Architecture
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ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

PRELIMINARY SUBSURFACE SOILS INVESTIGATION

Lots 1-90, The Ridge at Spring Creek, Filing No. 1
Colorado Springs, Colorado

PREPARED FOR:

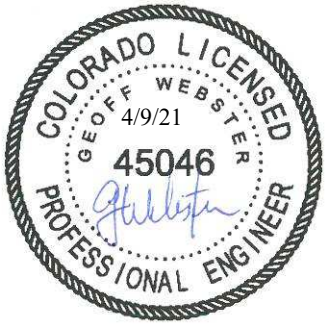
Challenger Colorado, LLC
8605 Explorer Drive, Suite 250
Colorado Springs, CO 80920

JOB NO. 182625

April 9, 2021

Respectfully Submitted,

RMG – Rocky Mountain Group



Geoff Webster, P.E.
Sr. Geotechnical Project Engineer

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GENERAL SITE AND PROJECT DESCRIPTION

Project Description

The site is generally located north of the southbound off-ramp from South Circle Drive to South Union Boulevard in Colorado Springs, Colorado. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

RMG understands the 17-acre site will be developed with internal streets and as many as 90 single-family residences. The structures are anticipated to be one to two-stories in height with multi-car garages. The homes may be constructed with or without basements. Comparing site survey to home site layout indicates retaining walls may be required around the site. RMG - Rocky Mountain Group was retained to explore the subsurface conditions at the site and develop geotechnical engineering recommendations for design and construction.

Existing Site Conditions

The site is the terraced south end of a mesa. The site steps downward from the northeast to the southwest. Vegetation includes native grasses, shrubs, weeds, and trees. Installed water and sewer utilities are present across the site.

FIELD INVESTIGATION AND LABORATORY TESTING

Drilling

The subsurface conditions were investigated by drilling twelve (12) exploratory test borings across the site. 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 a depth of 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 Figures 4 through 9.

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 to classify the soil and develop pertinent engineering properties. A Summary of Laboratory Test Results is presented in Figure 10 (two pages). Soils Classification Data are presented in Figures 11 through 13. Swell/Consolidation Test Results are presented in Figures 14 through 16.

SUBSURFACE CONDITIONS

Subsurface Materials

The subsurface materials encountered in the test borings were classified using the Unified Soils Classification System (USCS). The soils can be grouped into the general categories of silty to clayey sand, sandy clay, and sandy claystone. In general, surficial soil varies in type and depth across the site. Deep deposits of sandy clay encountered at the west end of the site are most likely fill material. Claystone bedrock was encountered near or at the ground surface in borings performed through the middle of the site. Silty sand overlays deeper claystone in those borings performed near the front of the site.

Clay and claystone exhibited low swell potential in laboratory testing, though this may be due to the fracture quality of the in situ material. Claystone is known to possess high swell potential, and therefore overexcavation and replacement of unsuitable soils and expansive soils will most likely be necessary to prepare the site for residential construction.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The descriptions shown on the logs are based upon the engineer's 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 any of the Test Borings. 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 FOUNDATION SYSTEMS

Overexcavation and Replacement Concepts

Where expansive clay and claystone soils are encountered near foundation or floor slab bearing levels, overexcavation and replacement with non-expansive structural fill to depths of 3 to 4-feet below foundation components should be anticipated. If properly performed, clay and claystone may be moisture conditioned to a level above optimum moisture to reduce its swell potential, and used to balance site grading. Note, even when moisture conditioned, clay and claystone are not recommended for use as structural fill directly below foundation components or floor slabs; a layer of non-expansive structural fill should separate the expansive soils from foundation elements.

The west end of the site appears to be sandy clay fill material. Standard Penetration blow counts indicate the soil in relatively consolidated. The fill soil will benefit from further compaction

improvement under foundation elements to achieve suitable bearing pressure. Silty sand of varying relative densities was encountered in some Test Borings, particularly along the south and extreme east portions of the site. Loose sands will typically require additional compaction to achieve suitable bearing pressures. In some cases, removal and recompaction may be required for loose soils.

Anticipated Foundation Concepts

Conventional shallow foundation systems consisting of standard spread footings/stemwalls or stiffened slabs are anticipated to be suitable for the proposed residential structures. Deep foundations or alternative foundation systems are not anticipated. If basements are anticipated, the deepest excavation cuts will be approximately 6 to 8 feet below the final ground surface.

The foundation system for each lot should be designed and constructed based upon recommendations developed in a detailed Site Specific Subsurface Soil Investigation completed after site development activities are complete. The recommendations presented in the Subsurface Soils Investigation should be verified following the excavation on each lot and evaluation of the building loads.

Note, even after the recommended overexcavation and replacement is completed, it is possible that some of the replacement soils will exhibit low-density or expansive characteristics. In all cases, contractors shall retain the responsibility for excavating to the appropriate line and grade, for the quality of their work, for adhering to plans and specifications, and for repairing defects regardless of when they are discovered.

The allowable bearing pressures to be used for design of foundation components should be determined by a detailed site specific Subsurface Soils Investigation. Allowable bearing pressures are anticipated to range from 2,000 to 2,500 psf for processed and compacted soils.

Foundation and basement walls should be designed to resist lateral pressures. For granular, non-expansive soils used as exterior backfill around foundations, an equivalent fluid pressure (EFP) of 40 pcf may be used for design. Any on-site expansive soils excavated during construction should not be used as structural backfill. The lateral pressures presented herein apply to level, drained backfill conditions. Lateral pressures for sloping/undrained conditions or for expansive soils should be determined on an individual basis.

Foundations Drains

A subsurface perimeter drain is recommended around portions of the structure that will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable. Depending on the conditions encountered during t lot specific Subsurface Soils Investigation and the conditions observed at the time of the Open Excavation Observation, additional subsurface drainage systems may be recommended.

One such system is an underslab drainage layer to help intercept groundwater before it enters the slab area should the groundwater levels rise. In general, if groundwater was encountered within 4

to 6 feet of the proposed basement slab elevation, an underslab drain should be anticipated. Another such system would consist of a subsurface drain and/or vertical drain board placed around the perimeter of the overexcavation to help intercept groundwater and allow for proper placement and compaction of the replacement structural fill. Careful attention should be paid to grade and discharge of the drainpipes of these systems.

It must be understood that the drain systems are designed to intercept some types of subsurface moisture and not others. Therefore, the drains could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

Floor Slabs

Slab performance risk evaluation is an engineering judgement which is used as a predictor of the general magnitude of potential slab heave, and the risk of poor slab performance. The Slab Performance Risk within the upper 10 feet at this site is judged to be 'Low" (less than 2% swell under a 1,000 psf surcharge) based on criteria provided by Colorado Association of Geotechnical Engineers and detailed in the following table:

Slab Performance Risk Categories

Slab Performance Risk Category	Representative Percent Swell (500 psf Surcharge)	Representative Percent Swell (1,000 psf Surcharge)
Low	0 to < 3	0 to < 2
Moderate	3 to < 5	2 to < 4
High	5 to < 8	4 to < 6
Very High	>8	>6

Note: Based on Colorado Association of Geotechnical Engineers, Guidelines for Slab Performance Risk Evaluation and Residential Basement Floor System Recommendations (Denver Metropolitan Area, 1996).

Floor slabs should be separated from structural components to allow for vertical movement. Control and construction joints should be placed in accordance with the latest guidelines and standards published by the American Concrete Institute (ACI) and applicable local Building Code requirements.

Concrete

Type I/II cement is recommended for concrete in contact with the subsurface materials. Calcium chloride should be used with caution for soils with high sulfate contents. The concrete should not be placed on frozen ground. If placed during periods of cold temperatures, the concrete should be kept from freezing. This may require covering the concrete with insulated blankets and heating. Concrete work should be completed in accordance with the latest applicable guidelines and standards published by ACI.

EARTHWORK

Structural Fill

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 Standard Proctor test (ASTM D-698), or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557) 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 shall consist of granular, non-expansive material. It should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557. The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement. The on-site clay soils are not recommended for use as structural fill below foundation components.

