ENTECH
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SUBSURFACE SOIL INVESTIGATION
1755 EAST LAS VEGAS STREET
COLORADO SPRINGS, COLORADO

Prepared for:

Land Development Consultants, Inc.
3898 Maizeland Road
Colorado Springs, CO 80909

Attn: Dave Hostetler

Add PCD File No. PPR1913

Per Chapter 11, section 11.3.3 of the El Paso County Drainage Criteria Manual recommendations for the foundation preparation and embankment construction shall be submitted with the complete design analysis for all permanent detention facilities.

April 15, 2019

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

LLL/rm

Encl.

Entech Job No. 190395
AAProjects/2019/190395 ssi

Reviewed By:

Joseph C. Goode, Jr., P.E.
President

COLORADO LICENSED
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5-1-19
PROFESSIONAL ENGINEER

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SUBSURFACE SOIL INVESTIGATION
1755 EAST LAS VEGAS STREET
COLORADO SPRINGS, COLORADO

1.0 INTRODUCTION

Land Development Consultants, Inc. is planning the construction of an Office/Shop Building with parking areas and associated site improvements at Rocky Top Resources located northwest of Janitell Road and East Las Vegas Street in the southern portion of Colorado Springs, Colorado. The approximate location of the project site is shown on the Vicinity Map, Figure 1. The proposed site is shown on Figure 2, Site Developmet Plan/ Test Boring Location Map.

This report describes the Subsurface Soil Investigation conducted for the office/shop building and provides recommendations for foundation design and construction. The subsurface soil investigation included drilling two test borings in the proposed building footprint, collecting samples of soil and conducting a geotechnical evaluation of the investigation findings. All drilling and subsurface investigation activities were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.0.

2.0 PROJECT AND SITE DESCRIPTION

It is Entech's understanding that the project will consist of constructing a new one-story office/shop building for Rocky Top Resources, and associated site improvements. At the time of drilling, the building area was being used for parking with thin layer of gravel across the site. The property is relatively flat gradually sloping to the southeast. The site is bounded by East Las Vegas Street and Highway 24 to the north, Spring Creek to the east and southeast, and Fountain Creek to the west. Building loads are expected to be moderate. Several stockpiles of landscaping materials are located around the property.

3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

Subsurface conditions in the planned building site were explored by drilling two test borings at the approximate locations shown in Figure 2. The borings were drilled to depths of 15 to 20 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted, continuous flight auger-drilling rig supplied and operated by Entech. Boring logs descriptive of the subsurface conditions encountered during drilling are presented in Appendix A. At the conclusion of drilling, observations of groundwater levels were made in each of the open boreholes.

Soil samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D-1586) using California samplers. Results of the Standard Penetration Test (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil samples recovered from the borings were visually classified and recorded on the boring logs. The soil classifications were later verified utilizing laboratory testing and grouped by soil type. The soil type numbers are included on the boring logs. It should be understood that the soil descriptions shown on the boring logs will vary between boring locations and sample depths. It should also be noted that the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil types and the actual stratigraphic transitions may be more gradual and vary with location. The Test Boring Logs are presented in Appendix A.

Water content testing (ASTM D-2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis (ASTM D-422) and Atterberg Limits Testing (ASTM D-4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Testing was performed using the Swell/Consolidation Test and FHA Swell Test in order to evaluate expansion/consolidation potential of the soil. Soluble sulfate testing was performed on select soil samples to evaluate the potential for below grade degradation of concrete due to sulfate attack. The laboratory testing results are summarized on Table 1 and are presented in Appendix B.

4.0 SUBSURFACE CONDITIONS

Two soil types were encountered in the test borings drilled for the subsurface soil investigation: Type 1: gravelly slightly silty sand and clayey sand (SM-SW, SC), and Type 2: sandy to very sandy clay (CL). Each soil type was classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

4.1 Soil

Soil Type 1 classified as a gravelly slightly silty sand and clayey sand (SM-SW, SC). The sand was encountered in the test borings at depths ranging from 4 to 9 feet bgs and extending to depths to the termination of the borings (15 to 20 feet). Standard Penetration Testing on the sand resulted in an SPT N-values of 7 to 27 bpf, indicating loose to medium dense states. Water content and grain size testing resulted in a water content of 2 to 16 percent with approximately 6 to 42 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in the sand being non-plastic. FHA Swell Testing resulted in an expansion pressure of 300psf, indicating a low expansion potential. Sulfate testing resulted in 0.00 to less than 0.01 percent soluble sulfate by weight, indicating a negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 2 classified as a very sandy to sandy clay (CL). The clay was encountered in test borings at the existing ground surface extending to depths ranging from 4 to 9 feet. Standard Penetration Testing on the clay resulted in an SPT N-value of 7 to 15 bpf, indicating firm to stiff consistencies. Water content and grain size testing resulted in a water content of 13 percent with approximately 61 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted

in a liquid limit of 33 and plastic index of 16. Swell/Consolidation Testing resulted in a volume change of 0.1 percent, indicating the clay has low expansion potential.

4.2 Groundwater

Depth to groundwater was measured in each of the borings during and subsequent to drilling. Groundwater was encountered in the test borings at 14 feet bgs. Test Boring No. 2 was caved at 10 feet the following day. Groundwater is not expected to affect construction of shallow foundations on the site. It should be noted that groundwater levels, other than those observed at the time of the subsurface investigation, could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas.

5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

The following discussion is based on the subsurface conditions encountered in the borings drilled for the planned development. If subsurface conditions different from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that the evaluation and recommendations presented can be reviewed and revised if necessary.

