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SITE VICINITY MAP

ANTLERS RANGE
NE CORNER OF MERIDIAN RD
AND AYERS RD
EL PASO COUNTY, CO
ANTLERS RANGE. LLC

JOB No. 198281

FIG No. 1

DATE 1-28-2025

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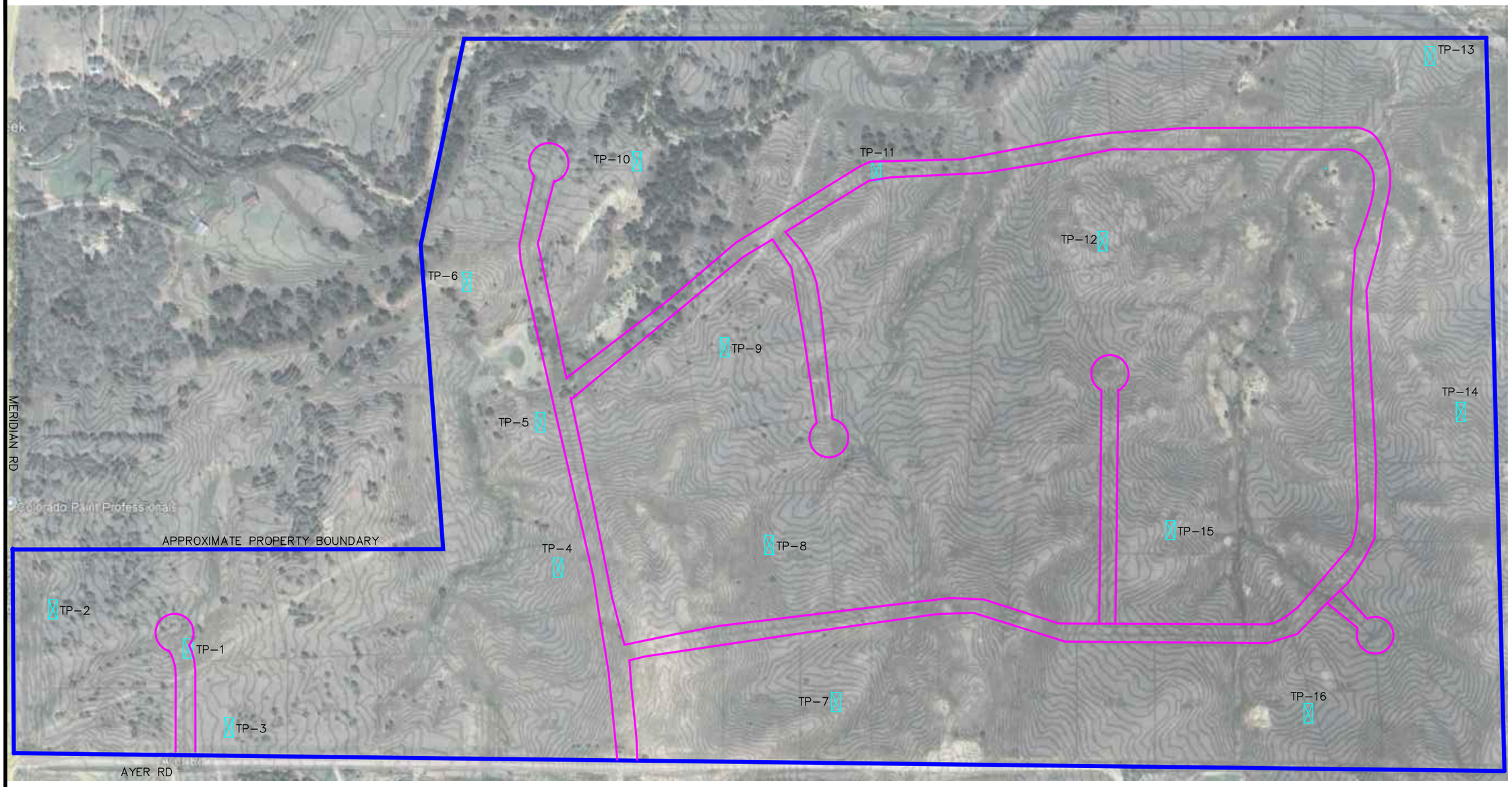
ANTLER RANGE
NE MERIDIAN RD AND AYERS RD
EL PASO COUNTY, CO

ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

PROPOSED LOT LAYOUT

SHEET No.
FIG-2



DENOTES APPROXIMATE LOCATION OF TEST PITS

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NE MERIDIAN RD AND AYERS RD
EL PASO COUNTY, CO

ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

TEST PIT LOCATION PLAN

SHEET No.
FIG-3

SOILS DESCRIPTION


CLAY


CLAY LOAM


SILTY CLAY


LOAM


> 35% ROCK


SANDY CLAY


LOAMY SAND


SANDY LOAM


SILTY CLAY


SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
5085 LIST DRIVE, SUITE 200
COLORADO SPRINGS, COLORADO

SYMBOLS AND NOTES


XX — STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


XX — UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).


FREE WATER TABLE


DEPTH AT WHICH BORING CAVED


BULK — DISTURBED BULK SAMPLE


AUG — AUGER "CUTTINGS"

4.5 — WATER CONTENT (%)

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EXPLANATION OF TEST PIT LOGS

JOB No. 198281

FIGURE No. 4

DATE Jan/28/2025

TEST PIT: **1** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: TOPSOIL: SAND SOIL STRUCTURE: GRANULAR SOIL GRADE: WEAK SOIL TYPE: 1					
SOIL TEXTURE: >35% ROCK SOIL STRUCTURE: GRANULAR SOIL GRADE: WEAK SOIL TYPE: R	2.5				
SOIL TEXTURE: SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1	5.0 7.5				

TEST PIT: **2** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: TOPSOIL: LOAMY SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1					
SOIL TEXTURE: >35% ROCK SOIL STRUCTURE: GRANULAR SOIL GRADE: WEAK SOIL TYPE: R	2.5				
SOIL TEXTURE: LOAMY SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1	5.0 7.5				

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TEST PIT LOG

JOB No. 198281

FIGURE No. 5

DATE Jan/28/2025

TEST PIT: **3**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

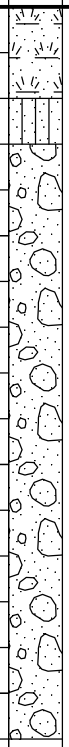
SOIL TEXTURE: TOPSOIL: SAND
SOIL STRUCTURE: SINGLE-GRAIN
SOIL GRADE: STUCTURELESS
SOIL TYPE: 1

SOIL TEXTURE: LOAMY SAND
SOIL STRUCTURE: SINGLE-GRAIN
SOIL GRADE: STUTURELESS
SOIL TYPE: 1

SOIL TEXTURE: >35% ROCK
SOIL STRUCTURE: GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: R

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

2.5
5.0
7.5



TEST PIT: **4**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: 8" FROST / TOPSOIL: SAND
SOIL STRUCTURE: SINGLE-GRAIN
SOIL GRADE: STRUCTURELESS
SOIL TYPE: 1

SOIL TEXTURE: SAND
SOIL STRUCTURE: SINGLE-GRAIN
SOIL GRADE: STUCTURELESS
SOIL TYPE: 1

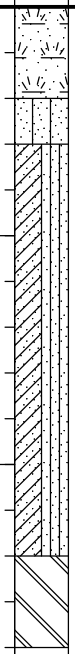
SOIL TEXTURE: SANDY LOAM
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 2