Proposed Grading, Cuts and Masses of Fill

Preliminary grading plans were not provided or reviewed by RMG at the time the report was issued. It is assumed (based on the test borings for this investigation) that the excavations will encounter sand soil. The on-site sand soils can generally be used as site grading fill or structural fill. Claystone is not recommended for use as structural fill or for use as site grading fill in areas that will be below or directly adjacent to the proposed structures. The on-site clay and claystone can generally be used as site grading fill for areas that have a minimum of 10 feet of separation from the proposed structures.

- ***Guideline Site Grading Specifications are included in the Appendix A.***

Surface Grading and Drainage

The ground surface should be sloped from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum 5 feet from the foundation and sloped parallel with the wall with a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure. Owners should maintain the surface grading and drainage

recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

The recommendations listed in this report are intended to address normal surface drainage conditions, assuming the presence of groundcover (established vegetation, paved surfaces, and/or structures) throughout the regions upslope from this structure. However, groundcover may not be present due to a variety of factors (ongoing construction/development, wildfires, etc.). During periods when groundcover is not present in the "upslope" regions, higher than normal surface drainage conditions may occur, resulting in perched water tables, excess runoff, flash floods, etc. In these cases, the surface drainage recommendations presented herein (even if properly maintained) may not mitigate all groundwater problems or moisture intrusion into the structure. We recommend that the site plan be prepared with consideration of increased runoff during periods when groundcover is not present on the upslope areas.

BURIED UTILITIES

Based upon the conditions encountered in the exploratory test borings, we anticipate that the soils encountered in the individual utility trench excavations will consist of silty sand. It is anticipated that the sand will be encountered at loose to medium relative densities.

We believe the sand will classify as Type C materials and the claystone will classify as Type B materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type B and C materials be laid back at ratios no steeper than 1:1 (horizontal to vertical) and 1½:1 (horizontal to vertical), respectively, unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

Utility mains such as water and sanitary sewer lines are typically placed beneath paved roadways. The settlement of the utility trench backfill can have a detrimental effect on pavements and roadway surfaces. We recommend that utility trench backfill be placed in thin loose lifts, moisture conditioned as required and compacted to the recommendations outlined in the **Structural Fill** section of this report. The placement and compaction of utility trench backfill should be observed and tested by a representative of RMG Engineers during construction. Use of "flowable fill," (i.e., a controlled low strength material (CLSM), or a similar material) should be considered in lieu of

compacted soil backfill for areas with low tolerances for surface settlements in deep excavations and areas with difficult access.

It is a common local practice for underdrains to be placed at the bottom of sanitary sewer trenched within drive lanes. Underdrains placed in the sanitary sewer trenches in areas where groundwater is anticipated will likely be the "active" type, which uses a perforated drainpipe. In areas where groundwater is not anticipated, “passive” type underdrains may be used. The outfall for the sanitary sewer trench underdrain was not known at the time of this investigation because the development plan and grading plan were not available for our review.

PRELIMINARY PAVEMENT RECOMMENDATIONS

Roadway plans had not been provided at the time of the report issue date. However, roadways throughout the proposed development will most likely be classified as Local in accordance with the Colorado Springs Engineering Criteria Manual (CSECM). The actual pavement section design for individual streets will be completed following overlot grading and installation of utilities.

Where claystone is encountered at pavement subgrade depths, it should be removed and replaced with non-plastic soil, or moisture conditioned and replaced. Thicker pavement sections can be anticipated if claystone is utilized as subgrade soil. Silty sand encountered at pavement depths in some borings is suitable as subgrade material. A site-specific pavement design should be conducted to determine the design pavement sections for the proposed roadways.

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 not intended for use for design and construction. **We recommend that a site specific Subsurface Soil Investigation be performed for all proposed structures including (but not limited to) residences, community or common buildings, retaining walls and pumphouses, commercial buildings, etc.**

To develop recommendations for construction of the proposed roadways, a pavement design investigation should be performed. This investigation should consist of additional test borings, soil laboratory testing and specific recommendations for the design and construction of roadway pavement sections.
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.

CLOSING

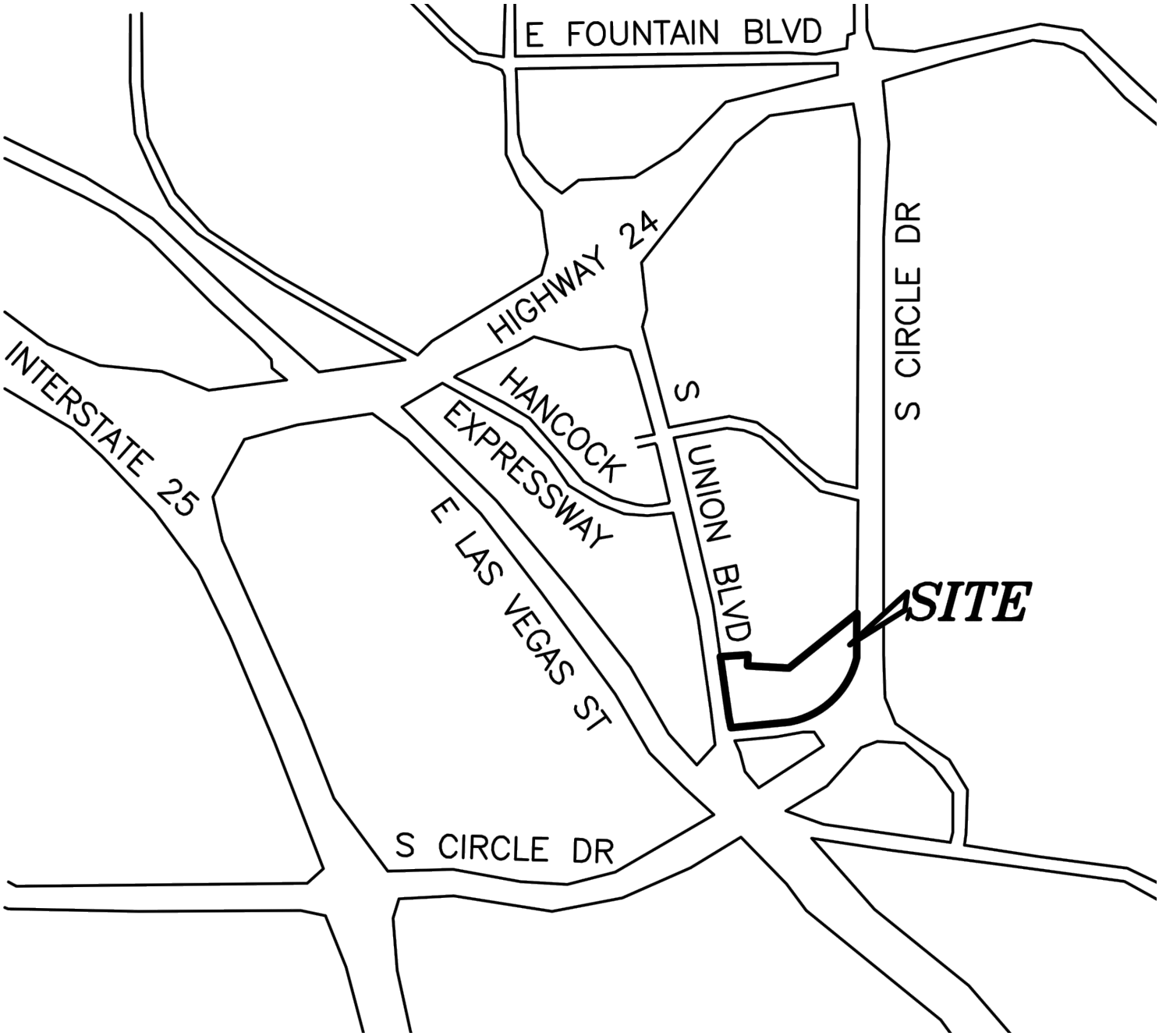
This report has been prepared for the exclusive use by **Challenger Colorado, LLC** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical engineering practices. The analyses and recommendations in this report are based 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



NOT TO SCALE

BASE MAP BY: BARRON LAND

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs,CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