The site will be developed by constructing a new one-story office/shop building and site improvements. The proposed building is expected to have slab-on-grade construction with no below grade levels. Given the subsurface conditions encountered at the time of drilling and the site development as described, the building can be supported with standard shallow spread footing foundations bearing on native medium dense sands and structural fill.

Subsurface soils encountered at anticipated foundation depths in the test borings generally consists of sandy to very sandy clay with underlying loose to medium dense gravelly silty and very clayey sands. Native slightly silty and very clayey sands were encountered below the clay at depths of 4 to 9 feet bgs in the test borings.

To provide a uniform bearing and minimize differential settlements, any expansive soils in building areas should be removed to the depth of 3 feet and be replaced with site granular soils or non-expansive imported structural fill. Loose soils, if encountered at foundation grade should be removed and recompacted to two to three feet below foundations. Uncontrolled fill, if encountered should be completely removed and replaced with approved soils. On-site granular materials, may be used as structural fill pending approval of Entech Engineering, Inc. Prior to placing the structural fill, the surface should be observed by Entech, scarified, moisture-conditioned, compacted, and tested.

5.1 Footing Subgrade Improvement/Foundation Systems

Based on the existing soil conditions, the structure can be supported utilizing shallow foundations resting on native medium dense sands, or structural fill (suitable granular import or approved onsite sands). A shallow foundation can consist of a conventional spread footing foundation.

Expansive clay soils were encountered in the test borings at anticipated foundation depth. Expansive soils encountered at or within 3 feet of foundation components or floor slabs will require overexcavation and replacement with non-expansive structural fill or penetrating to suitable soils. The overexcavation should extend outward a minimum distance of 3 feet from foundation footings. The overexcavation subgrade should be scarified to a minimum depth of 8 inches, be moisture-conditioned and compacted prior to the fill placement. The structural fill (suitable granular import or approved onsite sands) should be placed in completed maximum 6-inch lifts. Density tests should be performed to verify compaction with the first density test performed at the overexcavation subgrade and when each 12 to 18 inches of fill has been placed. All fill should be placed to the requirements of the "Structural Fill" paragraph.

5.2 Shallow Foundations

Provided the above recommendations are followed, the proposed structure can be supported with a shallow spread footing foundation on native medium dense sands, or structural fill (suitable granular import or approved onsite sands). A maximum allowable bearing pressure of 2400 psf is recommended for foundation members bearing on the recompacted sands. Spread footing and individual column pads should be placed in compliance with the foundation design. Exterior footings should extend a minimum of 30 inches below the adjacent exterior site grade for frost

protection. Following the above subgrade preparation recommendations, and adhering to the recommended maximum allowable bearing pressure, it is expected to result in foundation design which should limit total and differential vertical movements to 1 and ½ inches, respectively.

Foundation walls should be designed to resist lateral pressures generated by the soils on this site. An equivalent hydrostatic fluid pressure (in the active state) of 45 pcf is recommended for the granular on-site soils. The backfill soils should consist of a non-expansive soil. Expansive soils are not recommended for backfill against foundation walls. It should be noted that these values apply to level backfill conditions. If sloping backfill conditions exist, pressures will increase substantially depending on the conditions adjacent to the walls. Surcharge loading should also be considered in wall designs. Equivalent fluid pressures for sloping conditions should be determined on an individual basis.

Entech should observe overexcavated subgrades as well as the overall foundation excavation subgrade and evaluate if the exposed soil conditions are consistent with those described in this report. Entech should also provide recommendations for additional overexcavation depth, if required, and foundation drainage based on the excavation conditions observed at that time.

5.3 On-Grade Floor Slabs

On-grade floor slabs for the planned structure should be supported on compacted granular soils. Loose soils should be removed and recompacted. Where potentially expansive clay soil is encountered at or within 3 feet of floor slab grade it should be removed a minimum of 3 feet and replaced with a non-expansive granular fill. Uncontrolled fill should be completely removed and replaced with approved site soils or structural fill. The depth of overexcavation, if needed, should be determined at the time of the excavation observation. On-site granular soils, as approved by Entech, may be used as structural fill. Structural Fill should be compacted to a minimum of 95 percent of its Maximum Modified Proctor Dry Density Test (ASTM D-1557). The fill should be moisture conditioned to ±2 percent of the optimum moisture content as determined to aid in compaction. All soil beneath the slab should be free of organics, debris and stone sized larger than 3 inches in diameter.

5.4 Seismic Site Classification

Based on the subsurface conditions encountered at the site and in accordance with Section 1613 of the 2015 International Building Code (IBC), the site meets the conditions of a Site Class D with the upper loose soils mitigated during construction.

5.5 Surface and Subsurface Drainage

Positive surface drainage is recommended around the building perimeter to minimize infiltration of surface water into the supporting foundation soils. A 10 percent slope adjacent to foundations is recommended where possible. A minimum ground surface slope of 5 percent in the first 10 feet adjacent to exterior foundation walls is recommended for landscaped areas. For paved areas and other impervious surfaces, a minimum slope of 2 percent is adequate. All roof drains and gutter downspouts should be extended to discharge well beyond the building's foundation backfill zone or be connected to a storm sewer system.

To help minimize infiltration of water into the foundation zone, vegetative plantings placed close to foundation walls should be limited to those species having low watering requirements and irrigated grass should not be located within 5 feet of the foundation. Trees should be located a minimum of 10 feet from foundations. Similarly, sprinklers are not recommended to discharge water within 5 feet of foundations. Irrigation near foundations should be limited to the minimum amount sufficient to maintain vegetation. Application of more irrigation water than necessary can increase the potential for slab and foundation movement. Items such as sidewalks should not be situated as to allow water to be trapped near the foundation.

