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SUBSURFACE SOIL INVESTIGATION

Lot 14, Blk 15, Park Vista Estates Addition
El Paso County, Colorado

PREPARED FOR:

Thirteen Outlaws, LLC
6097 Leon Young Drive
Colorado Springs, CO 80924

JOB NO. 193526

July 13, 2023

Respectfully Submitted,
RMG – Rocky Mountain Group

Kelli Zigler

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Project Geologist

Reviewed by,
RMG – Rocky Mountain Group

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7/13/23
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PROFESSIONAL ENGINEER

Tony Munger, P.E.
Sr. Geotechnical Project Manager

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GENERAL SITE AND PROJECT DESCRIPTION

Project Description

The site is located in the northeastern portion of Colorado Springs, Colorado, at the northern corner of the intersection of Austin Bluffs Parkway and Platinum Drive. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

The project is to consist of paved parking lot. Structures are not currently proposed. The parking lot is to accommodate the commercial business located at 4910 Turquoise Drive, north and east of the site. RMG – Rocky Mountain Group was retained to explore the subsurface conditions at the site and develop geotechnical engineering recommendations for construction of the proposed parking lot.

Existing Site Conditions

The site is presently a vacant undeveloped lot. Low to moderate growth of native weeds and grasses were present across the site. Curb-and-gutter has been installed within the roadway alignments, and the roads surrounding the property have been paved. The topography across the site consists of a mild slope downwards to the south and east.

Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations for this site were not available for our review.

FIELD INVESTIGATION AND LABORATORY TESTING

Drilling

The subsurface conditions on the site were investigated by drilling two exploratory test borings. Additionally, two test borings were performed on Lot 13 to the east of the site. The information obtained from these test borings were considered in preparation of this report. The approximate locations of the test borings are presented in the Test Boring Location Plan, Figure 2.

The test borings were advanced with a power-driven, continuous-flight auger drill rig to depths of about 20 feet below the existing ground surface. Samples were obtained in general accordance with ASTM D-1586 utilizing a 2-inch OD split-barrel sampler or in general accordance with ASTM D-3550 utilizing a 2½-inch OD modified California sampler. An Explanation of Test Boring Logs is presented in Figure 3. The Test Boring Logs are presented in Figure 4.

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 5. Soil Classification Data are presented in Figure 6. Swell/Consolidation tests were not performed on this site. However, one swell test was performed on Lot 13 (TB-4835-2) at a depth of 2 feet. That swell test result is presented in Figure 7.

SUBSURFACE CONDITIONS

Subsurface Materials

The subsurface materials encountered in the test borings were classified using the Unified Soils Classification System (USCS) and the materials were grouped into the general categories of sandy clay fill and native silty to clayey sand with clay seams.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon visual classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

Groundwater

Groundwater was not encountered in the test borings during field exploration. Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

ANTICIPATED PAVEMENT RECOMMENDATIONS

The discussion presented below is based on the subsurface conditions encountered in the test borings, laboratory test results and the project characteristics previously described. If the subsurface conditions are different from those described in this report or the project characteristics change, RMG should be retained to review our recommendations and modify them, if necessary. The conclusions and recommendations presented in this report should be verified by RMG during construction.

Pavement Design

The pavement recommendations were performed using the Colorado Asphalt Pavement Association's *A Guideline for the Design and Construction of Asphalt Parking Lots in Colorado*. Table 1 of this document shows suggested thicknesses for Hot Mix Asphalt (HMA) over aggregated base course (ABC) for various California Bearing Ratio (CBR) values and traffic levels.

The test borings were performed for the purpose of providing the pavement recommendations. Samples were collected from the top two feet of the soil stratum in one of the test borings and returned to RMG's soil laboratory for testing, classification and analysis. This material will form the subgrade of the pavement section, and its stability and strength are critical to pavement design. The soil consisted of sandy clay fill. The sandy clay fill should classify as A-6 to A-7-6 soil in accordance with the American Association of State Highway and Transportation Officials (AASHTO) classification system. These soils are considered "fair to poor" as subgrade material.