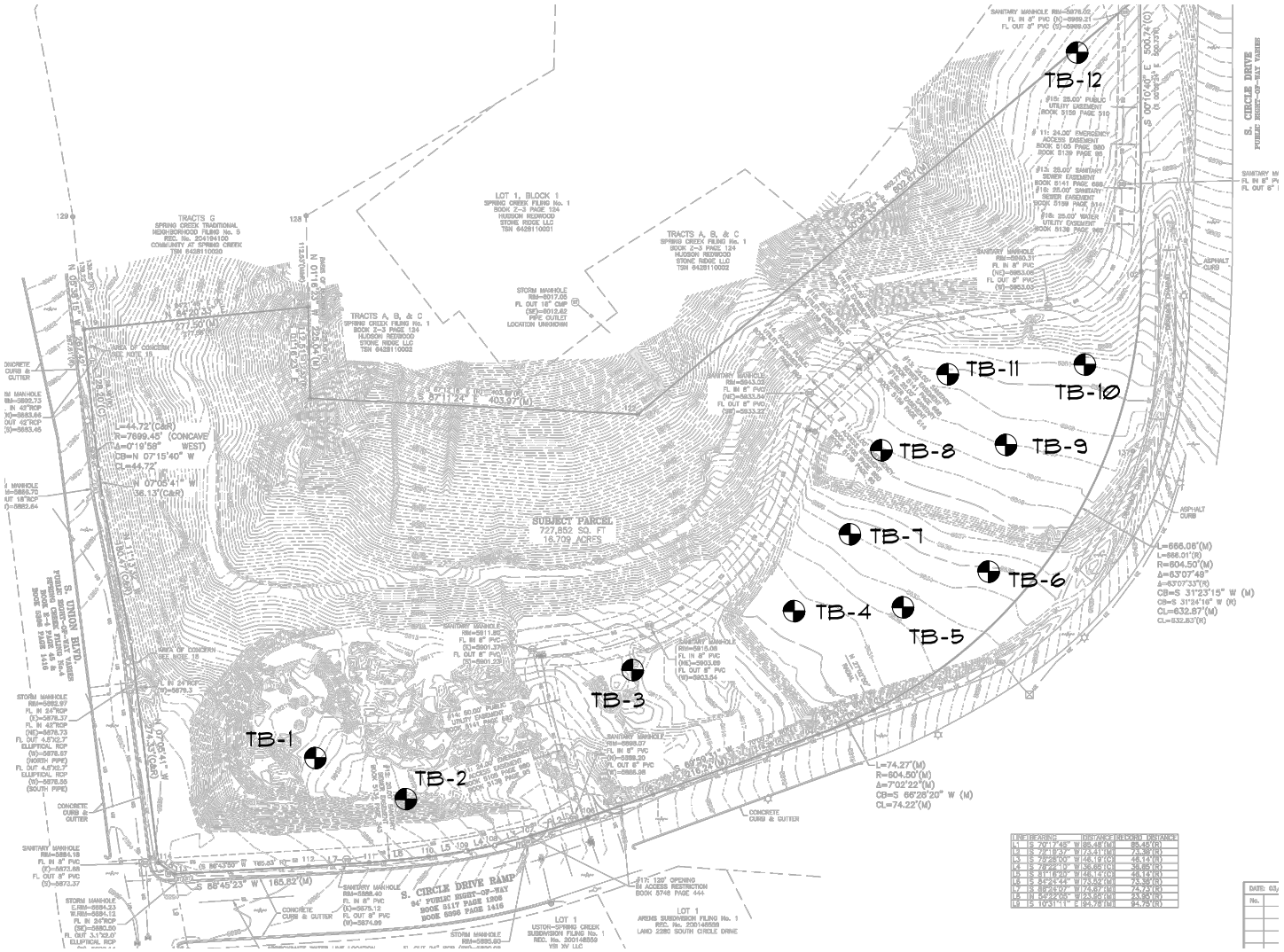
SITE VICINITY MAP

THE RIDGE AT SPRING CREEK
FILING NO. 1
COLORADO SPRINGS, COLORADO
CHALLEGER COLORADO, LLC

JOB No. 182625

FIG No. 1

DATE 04-09-2021



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● DENOTES APPROXIMATE LOCATION OF TEST BORINGS

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Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

TEST BORING LOCATION PLAN

THE RIDGE AT SPRING CREEK
FILING NO. 1
COLORADO SPRINGS, COLORADO
CHALLEGER COLORADO, LLC

JOB No. 182625

FIG No. 2

DATE 04-09-2021

SOILS DESCRIPTION


CLAYEY SAND


CLAYSTONE


FILL: SAND, SILTY TO CLAYEY


FILL: CLAY, SANDY


SANDSTONE


SANDY CLAY


SHALE


SILTY 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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Colorado Spings, CO 80918
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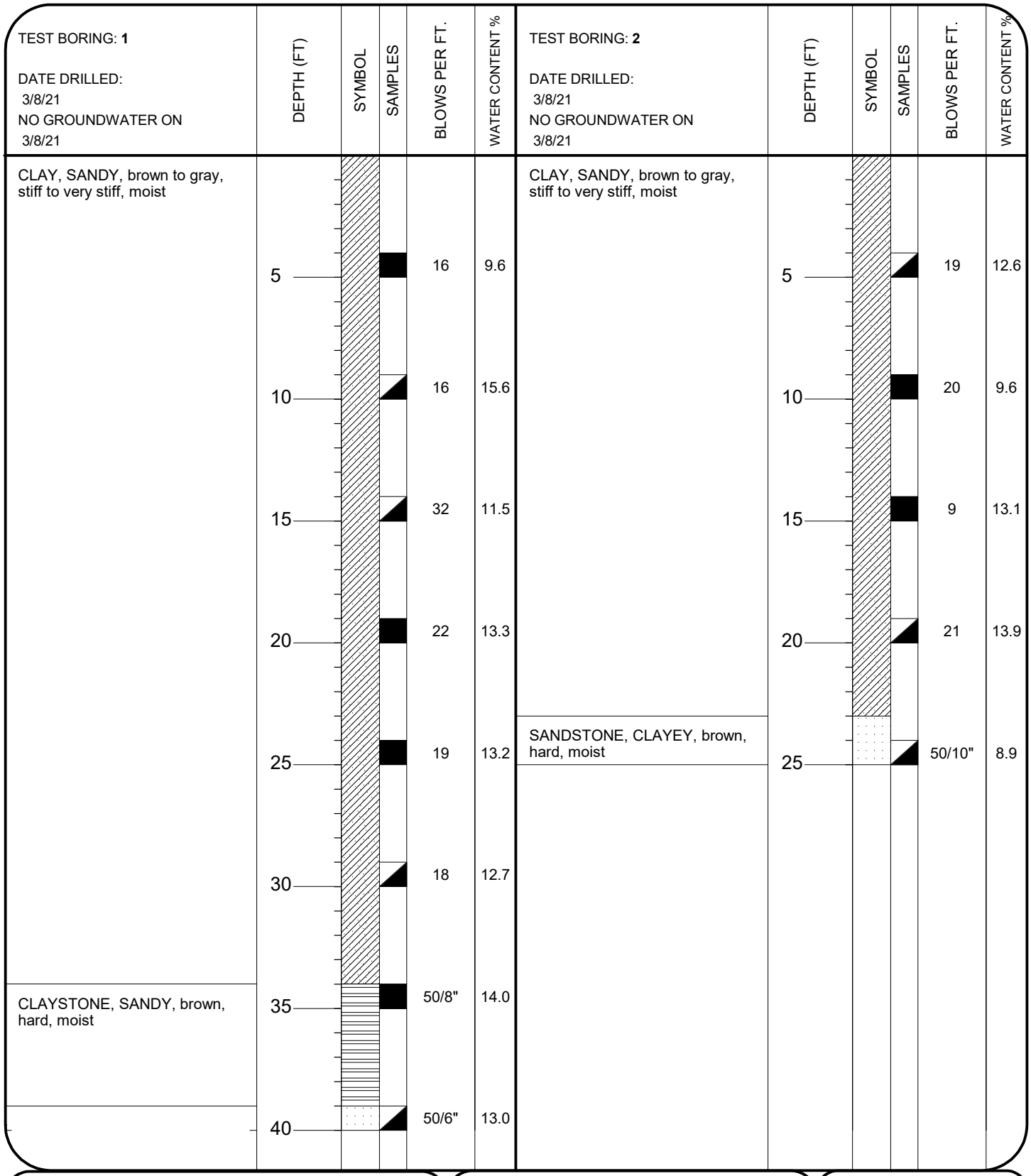
EXPLANATION OF TEST BORING LOGS