Perimeter drains are not necessary for slab-on-grade construction provided the slab is positioned above finished exterior site grade, drainage is maintained and backfill is compacted. In the event a below grade space is included, a foundation perimeter drain around that space is recommended. A typical perimeter drain detail is shown in Figure 3. The perimeter drain should be provided with a free gravity outlet or be connected to a sump/pump system.

5.6 Concrete Degradation Due to Sulfate Attack

Sulfate solubility testing was conducted on soil samples to evaluate the potential for sulfate attack on concrete placed below surface grade. The test results indicated 0.00 to less than 0.01 percent

soluble sulfate (by weight) (Table 1). The test results indicate the sulfate component of the in-place soil presents a negligible exposure threat to concrete placed below the site grade.

Type II cement is recommended for concrete at this site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in the foundation excavation prior to the placement of concrete. If standing water is present in the foundation excavation, it should be removed by ditching to sumps and pumping the water away from the foundation area prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

5.7 Foundation Excavation Observation

Subgrade preparation for building foundations should be observed by Entech prior to construction of the footings and floor slabs in order to verify that (1) no anomalies are present, (2) materials of the proper bearing pressure have been encountered or placed, and (3) no loose or soft spots, expansive or organic soil, soil or debris are present in the foundation area prior to concrete placement or backfilling. Entech should make final recommendations for over-excavation, if required, and foundation drainage at the time of excavation observation, if necessary. Final design parameters for the building should also be determined.

5.8 Structural Fill

Areas to receive fill should have all topsoil, uncontrolled fill, organic material and debris removed. Fill must be properly benched. The surface should be scarified and moisture conditioned to within ±2 percent of its optimum moisture content and compacted to 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) beneath footings prior to placing new fill. New fill beneath footings should be non-expansive or reconditioned granular fill and be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) for granular soils. These materials should be placed at a moisture content conducive to compaction, usually ±2 percent of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech

Engineering, Inc. Imported soils should be approved by Entech Engineering, Inc. prior to being hauled to the site.

Compacted, non-expansive granular soil, free of organics, debris and cobbles greater than 3 inches in diameter, is recommended for filling foundation components and for filling beneath floor slabs. All fill placed within the foundation area or beneath floor slabs should be placed and compacted as previously discussed. Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of six inches or less. Mechanical methods can be used for placement and compaction of fill; however, heavy equipment should be kept at distance from foundation walls and below slab infrastructure to avoid over stressing. No water flooding techniques of any type should be used for compaction or placement of foundation or floor slab fill material. Entech should approve any imported fill to be used within the foundation area prior to delivery to the site.

5.9 Utility Trench Backfill

Fill placed in utility trenches should be compacted according to local specifications. Fill should be placed in horizontal lifts having a compacted thickness of six inches or less and at a water content conducive to adequate compaction. Mechanical methods should be used for fill placement; however, heavy equipment should be kept at a distance from foundation walls. No water flooding techniques of any type should be used for compaction or placement of utility trench fill.

Trench backfill placement should be performed in accordance with the City of Colorado Springs specifications. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

5.10 General Backfill

Any areas to receive fill outside the foundation limits should have all topsoil, organic material, and debris removed. Fill must be properly benched into existing slopes in order to be adequately compacted. The fill receiving surface should be scarified to a depth of 12-inches and moisture conditioned to –2 to +2 percent of the optimum water content, and compacted to a minimum of 95 percent of the ASTM D-1557 Modified Maximum Dry Density for the site sands (ASTM D-698 Standard Maximum Dry Density for site clays) before the addition of new fill. Fill should be placed

in thin lifts not to exceed 6 inches in thickness after compaction while maintaining the density above. Fill material should be free of vegetation and other unsuitable material and shall not contain rocks or fragments greater than 3 inches. Topsoil and strippings should be segregated from all other fill sources on the site. Fill placement and compaction beneath and around foundations, in utility trenches, beneath roadways or other structural features of the project should be observed and tested by Entech during construction.

5.11 Excavation Stability

Excavation sidewalls must be properly sloped, benched and/or otherwise supported in order to maintain stable conditions. All excavation openings and work completed therein shall conform to OSHA Standards as put forward in CFR 29, Part 1926.650-652, (Subpart P).

5.12 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the foundation subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to eliminate burial of snow, ice or frozen material within the planned construction area.

5.13 Construction Observations

It is recommended that Entech observe and document the following activities during construction of the building foundations.

- Excavated subgrades and subgrade preparation.
- Placement of foundation perimeter drains (if installed).
- Placement/compaction of fill material for the foundation components and floor slab.
- Placement/compaction of utility bedding and trench backfill.

6.0 CLOSURE

The subsurface investigation, geotechnical evaluation and recommendations presented in this report are intended for use by Land Development Consultants, Inc. for planning the construction of an Office/Shop Building with parking areas and associated site improvements at Rocky Top Resources located northwest of Janitell Road and East Las Vegas Street in the southern portion of Colorado Springs, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests that it be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