Soil Mitigation

The Colorado Asphalt Pavement Association's notes that fair to poor quality soils may be improved by adding granular materials, lime, asphalt, or other mixtures to stabilize the existing soils. Low quality soil may include expansive soils, shallow ground water, subgrade instability, etc. Based on the AASHTO classification of for the soils on this lot, the subgrade soils evaluated for this pavement design are anticipated to exhibit a swell of less than 2.0%. Groundwater or wet and unstable soils were not encountered in the borings. Therefore, special mitigation measures do not appear to be necessary for subgrade preparation. However, the sandy clay fill is considered uncontrolled, and may not be uniformly compacted. Areas of unsuitable soils (lower density soils, highly expansive soils, and/or soils containing trash, debris, vegetation, or other deleterious materials) may be present within the fill. Where present, these unsuitable soils may result in additional movement and/or cracking of the pavement surface. If the risk of such movement is not acceptable, we recommend removal of the upper 2 feet of fill soil and replacement with structural fill as indicated in the **Structural Fill – General** section of this report.

Subgrade Preparation

All subgrade fill material placed below pavements should be moisture conditioned and compacted in accordance with the ***Structural Fill – General*** section of this report. Prior to placement of the pavement section, the final subgrade should be scarified to a depth of 12 inches, adjusted to within 2 percent of the optimum moisture content and recompacted. The subgrade should then be proof-rolled with a heavy, pneumatic tired vehicle. Areas which deform under wheel loads should be removed and replaced. Base course should be compacted to at least 95 percent of the maximum Modified Proctor density (ASTM D1557).

Structural Fill - General

Areas to receive structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) prior to placing structural fill. Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill should be placed in loose lifts of not more than 10-inches, moisture-conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) or to 98 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by the RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

To verify the condition of the compacted soils, density tests should be performed during placement. The first density tests should be conducted when 24 inches of fill have been placed.

Pavement Thickness

Based on Table 1 (referenced above) and an estimated CBR between 5 and 10, the recommended pavement section for the majority of paved areas and for heavy vehicle loading areas is presented below.

Estimated Hot-Mix Asphalt Pavement Section	
Traffic Level	**HMA over ABC (inches)**
Light Traffic / Passenger Cars	3.5 / 8.5
Moderate Traffic / Some Trucks	4.0 / 12.0

As an alternative to the HMA section above, Rigid Concrete Pavements are recommended in areas where heavy vehicle loading is expected. These areas include drop-off/pick-up areas, loading docks, trash pick-up areas, and other locations where heavy trucks will be making frequent turning and braking movements. Rigid pavements may be constructed directly on proof-rolled non-expansive granular subgrade, the top one foot of which has been compacted to a minimum of 95% of maximum dry density as determined by ASTM D1557.

Minimum Rigid Concrete Pavement Section	
Traffic Level	**Portland Cement Concrete (in.)**
Light to Moderate Vehicles with Turning Motions	6.0 in.

These recommendations are for preliminary planning purposes only. The CBR value is based on the materials encountered at the time of drilling and will be dependent upon the soil material used for site fill and subgrade construction. We suggest evaluating the soil conditions after site grading and pavement layout to assess our recommendations.

Pavement Materials

Pavement materials should be selected, prepared, and placed in accordance with the above referenced document, the *Pikes Peak Region Asphalt Paving Specifications*, and all other

requirements set forth by the governing jurisdictions. Tests should be performed in accordance with the applicable procedures presented in those specifications.

Surface Drainage

Surface drainage is important for the satisfactory performance of pavement. Wetting of the subgrade soils or base course will cause a loss of strength which can result in pavement distress. Surface drainage should provide for efficient removal of storm-water runoff. As a general rule, parking area surfaces should have a minimum slope of 2 percent (approximately ¼ inch per foot). Water should not be allowed to pond on the pavement or at the edges of the pavement, and areas adjacent to the pavement should be designed to provide positive drainage away from the paved surface.