JOB No. 182625

FIGURE No. 3

DATE Apr/09/2021



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TEST BORING LOG

JOB No. 182625

FIGURE No. 4

DATE Apr/09/2021

TEST BORING: **3** DATE DRILLED: 3/8/21 NO GROUNDWATER ON 3/8/21	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
FILL: SAND, CLAYEY, brown, moist					
SAND, CLAYEY, light brown, very dense, moist	5			50/10"	10.3
CLAYSTONE, SANDY, brown with rust staining, hard to very hard, moist	10			50/7"	11.3
	15			50/6"	42.7

TEST BORING: **4** DATE DRILLED: 3/8/21 NO GROUNDWATER ON 3/8/21	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
CLAYSTONE, SANDY, brown, hard , moist	5			50/8"	10.9
	10			50/6"	12.1
SHALE, SANDY, grey, hard, moist	15			50/5"	8.3

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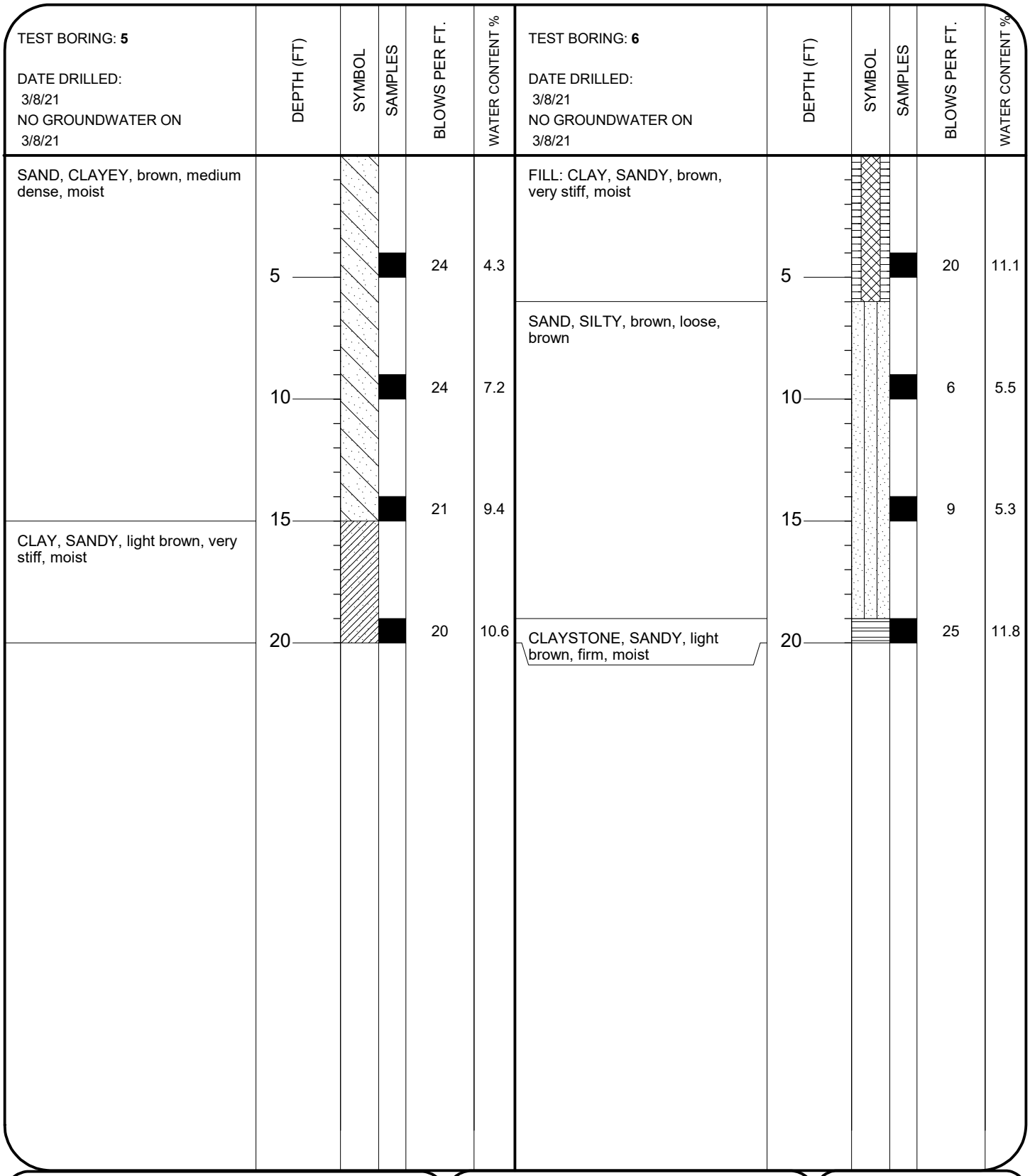
TEST BORING LOG

JOB No. 182625

FIGURE No. 5

DATE Apr/09/2021



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TEST BORING LOG

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FIGURE No. 6

DATE Apr/09/2021

TEST BORING: **7** DATE DRILLED: 3/8/21 NO GROUNDWATER ON 3/8/21	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, light brown, moist					
CLAYSTONE, SANDY, light brown, hard, moist	5			50/6"	10.3
	10			50/6"	11.8
	15			50/6"	12.1

TEST BORING: **8** DATE DRILLED: 3/8/21 NO GROUNDWATER ON 3/8/21	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
CLAYSTONE, SANDY, light brown, medium hard to hard, moist	5			30	8.0
	10			50/7"	12.3
	15			50/6"	7.3

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TEST BORING LOG

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FIGURE No. 7

DATE Apr/09/2021

TEST BORING: **9**

DATE DRILLED:
3/8/21
NO GROUNDWATER ON
3/8/21

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	WEATHERED CLAYSTONE, SANDY, light brown, weathered to hard, moist			
5			12	12.4
10			50/9"	16.0
15			50/9"	12.9

TEST BORING: **10**

DATE DRILLED:
3/8/21
NO GROUNDWATER ON
3/8/21

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	FILL: SAND, SILTY, light brown, loose to medium dense, moist			
5			20	4.2
	SAND, SILTY, light brown to tan, loose to medium dense, moist			
10			7	5.5
15			10	8.0
20			9	6.6

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TEST BORING LOG

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FIGURE No. 8

DATE Apr/09/2021

TEST BORING: **11**

DATE DRILLED:
3/8/21
NO GROUNDWATER ON
3/8/21

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	CLAYSTONE, SANDY, light brown, medium hard to hard, moist			
5			41	15.7
10			50/6"	12.7
	SHALE, SANDY, blue to gray, hard, moist			
15			50/4"	11.3

TEST BORING: **12**

DATE DRILLED:
3/8/21
NO GROUNDWATER ON
3/8/21

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	SAND, SILTY, brown, loose to medium dense, moist			
5			9	30.9
10			19	3.2
15	CLAYSTONE, SANDY, light brown, firm to hard, moist		21	9.9
20			50/8"	11.7