TABLE

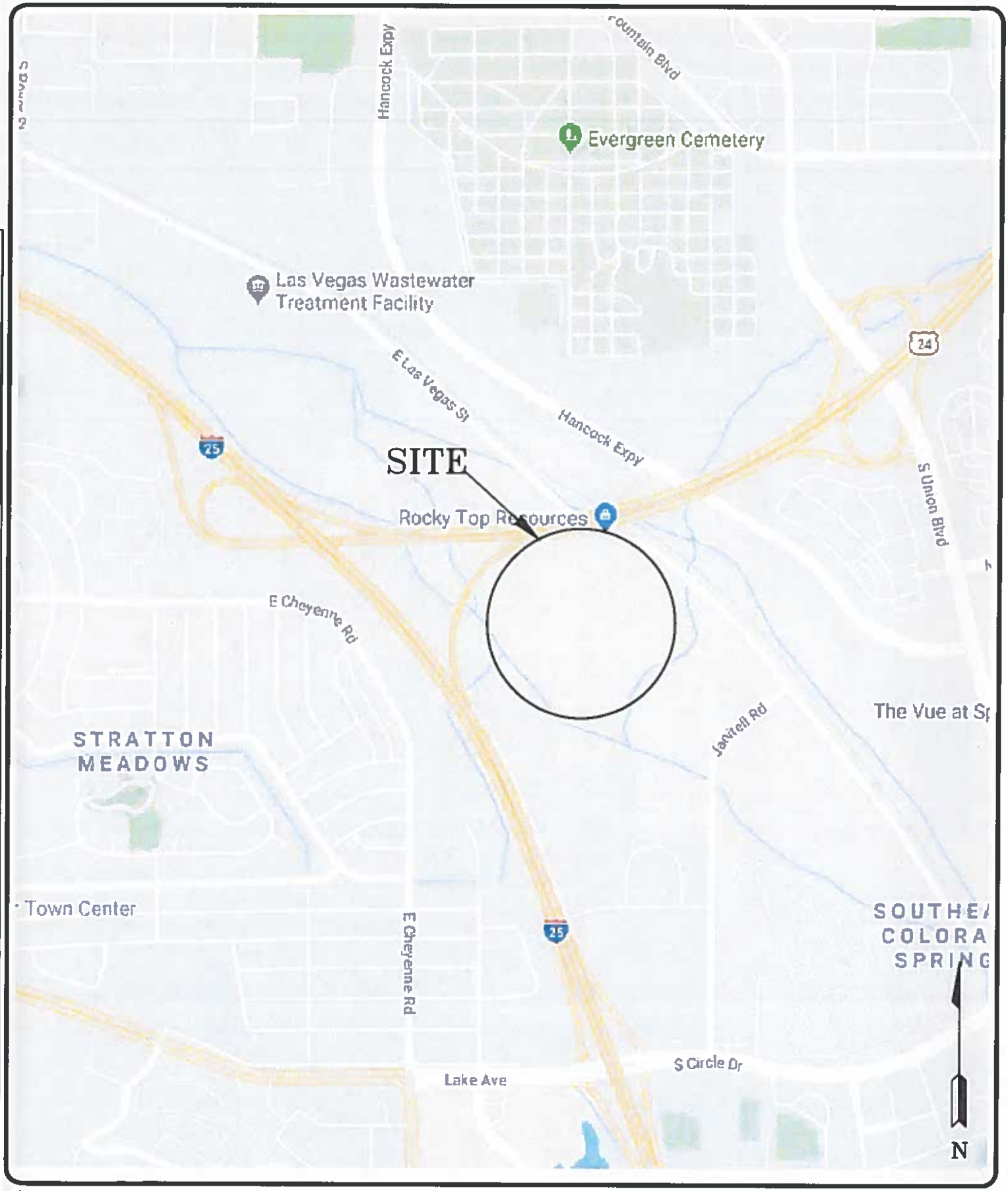
TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT LAND DEV. CONSULTANTS
PROJECT 1755 E. LAS VEGAS ST.
JOB NO. 190395

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	10			6.3			<0.01			SM-SW	SAND, SILTY
1	2	15			7.9	NV	NP				SM-SW	SAND, SLIGHTLY SILTY
1	2	5			42.2			0.00	300		SC	SAND, VERY CLAYEY
2	1	2-3	10.3	114.5	61.1	33	16			0.1	CL	CLAY, VERY SANDY