CLOSING

This report has been prepared for the exclusive purpose of providing geotechnical engineering information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

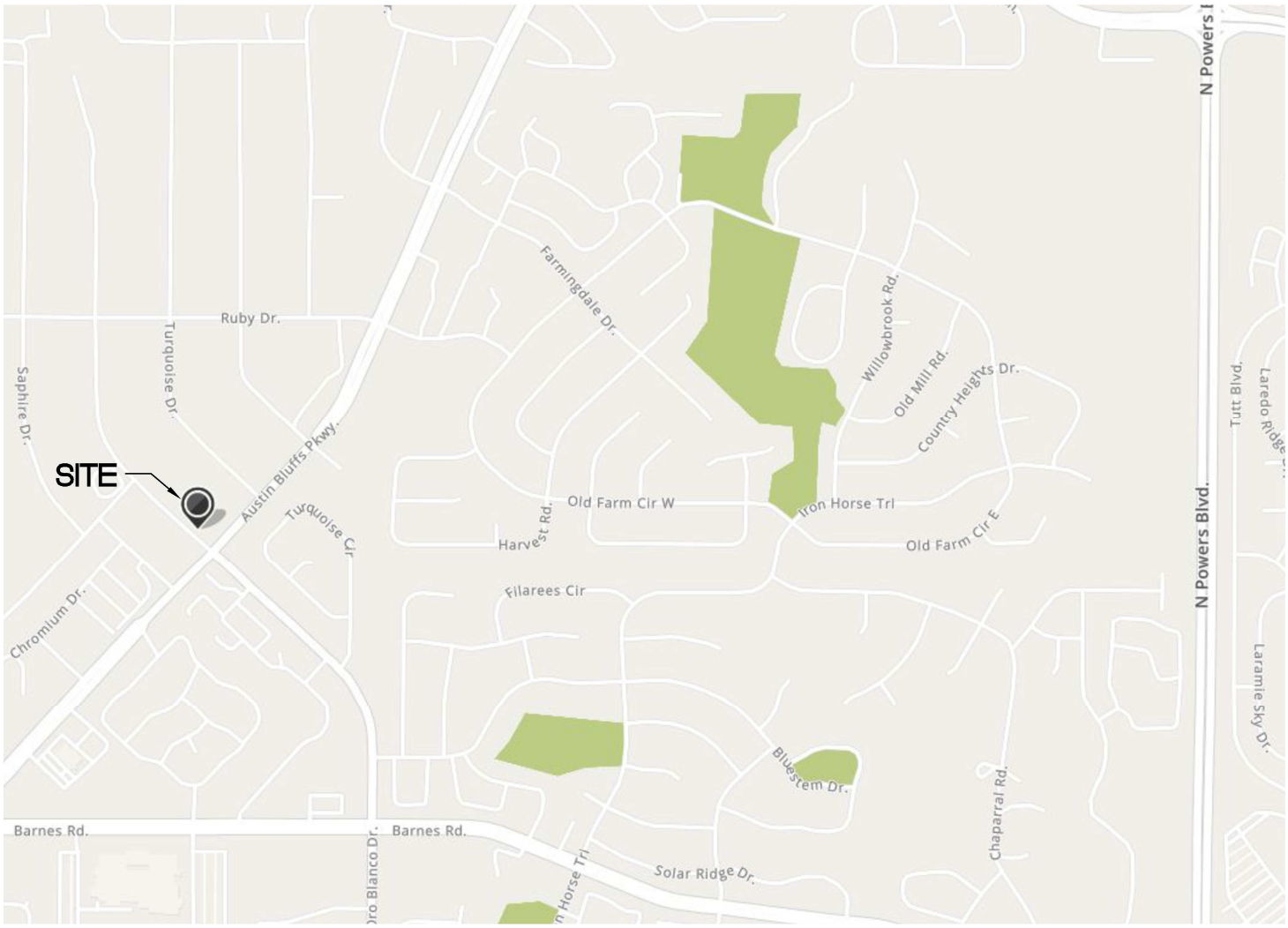
This report has been prepared for the exclusive use by **Thirteen Outlaws, LLC** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical engineering practices. The analyses and recommendations in this report are based in part upon data obtained from test borings, site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG should be retained to review the recommendations presented in this report considering the varied condition, and either verify or modify them in writing.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers 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.