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TEST BORING LOG

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FIGURE No. 9

DATE Apr/09/2021

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	FHA Expansion Pressure (psf)	% Swell/ Collapse	USCS Classification
1	4.0	9.6								
1	9.0	15.6								
1	14.0	11.5	100.8	31	13	0.0	58.8	1000	- 2.7	CL
1	19.0	13.3								
1	24.0	13.2								
1	29.0	12.7								
1	34.0	14.0		38	23	0.0	87.7			CL
1	39.0	13.0								
2	4.0	12.6	102.2	33	20	2.5	44.6	1000	- 1.3	SC
2	9.0	9.6								
2	14.0	13.1								
2	19.0	13.9								
2	24.0	8.9								
3	4.0	10.3								
3	9.0	11.3		35	20	0.0	75.1			CL
3	14.0	42.7								
4	4.0	10.9								
4	9.0	12.1								
4	14.0	8.3	91.2	36	22	0.0	82.3	1000	- 5.6	CL
5	4.0	4.3		30	15	33.6	18.0			SC
5	9.0	7.2								
5	14.0	9.4								
5	19.0	10.6								
6	4.0	11.1		37	22		79.4			CL
6	9.0	5.5								
6	14.0	5.3								
6	19.0	11.8								
7	4.0	10.3								
7	9.0	11.8	119.2	32	8		40.1	1000	0.6	SM
7	14.0	12.1								
8	4.0	8.0					47.9			
8	9.0	12.3								
8	14.0	7.3								
9	4.0	12.4	116.9					1000	- 0.1	

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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 182625
FIGURE No. 10

DATE Apr/09/2021

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	FHA Expansion Pressure (psf)	% Swell/ Collapse	USCS Classification
9	9.0	16.0					68.9			
9	14.0	12.9								
10	4.0	4.2				27.1	11.3			
10	9.0	5.5								
10	14.0	8.0								
10	19.0	6.6								
11	4.0	15.7								
11	9.0	12.7								
11	14.0	11.3		36	21		63.2			CL
12	4.0	30.9								
12	9.0	3.2				0.0	9.7			
12	14.0	9.9								
12	19.0	11.7								

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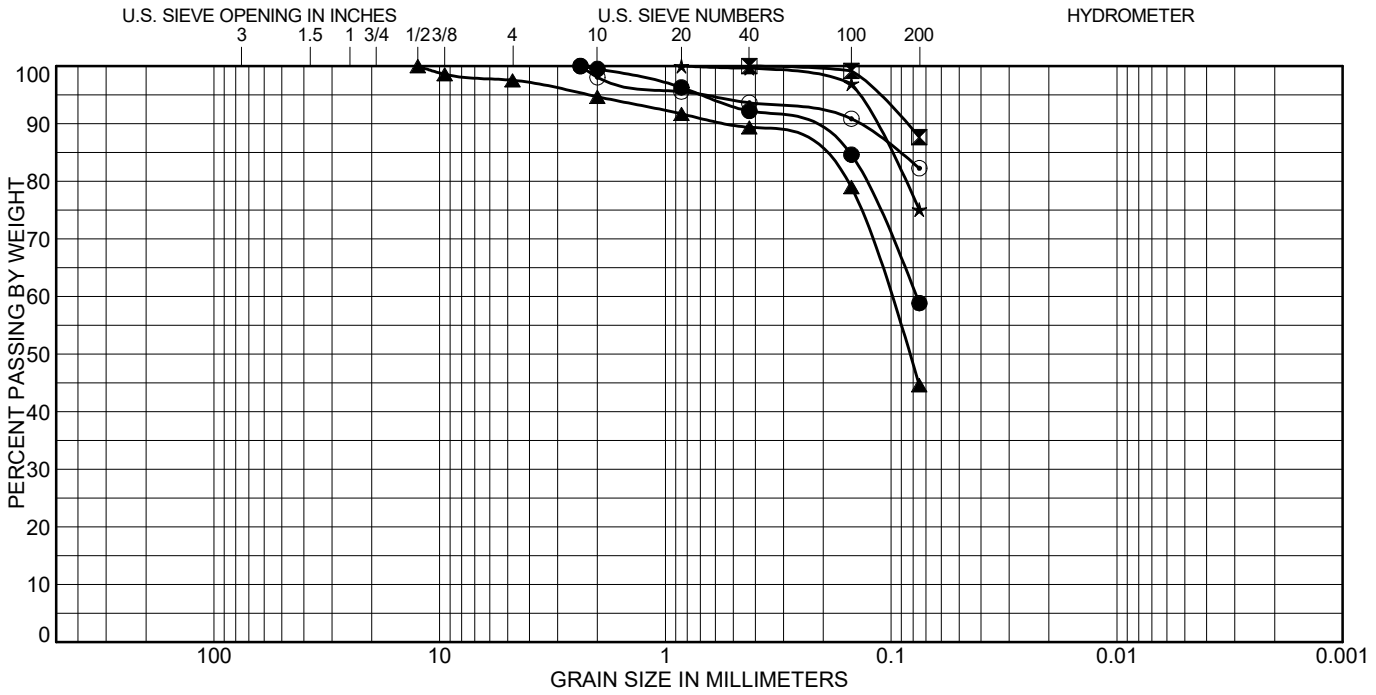
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 182625
FIGURE No. 10
PAGE 2 OF 2
DATE Apr/09/2021



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	1	14.0	SANDY LEAN CLAY(CL)	31	18	13
⧓	1	34.0	LEAN CLAY(CL)	38	15	23
▲	2	4.0	CLAYEY SAND(SC)	33	13	20
★	3	9.0	LEAN CLAY with SAND(CL)	35	15	20
⊙	4	14.0	LEAN CLAY with SAND(CL)	36	14	22

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	14.0	0.0	41.2	58.8	
⧓	1	34.0	0.0	12.3	87.7	
▲	2	4.0	2.5	52.9	44.6	
★	3	9.0	0.0	24.9	75.1	
⊙	4	14.0	0.0	17.7	82.3	

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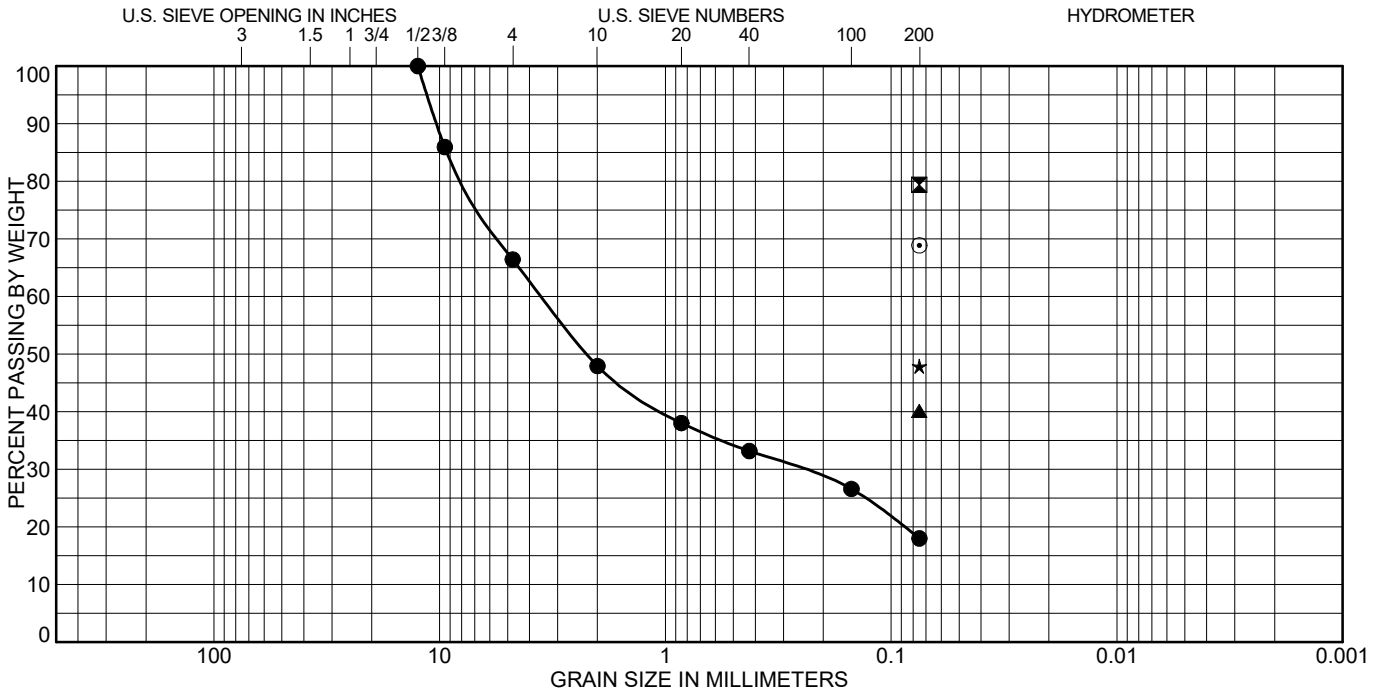
SOIL CLASSIFICATION DATA