FIGURES



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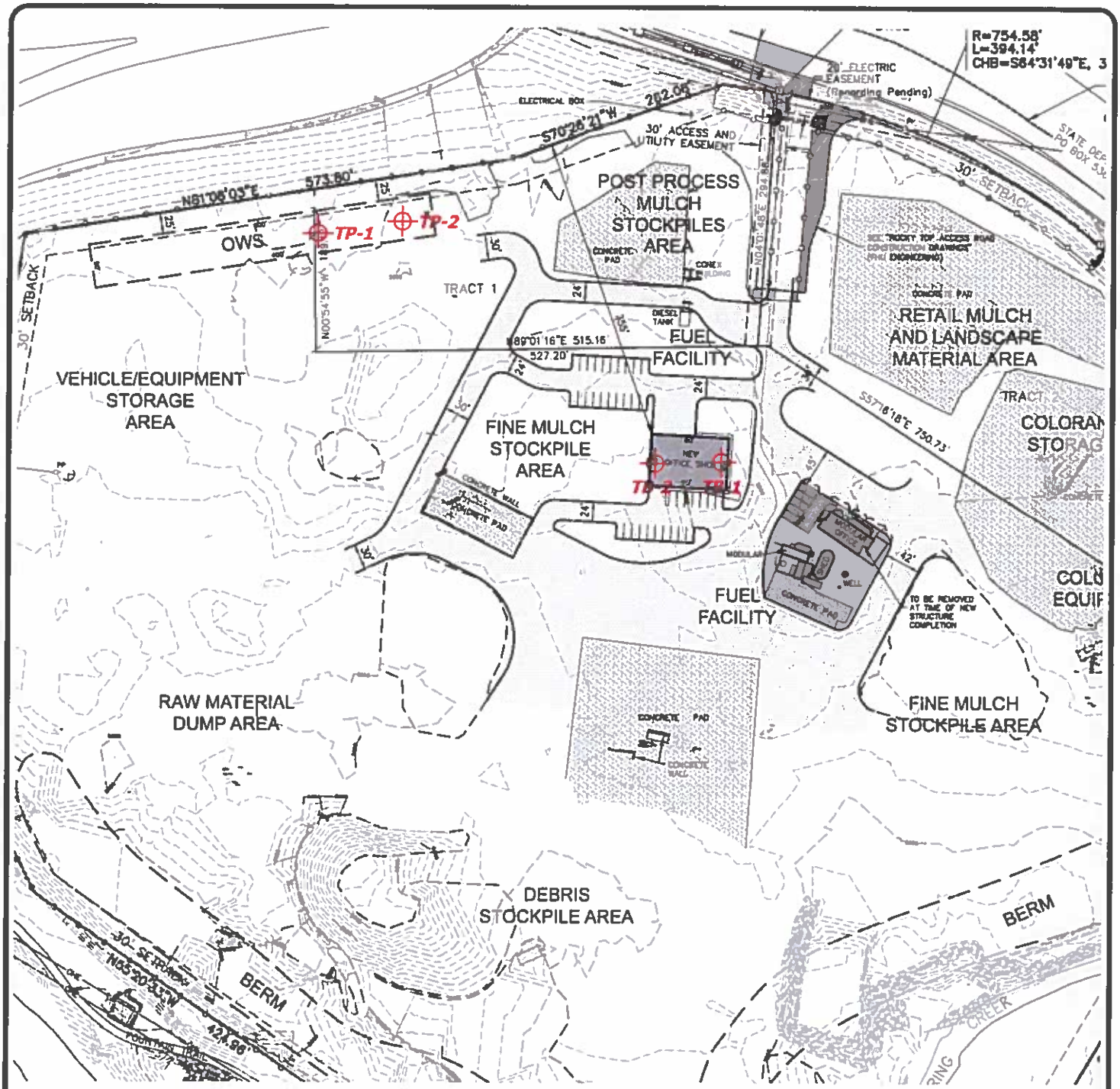
VICINITY MAP
1755 EAST LAS VEGAS STREET
COLORADO SPRINGS, COLORADO
FOR: LAND DEVELOPMENT CONSULTANTS, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/4/19		

JOB NO.: 190395

FIG NO.: 1



TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

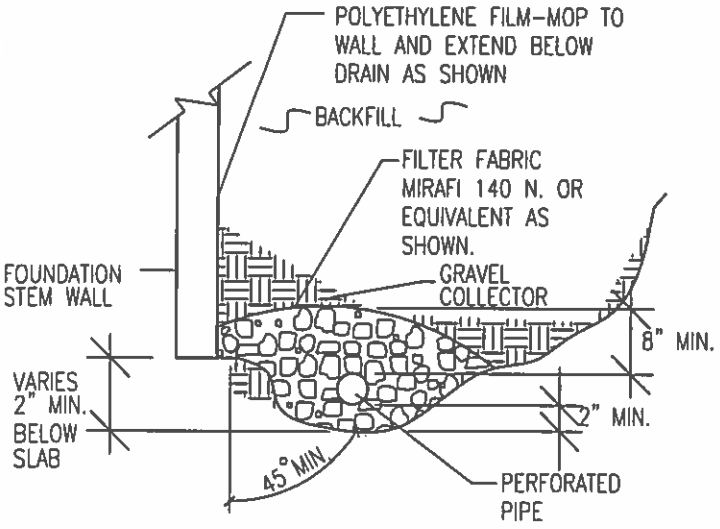
ENTECH ENGINEERING, INC.
305 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

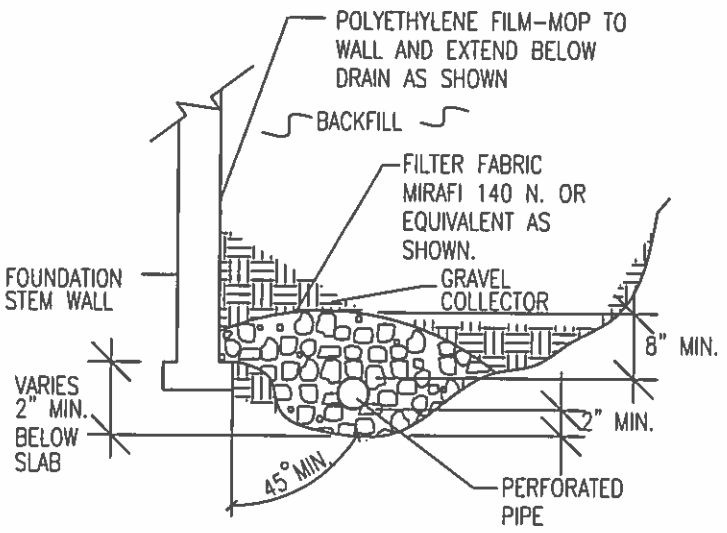
TEST BORING LOCATION MAP
1755 EAST LAS VEGAS STREET
COLORADO SPRINGS, COLORADO
FOR: LAND DEVELOPMENT CONSULTANTS, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/4/19		

JOB NO.: 190395

FIG NO.: 2





NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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PERIMETER DRAIN DETAIL

DRAWN:	DATE DRAWN:	DESIGNED BY:	CHECKED:
		DS	LLL

JOB NO.: 190395

FIG. NO.: 3

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 3/26/2019
Job # 190395

REMARKS

WATER @ 14', 3/27/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			14	12.6	2	CLAY, VERY SANDY, BROWN, FIRM TO SOFT, MOIST
5			7	13.2	2	
						SAND, GRAVELLY, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO WET
10			16	1.8	1	
15			18	15.9	1	
20			11	10.8	1	

TEST BORING NO. 2
DATE DRILLED 3/26/2019
CLIENT LAND DEV. CONSULTANTS
LOCATION 1755 E. LAS VEGAS ST.