SOIL TEXTURE: CLAY LOAM
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 3

LIMITING LAYER AT 7 FEET DUE TO CLAYSTONE BEDROCK

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

2.5
5.0



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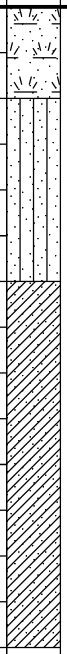
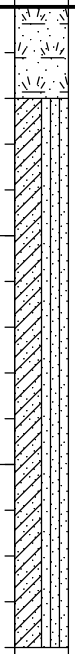
TEST PIT LOG

JOB No. 198281

FIGURE No. 6

DATE Jan/28/2025

TEST PIT: **5** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: 10" FROST / TOPSOIL: SANDY LOAM SOIL STRUCTURE: GRANULAR SOIL GRADE: MODERATE SOIL TYPE: 2 SOIL TEXTURE: LOAMY SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STRUCTURELESS SOIL TYPE: 1 SOIL TEXTURE: SANDY CLAY SOIL STRUCTURE: BLOCKY SOIL GRADE: MODERATE SOIL TYPE: 4	2.5 5.0				
LIMITING LAYER AT 7 FEET DUE TO HARD SANDSTONE BEDROCK					

TEST PIT: **6** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: 10" FROST / TOPSOIL: SANDY LOAM SOIL STRUCTURE: GRANULAR SOIL GRADE: MODERATE SOIL TYPE: 2 SOIL TEXTURE: SANDY LOAM SOIL STRUCTURE: GRANULAR SOIL GRADE: WEAK SOIL TYPE: 3	2.5 5.0				
LIMITING LAYER AT 7 FEET DUE TO HARD SANDSTONE BEDROCK					

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TEST PIT LOG

JOB No. 198281

FIGURE No. 7

DATE Jan/28/2025

TEST PIT: **7**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: TOPSOIL: SANDY LOAM
SOIL STRUCTURE: GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 2

SOIL TEXTURE: SILTY CLAY
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 4

2.5

SOIL TEXTURE: SANDY CLAY LOAM
SOIL STRUCTURE: GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 3

5.0

LIMITING LAYER AT 5 FEET DUE TO HARD SANDSTONE BEDROCK

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

TEST PIT: **8**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: CLAY LOAM
SOIL STRUCTURE: GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 2

SOIL TEXTURE: SANDY CLAY
SOIL STRUCTURE: BLOCKY
SOIL GRADE: STRONG
SOIL TYPE: 4

2.5

SOIL TEXTURE: CLAY
SOIL STRUCTURE: BLOCKY
SOIL GRADE: STRONG
SOIL TYPE: 4

LIMITING LAYER DUE AT 3.5 FEET DUE TO SANDSTONE BEDROCK

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

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TEST PIT LOG

JOB No. 198281

FIGURE No. 8

DATE Jan/28/2025

TEST PIT: **9**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: SANDY LOAM
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 2

SOIL TEXTURE: SANDY CLAY
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: 3

SOIL TEXTURE: SANDY LOAM
SOIL STRUCTURE:
SINGLE-GRAIN
SOIL GRADE: STUCTURELESS
SOIL TYPE: 2

LIMITING LAYER AT 4 FEET
DUE TO SANDSTONE
BEDROCK

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

2.5

5.0

TEST PIT: **10**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: SANDY CLAY
LOAM
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: 3A

SOIL TEXTURE: CLAY
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 4

SOIL TEXTURE: LOAMY SAND
SOIL STRUCTURE:
SINGLE-GRAIN
SOIL GRADE: STUCTURELESS
SOIL TYPE: 1

DEPTH (FT) | SYMBOL | SAMPLES | BLOWS PER FT. | WATER CONTENT %

2.5

5.0

7.5

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TEST PIT LOG

JOB No. 198281

FIGURE No. 9

DATE Jan/28/2025

TEST PIT: **11**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: LOAM
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 2

SOIL TEXTURE: SILTY CLAY
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 4

SOIL TEXTURE: >35% ROCK
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: R

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
2.5				
5.0				
7.5				

TEST PIT: **12**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: TOPSOIL:
SAND, <35% ROCK
SOIL STRUCTURE:
STUCTURELESS
SOIL GRADE: WEAK
SOIL TYPE: R