JOB No. 182625

FIGURE No. 11

DATE Apr/09/2021



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	5	4.0	CLAYEY SAND with GRAVEL(SC)	30	15	15
⧓	6	4.0	LEAN CLAY with SAND(CL)	37	15	22
▲	7	9.0	SILTY SAND(SM)	32	24	8
★	8	4.0				
⊙	9	9.0				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	5	4.0	33.6	48.4	18.0	
⧓	6	4.0			79.4	
▲	7	9.0			40.1	
★	8	4.0			47.9	
⊙	9	9.0			68.9	

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SOIL CLASSIFICATION DATA

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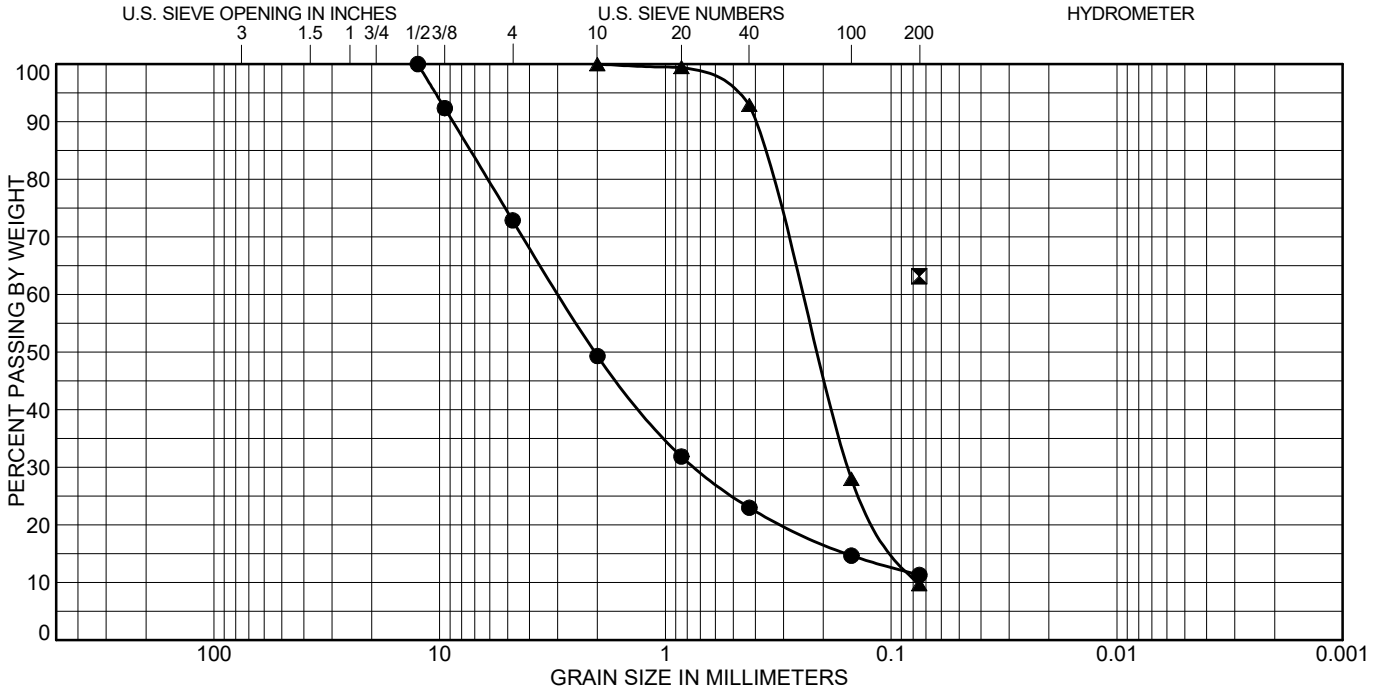
FIGURE No. 12

DATE Apr/09/2021



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	**10**	**4.0**				
⧓	**11**	**14.0**	**SANDY LEAN CLAY(CL)**	**36**	**15**	**21**
▲	**12**	**9.0**				

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	**10**	**4.0**	**27.1**	**61.6**	**11.3**	
⧓	**11**	**14.0**			**63.2**	
▲	**12**	**9.0**	**0.0**	**90.3**	**9.7**	

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SOIL CLASSIFICATION DATA

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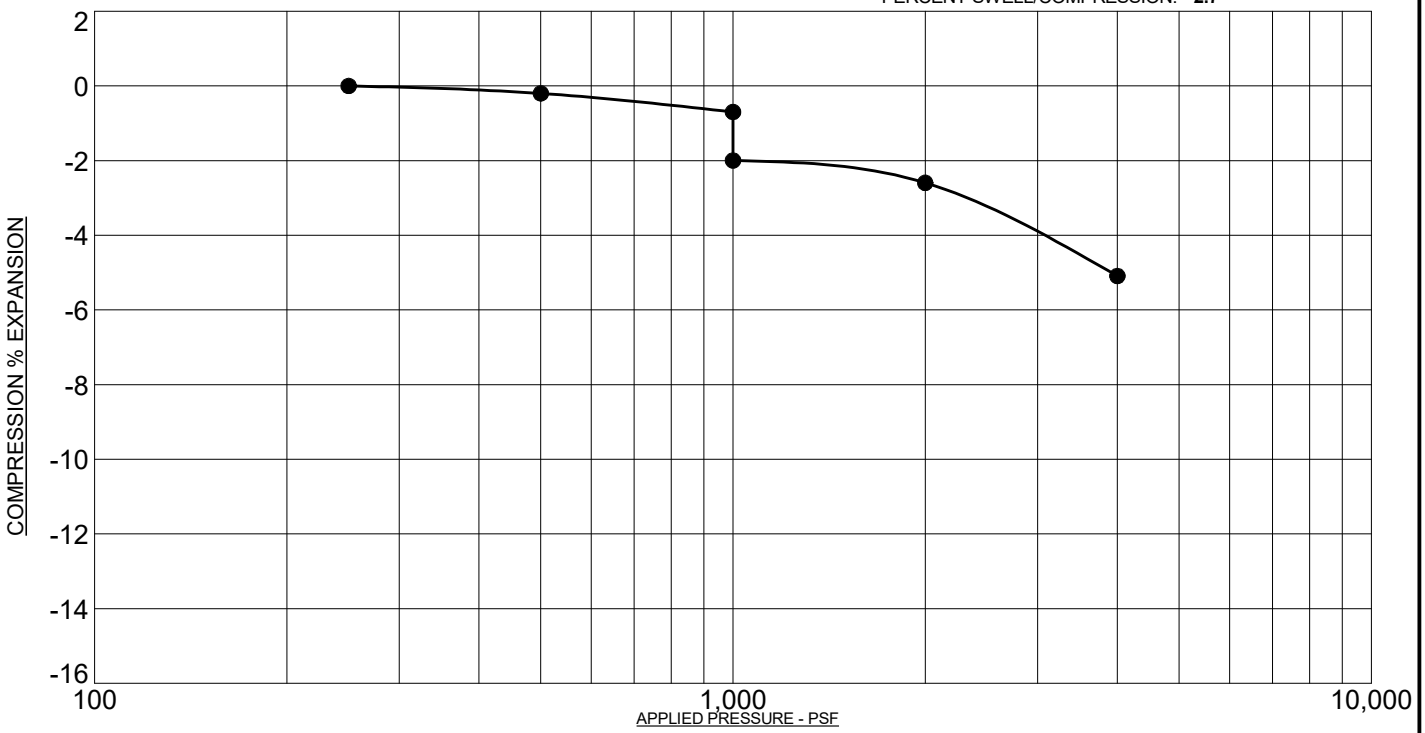
FIGURE No. 13