REMARKS

WATER @ 14', 3/26/19
CAVED TO 10', 3/27/19, DRY

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			15	12.5	2	CLAY, SANDY, BROWN, STIFF, MOIST
5			7	13.5	1	SAND, VERY CLAYEY, FINE GRAINED, TAN, LOOSE, MOIST
10			27	3.2	1	SAND, GRAVELLY, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST TO WET
15			*	9.8	1	
20						

* - BULK SAMPLE TAKEN

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TEST BORING LOG

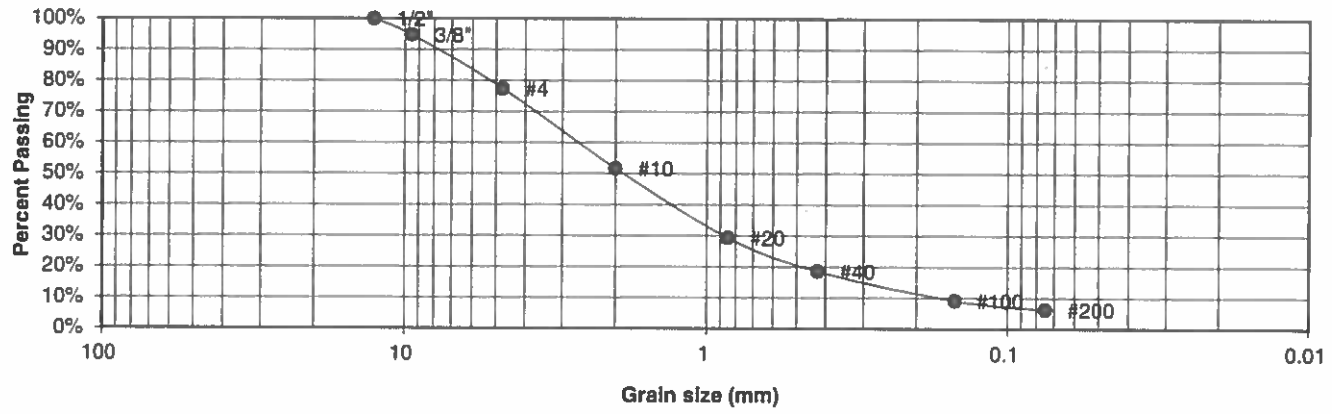
DRAWN:	DATE:	CHECKED: ✓	DATE:

JOB NO.: 190395
FIG NO.: A- 1

APPENDIX B: Laboratory Testing Results

UNIFIED CLASSIFICATION	SM-SW	CLIENT	LAND DEV. CONSULTANTS
SOIL TYPE #	1	PROJECT	1755 E. LAS VEGAS ST.
TEST BORING #	1	JOB NO.	190395
DEPTH (FT)	10	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	94.8%
4	77.4%
10	51.7%
20	29.3%
40	18.5%
100	9.2%
200	6.3%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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COLORADO SPRINGS, COLORADO 80907

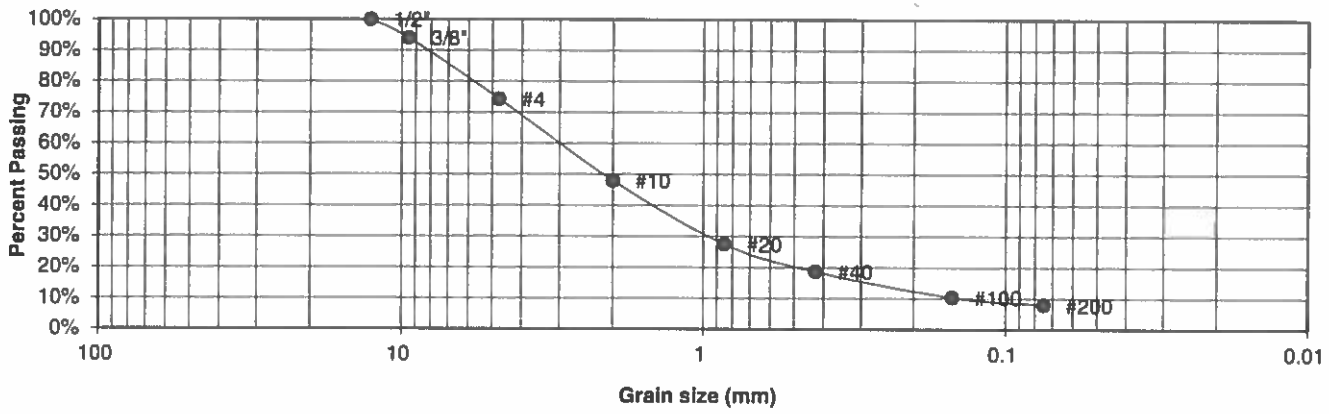
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/11/19

JOB NO.: 190395
FIG NO.: B-1

UNIFIED CLASSIFICATION	SM-SW	CLIENT	LAND DEV. CONSULTANTS
SOIL TYPE #	1	PROJECT	1755 E. LAS VEGAS ST.
TEST BORING #	2	JOB NO.	190395
DEPTH (FT)	15	TEST BY	BL

Sieve Analysis
Grain Size Distribution



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	94.0%
4	74.3%
10	48.0%
20	27.5%
40	18.6%
100	10.4%
200	7.9%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start

Moisture at finish

Moisture increase

Initial dry density (pcf)

Swell (psf)