The scope of services for this project does not include, either specifically or by implication, 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 Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

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



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SITE VICINITY MAP

4815 PLATINUM DRIVE
LOT 14, BLK 15, PARK VISTA ESTATES
COLORADO SPRINGS, CO
THIRTEEN OUTLAWS, LLC

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FIG No. 1

DATE 7-13-2023

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DENOTES APPROXIMATE LOCATION OF TEST BORINGS

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TEST BORING LOCATION PLAN

4815 PLATINUM DRIVE
LOT 14, BLK 15, PARK VISTA ESTATES
COLORADO SPRINGS, CO
THIRTEEN OUTLAWS, LLC

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FIG No. 2

DATE 7-13-2023

SOILS DESCRIPTION

FILL: CLAY, SANDY

SILTY TO CLAYEY SAND

UNLESS NOTED OTHERWISE, ALL LABORATORY
TESTS PRESENTED HEREIN WERE PERFORMED BY:
RMG - ROCKY MOUNTAIN GROUP
2910 AUSTIN BLUFFS PARKWAY
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

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FIGURE No. 3

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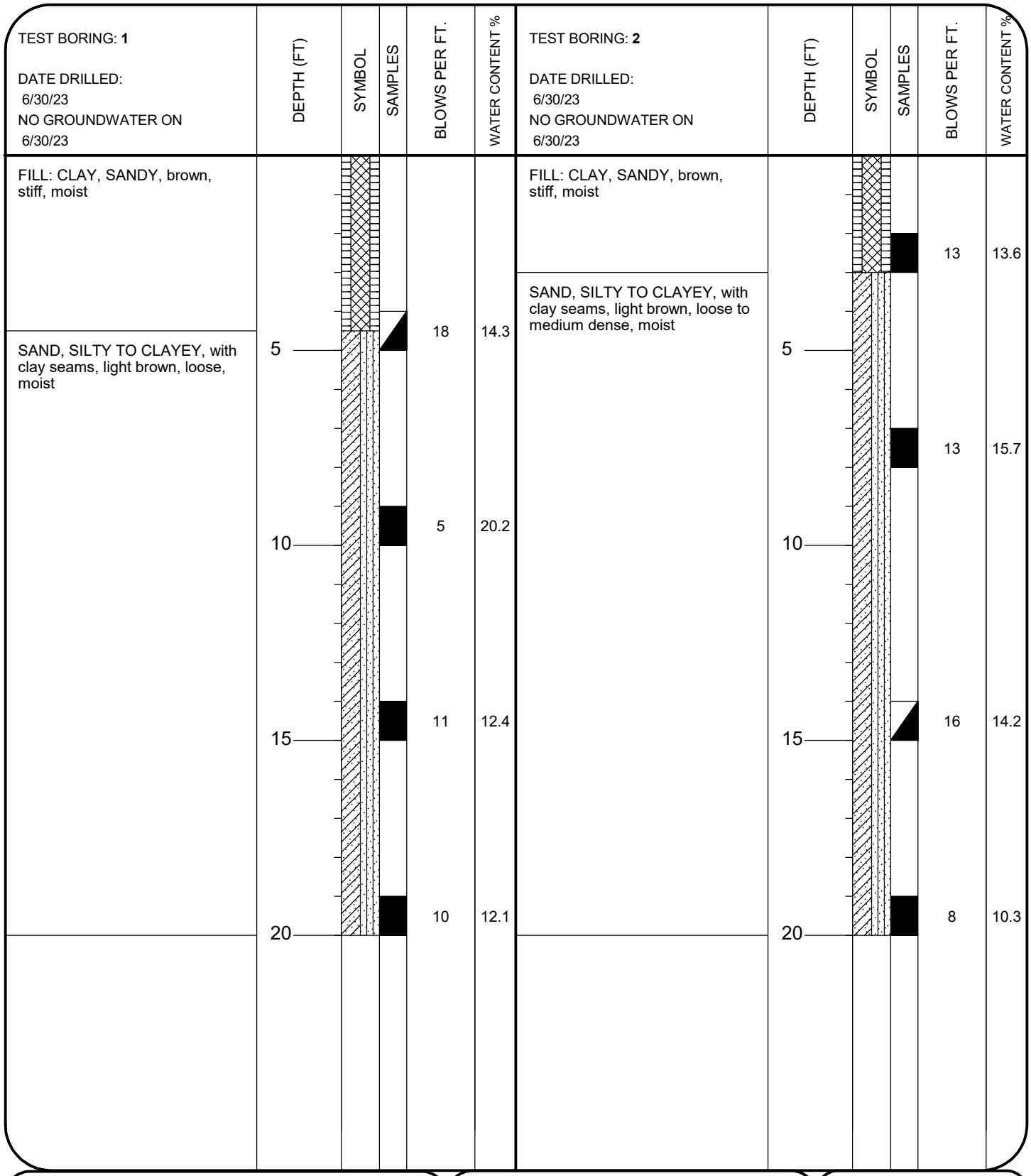