SOIL TEXTURE: >35% ROCK
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: R

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
2.5				
5.0				
7.5				

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TEST PIT LOG

JOB No. 198281

FIGURE No. 10

DATE Jan/28/2025

TEST PIT: **13**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: LOAMY SAND
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: MODERATE
SOIL TYPE: 1

SOIL TEXTURE: SILTY CLAY
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 4

LIMITING LAYER DUE AT 8 FEET DUE TO INDICATIONS OF POTENTIALLY PERCHED WATER

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
2.5				
5.0				
7.5				

TEST PIT: **14**

DATE DRILLED:
12/23/24
NO GROUNDWATER ON
12/23/24

SOIL TEXTURE: SILTY LOAM WITH ORGANICS
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: 2A

SOIL TEXTURE: SANDY CLAY LOAM
SOIL STRUCTURE: BLOCKY
SOIL GRADE: MODERATE
SOIL TYPE: 3

SOIL TEXTURE: SAND
SOIL STRUCTURE:
SINGLE-GRAIN
SOIL GRADE: STUCTURELESS
SOIL TYPE: 1

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
2.5				
5.0				
7.5				

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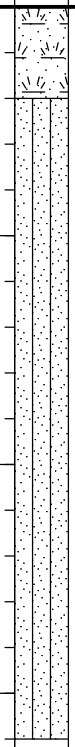
TEST PIT LOG

JOB No. 198281

FIGURE No. 11

DATE Jan/28/2025

TEST PIT: **15** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1 SOIL TEXTURE: SANDY CLAY SOIL STRUCTURE: BLOCKY SOIL GRADE: STRONG SOIL TYPE: 4 SOIL TEXTURE: >35% ROCK SOIL STRUCTURE: GRANULAR SOIL GRADE: WEAK SOIL TYPE: R	2.5 5.0 7.5				

TEST PIT: **16** DATE DRILLED: 12/23/24 NO GROUNDWATER ON 12/23/24	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SOIL TEXTURE: TOPSOIL: LOAMY SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1 SOIL TEXTURE: SAND SOIL STRUCTURE: SINGLE-GRAIN SOIL GRADE: STUCTURELESS SOIL TYPE: 1	2.5 5.0 7.5				