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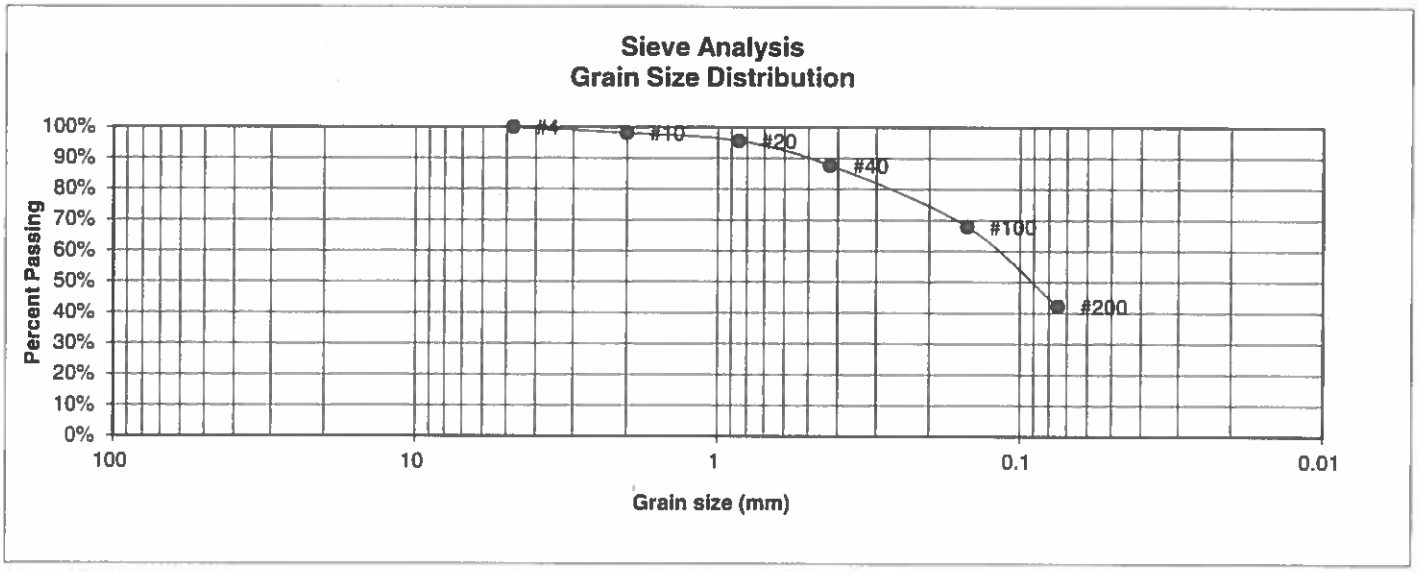
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/4/19

JOB NO.: 190395

FIG NO.: B-2

UNIFIED CLASSIFICATION	SC	CLIENT	LAND DEV. CONSULTANTS
SOIL TYPE #	1	PROJECT	1755 E. LAS VEGAS ST.
TEST BORING #	2	JOB NO.	190395
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.1%
20	95.6%
40	87.7%
100	67.9%
200	42.2%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell

Moisture at start	15.0%
Moisture at finish	19.4%
Moisture increase	4.3%
Initial dry density (pcf)	102
Swell (psf)	300

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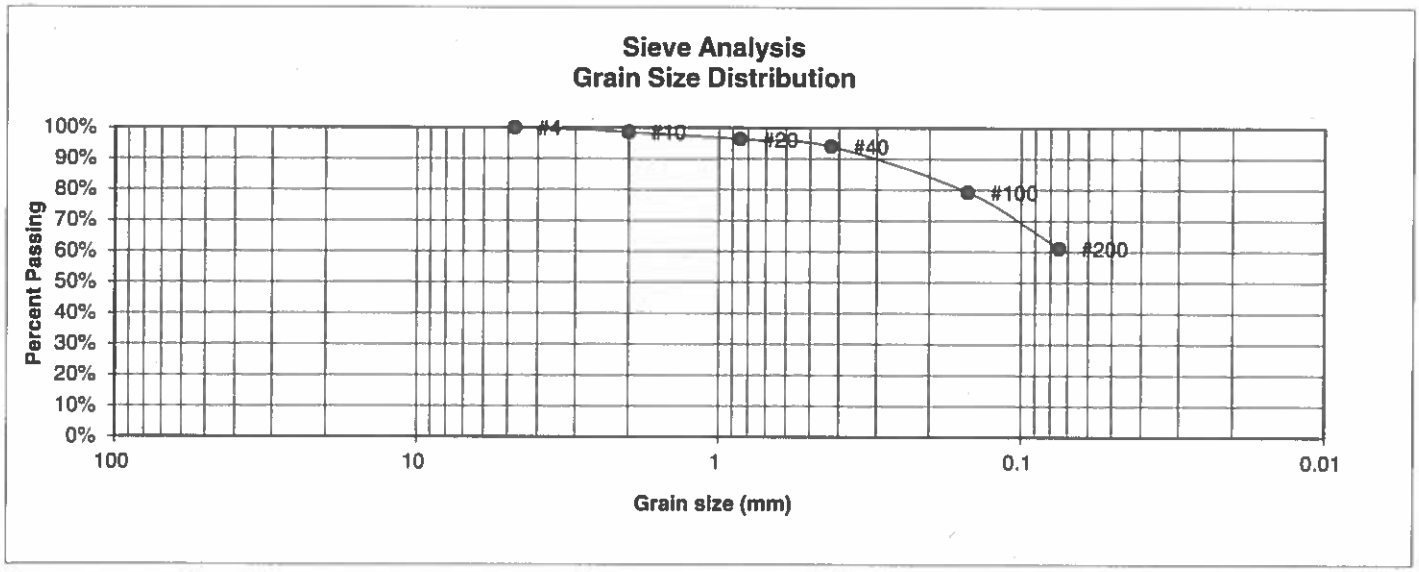
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/4/19