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TEST BORING LOG

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FIGURE No. 4

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Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	Load at Saturation (psf)	% Swell/ Collapse	USCS Classification
1	4.0	14.3								
1	9.0	20.2				0.0	73.5			
1	14.0	12.4								
1	19.0	12.1								
2	2.0	13.6				0.0	58.1			
2	7.0	15.7								
2	14.0	14.2								
2	19.0	10.3								
TB-4835-2	2.0	14.5	111.9						0.0	

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SUMMARY OF LABORATORY TEST RESULTS

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FIGURE No. 5
PAGE 1 OF 1
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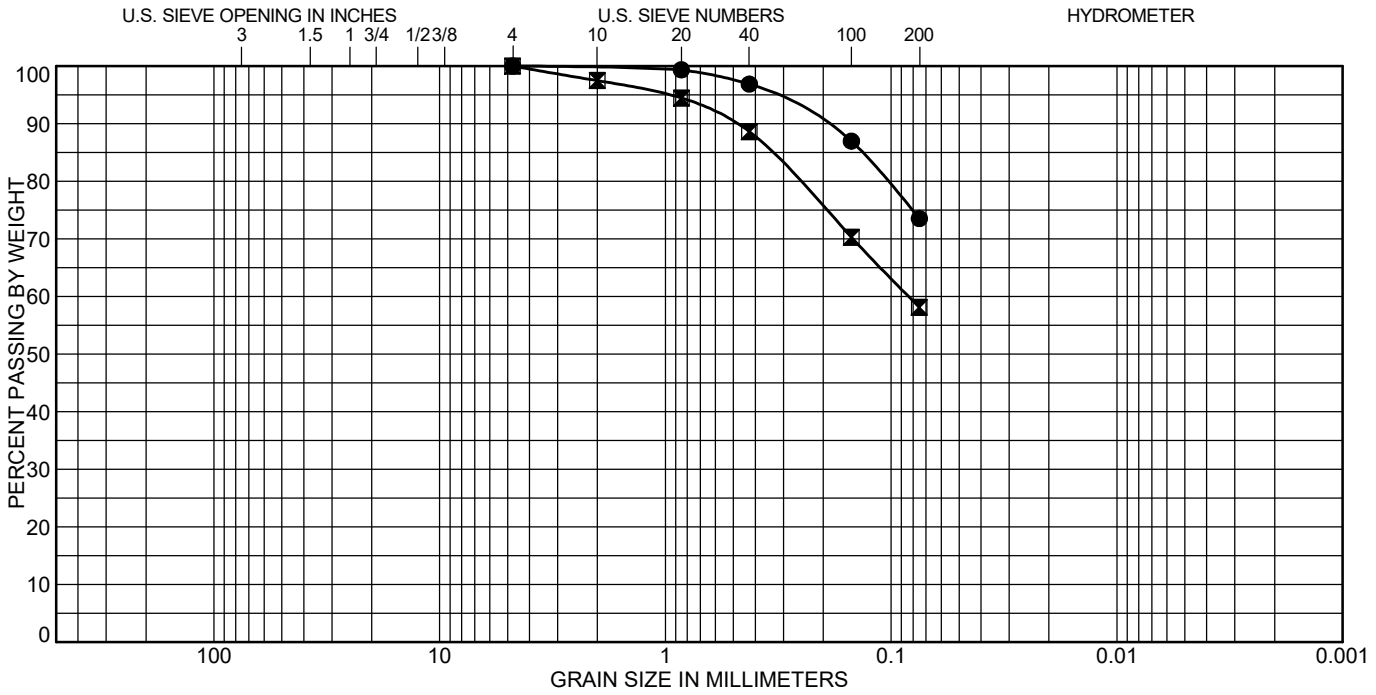