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TEST PIT LOG

JOB No. 198281

FIGURE No. 12

DATE Jan/28/2025

TEST PIT: **17**

DATE DRILLED:
12/23/25
NO GROUNDWATER ON
12/23/25

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %

SOIL TEXTURE: TOPSOIL:
35% ROCK

SOIL TEXTURE: >35% ROCK
SOIL STRUCTURE:
GRANULAR
SOIL GRADE: WEAK
SOIL TYPE: R

2.5

5.0

7.5

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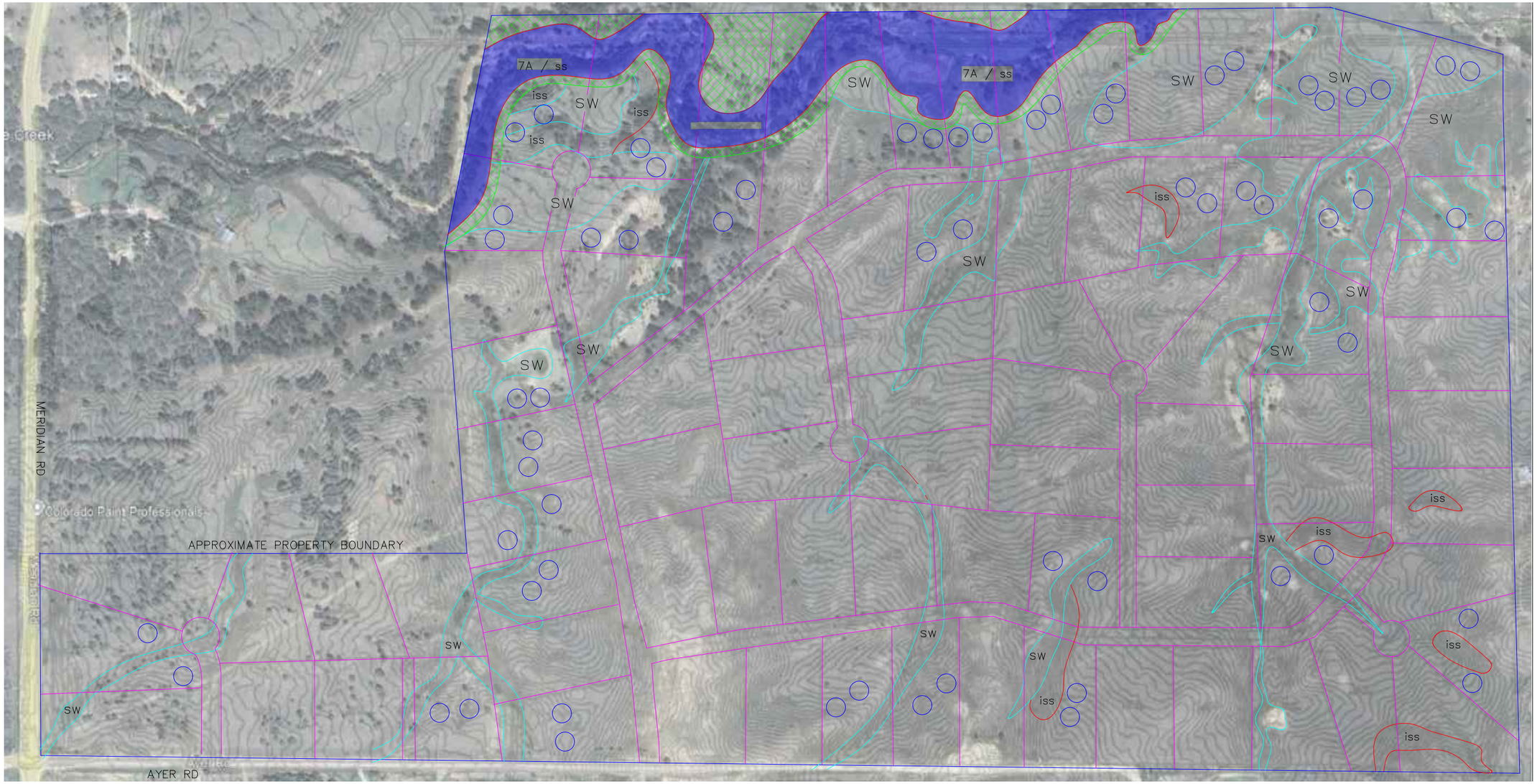
TEST PIT LOG

JOB No. 198281

FIGURE No. 13

DATE Jan/28/2025



- *fw - Regulatory floodway* as designated by FEMA. This area is to be designated a "No Build Area" until further investigations are completed.
- *sw* - seasonally wet - areas that may collect surface water during heavy precipitation events
- iss - isolated steep slopes that can be regarded as needed during construction of the individual residences

AREA TO BE CONSIDERED A NO BUILD AREA

Proposed locations for the OWTS - only shown on the lots with physical restraints - these lots will require an engineered system. The remaining lots each have two locations for the proposed and alternate OWTS

Note: The chosen OWTS and home location are for illustration only. If the El Paso County Health Department physical setback requirements are met for each lot, steep slopes and the floodway are avoided there are no restrictions on the OWTS placement.

NOT TO SCALE

JOB No. 198281

RMG
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Forensics
Civil / Planning
Architecture
Structural
Geotechnical
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ANTLER RANGE, LLC

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	1-28-2025

SEPTIC SUITABILITY MAP

SHEET No.
FIG-14