DATE Apr/09/2021

PROJECT: **The Ridge at Spring Creek, Filing No. 1, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **CLAY, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **1 @ 14 FT**
NATURAL DRY UNIT WEIGHT: **100.8 PCF**
NATURAL MOISTURE CONTENT: **9.6%**
PERCENT SWELL/COMPRESSION: **- 2.7**



PROJECT: **The Ridge at Spring Creek, Filing No. 1, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **FILL: SAND, CLAYEY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **2 @ 4 FT**
NATURAL DRY UNIT WEIGHT: **102.2 PCF**
NATURAL MOISTURE CONTENT: **12.6%**
PERCENT SWELL/COMPRESSION: **- 1.3**

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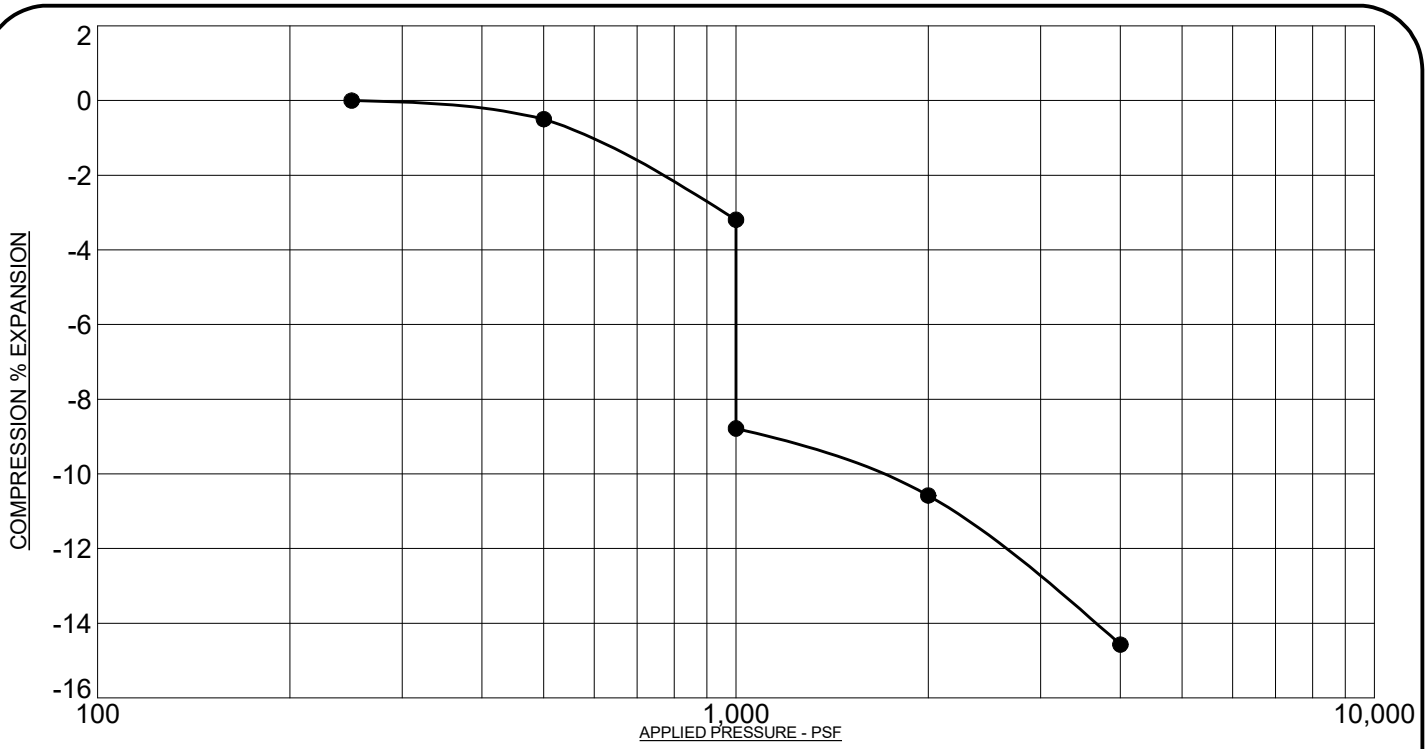
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 182625

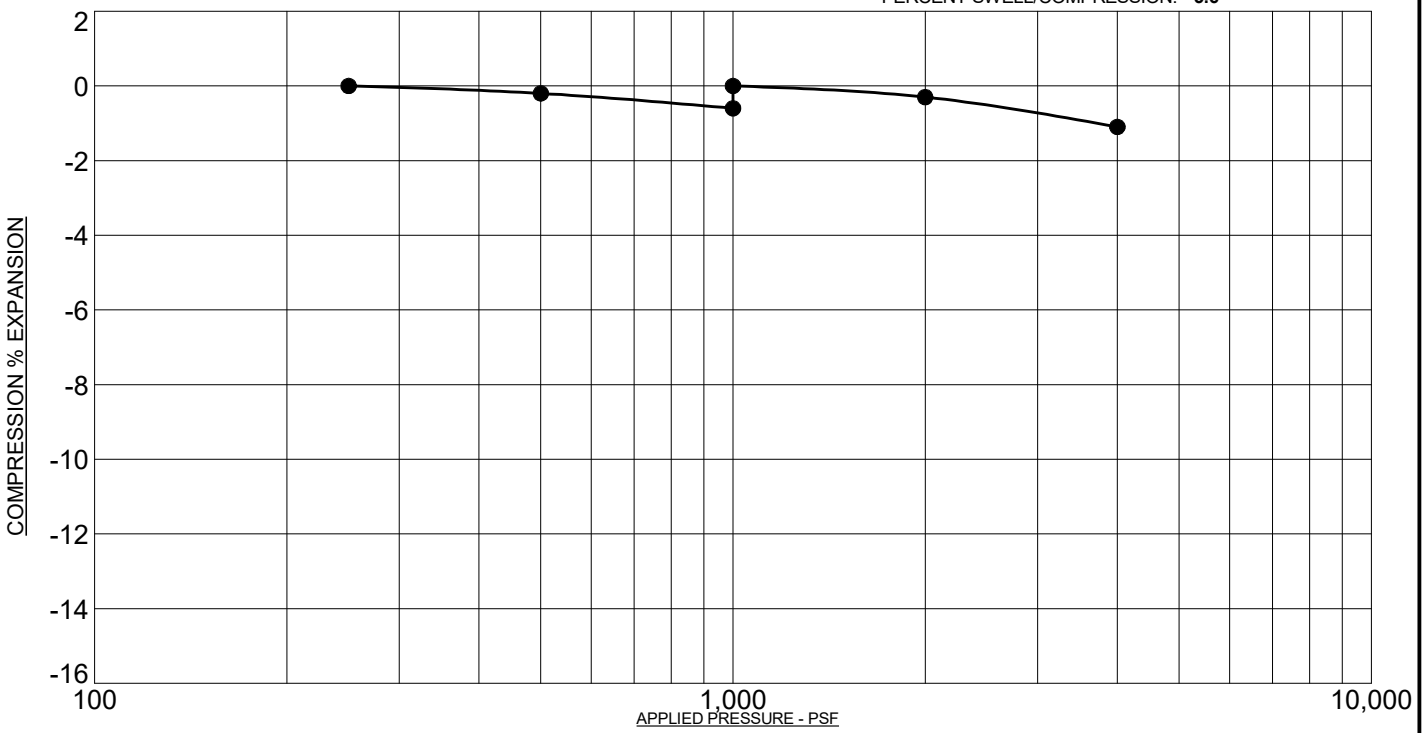
FIGURE No. 14

DATE Apr/09/2021



PROJECT: **The Ridge at Spring Creek, Filing No. 1, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **SHALE, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **4 @ 14 FT**
NATURAL DRY UNIT WEIGHT: **91.2 PCF**
NATURAL MOISTURE CONTENT: **8.3%**
PERCENT SWELL/COMPRESSION: **- 5.6**



PROJECT: **The Ridge at Spring Creek, Filing No. 1, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **7 @ 9 FT**
NATURAL DRY UNIT WEIGHT: **119.2 PCF**
NATURAL MOISTURE CONTENT: **11.8%**
PERCENT SWELL/COMPRESSION: **0.6**