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	1	9.0				
⊠	2	2.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	9.0	0.0	26.5	73.5	
⊠	2	2.0	0.0	41.9	58.1	

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SOIL CLASSIFICATION DATA

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FIGURE No. 6

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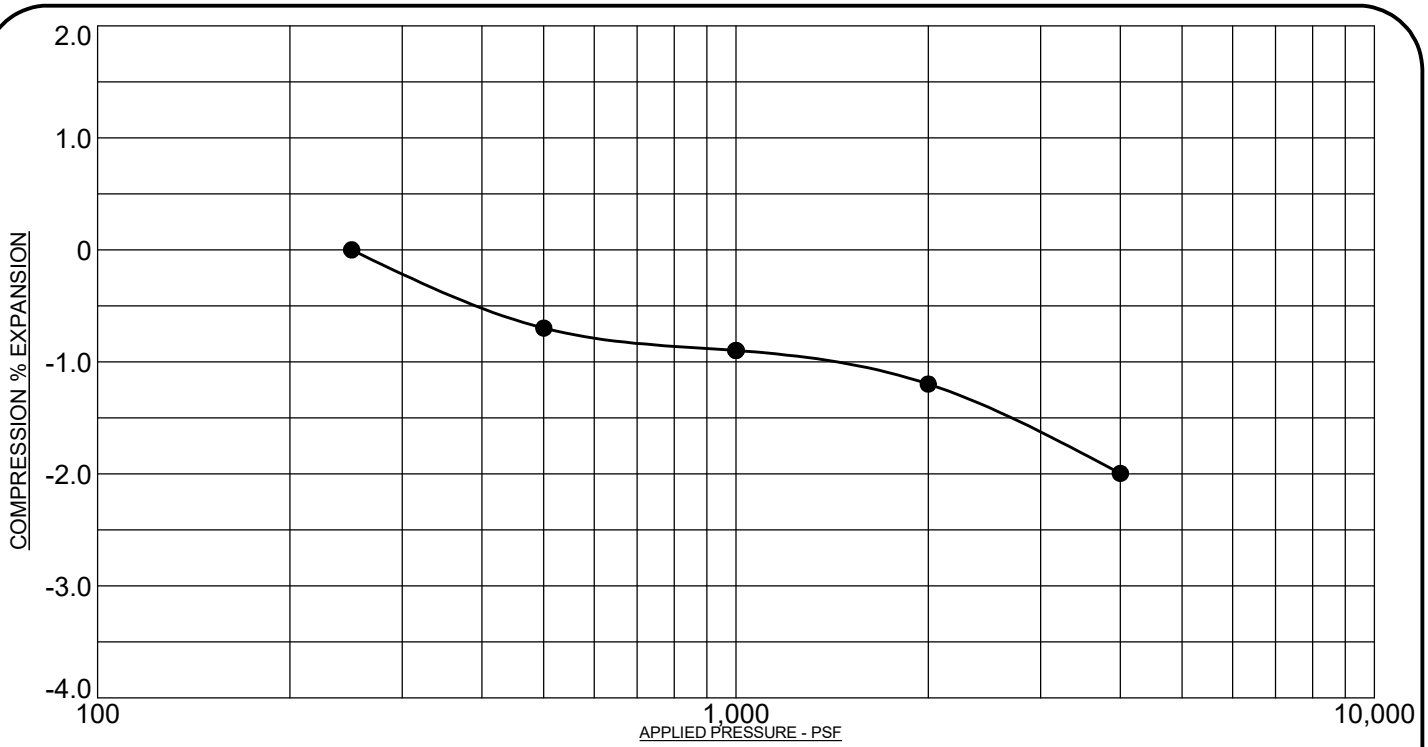

PROJECT: **4835 Platinum Drive, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **FILL: CLAY, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **2 @ 2 FT**
NATURAL DRY UNIT WEIGHT: **111.9 PCF**
NATURAL MOISTURE CONTENT: **14.5%**
PERCENT SWELL/COMPRESSION: **0.0**

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SWELL/CONSOLIDATION TEST RESULTS

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FIGURE No. 7

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