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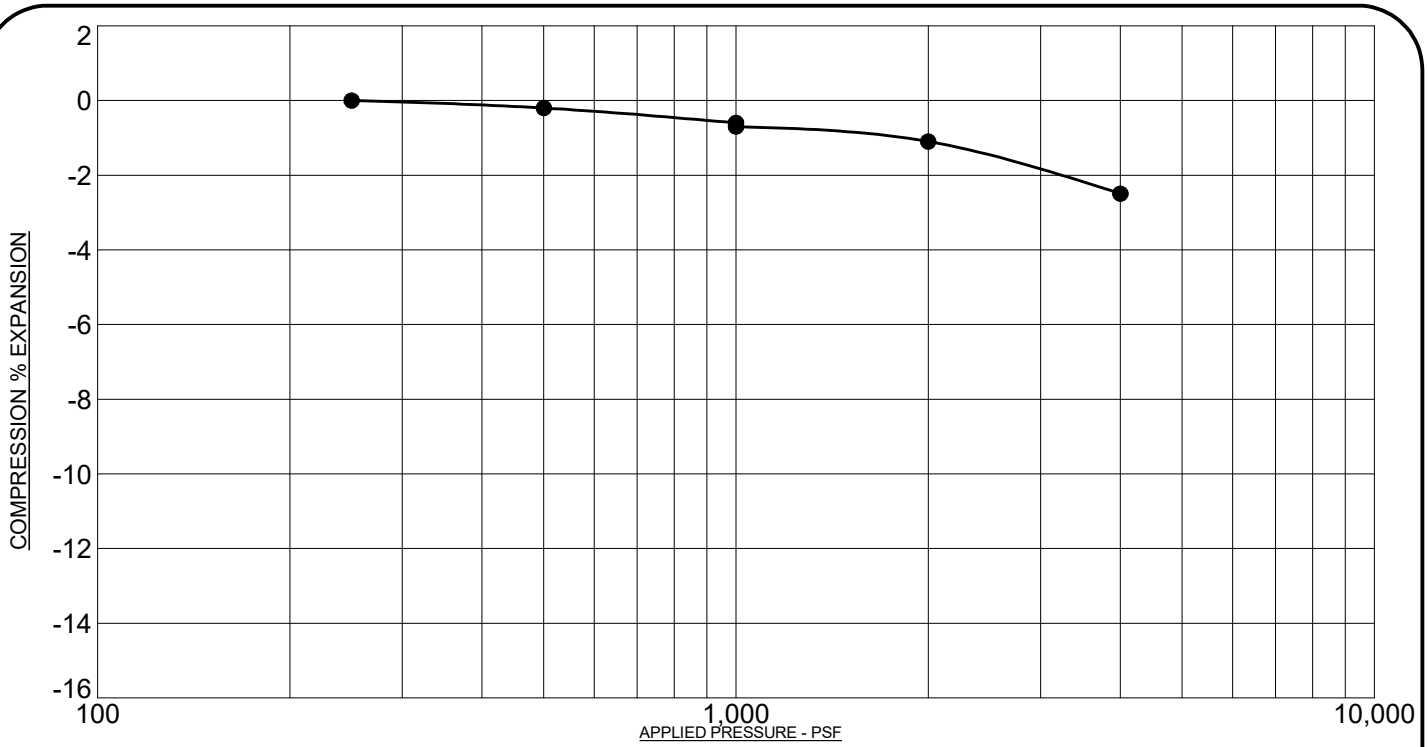
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 182625

FIGURE No. 15

DATE Apr/09/2021



PROJECT: **The Ridge at Spring Creek, Filing No. 1, Colorado Springs, Colorado**
SAMPLE DESCRIPTION: **CLAYSTONE, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **9 @ 4 FT**
NATURAL DRY UNIT WEIGHT: **116.9 PCF**
NATURAL MOISTURE CONTENT: **12.4%**
PERCENT SWELL/COMPRESSION: **- 0.1**

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SWELL/CONSOLIDATION TEST RESULTS

JOB No. 182625

FIGURE No. 16

DATE Apr/09/2021

APPENDIX A

Guideline Site Grading Specifications

Description: Unless specified otherwise by local or state regulatory agencies, these guideline specifications are for the excavation, placement and compaction of material from locations indicated on the plans, or staked by the Engineer, as necessary to achieve the required elevations. These specifications shall also apply to compaction of materials that may be placed outside of the project.

General: The Geotechnical Engineer shall approve fill materials, method of placement, moisture contents and percent compactions, and shall give written approval of the compacted fill.

Clearing Site: The Contractor shall remove trees, brush, rubbish, vegetation, topsoil and existing structures before excavation or fill placement is commenced. The Contractor shall dispose of the cleared material to provide the Owner with a clean job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures. Clearing shall also include removal of existing fills that do not meet the requirements of this specification and existing structures.

Preparation of Slopes or Drainage Areas to Receive Fill: Natural slopes or slopes of drainage gullies where grades are 20 percent (5:1, horizontal to vertical) or steeper shall be benched prior to fill placement. Benches shall be at least 10 feet wide. Benches may require additional width to accommodate excavation or compaction equipment. At least one bench shall be provided for each 5 feet or less of vertical elevation difference. The bench surface shall be essentially horizontal perpendicular to the slope or at a slight incline into the slope.

Scarifying: Topsoil and vegetation shall be removed from the ground surface in areas to receive fill. The surface shall be plowed or scarified a minimum of 12 inches until the surface is free from ruts, hummocks or other uneven features which would prevent uniform compaction by the equipment to be used.

Compacting Area to Receive Fill: After the area to receive fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, moisture conditioned to a proper moisture content and compacted to the maximum density as specified for the overlying fill. Areas to receive fill shall be worked, stabilized, or removed and replaced, if necessary, in accordance with the Geotechnical Engineer's recommendations in preparation for fill.

Fill Materials: Fill material shall be free from organic material or other deleterious substances, and shall not contain rocks or lumps having a diameter greater than six inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer or imported to the site and shall be approved by the Geotechnical Engineer prior to placement. It is recommended that the fill materials have nil to low expansion potential, i.e., consist of silty to slightly clayey sand.

Moisture Content: Fill materials shall be moisture conditioned to within limits of optimum moisture content specified. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas or imported to the site.

The contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water to the fill material during placement. The Contractor may be required to rake or disk the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with watering equipment, approved by the Geotechnical Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are eroded.

Should too much water be added to the fill, such that the material is too wet to permit the desired compaction to be obtained, compacting and work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework the wet material in an approved manner to hasten its drying.

Compaction of Fill Areas: Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill materials shall be placed such that the thickness of loose material does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical Engineer. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area.

Moisture Content and Density Criteria:

A. For fill soils supporting utilities and roadways, 95% maximum Standard Proctor dry density at 2% $\pm$ of optimum moisture content.

B. For granular, structural fill soils fills supporting future buildings, 92% maximum Modified Proctor dry density at 2% $\pm$ of optimum moisture content. For moisture-conditioned expansive fill soils supporting future buildings, 95% of maximum Standard Proctor dry density at 1% to 4% above optimum moisture content.

C. For general grading fills, 90% maximum Standard Proctor dry density or Modified Proctor dry density at 2% $\pm$ of optimum moisture content.

Compaction of Slopes: Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and such that there is no appreciable amount of loose soil on the slopes. Compaction of slopes may be done progressively in increments of three to five feet in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

Density Testing: Field density testing shall be performed by the Geotechnical Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

Observation and Testing of Fill: Observation by the Geotechnical Engineer shall be sufficient during the placement of fill and compaction operations so that he can declare the fill was placed in general conformance with Specifications. All observations necessary to test the placement of fill and observe compaction operations will be at the expense of the Owner.

Seasonal Limits: No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer indicates the moisture content and density of previously placed materials are as specified.

Reporting of Field Density Tests: Density tests made by the Geotechnical Engineer shall be submitted progressively to the Owner. Dry density, moisture content, percent compaction, and approximate location shall be reported for each test taken.