JOB NO.: 190395

FIG NO.: B-3

UNIFIED CLASSIFICATION	CL	CLIENT	LAND DEV. CONSULTANTS
SOIL TYPE #	2	PROJECT	1755 E. LAS VEGAS ST.
TEST BORING #	1	JOB NO.	190395
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.6%
20	96.3%
40	94.0%
100	79.3%
200	61.1%

Atterberg Limits	
Plastic Limit	17
Liquid Limit	33
Plastic Index	16

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/14/19

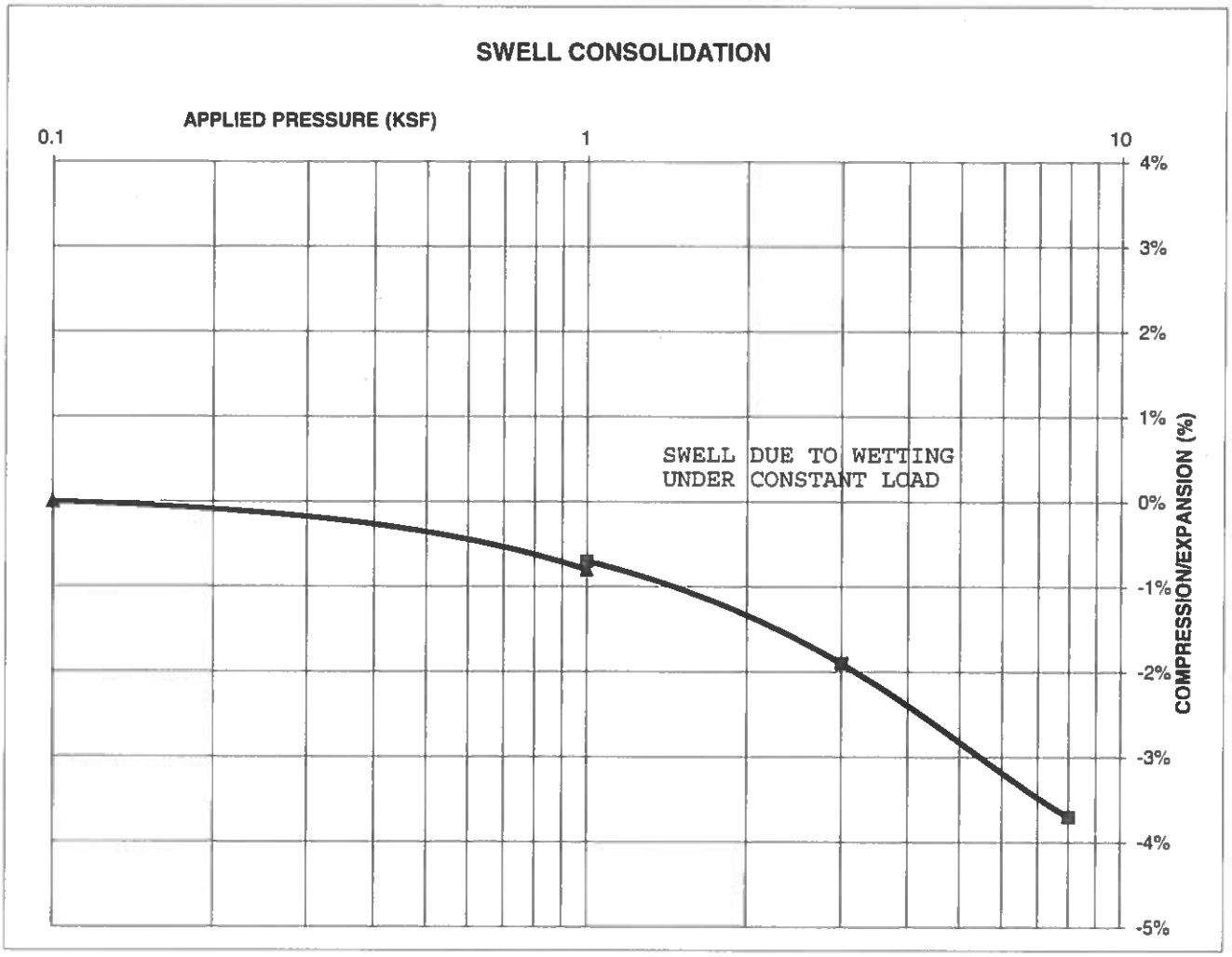
JOB NO.: 190395

FIG NO.: B-4

CONSOLIDATION TEST RESULTS

TEST BORING #	1	DEPTH(ft)	2-3
DESCRIPTION	CL	SOIL TYPE	2
NATURAL UNIT DRY WEIGHT (PCF)			115
NATURAL MOISTURE CONTENT			10.3%
SWELL/CONSOLIDATION (%)			0.1%

JOB NO. 190395
CLIENT LAND DEV. CONSULTANTS
PROJECT 1755 E. LAS VEGAS ST.



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/4/19

JOB NO.: 190395
FIG NO.: B-5

CLIENT	LAND DEV. CONSULTANTS	JOB NO.	190395
PROJECT	1755 E. LAS VEGAS ST.	DATE	4/1/2019
LOCATION	1755 E. LAS VEGAS ST.	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-2	5	1	SC	0.00
TB-1	10	1	SM-SW	<0.01

QC BLANK PASS

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LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	4/4/19

JOB NO.: 190395
FIG NO.: B-6

Markup Summary

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Per Chapter 11, section 11.3.3 of the El Paso County Drainage Criteria Manual recommendations for the foundation preparation and embankment construction shall be submitted with the complete design analysis for all permanent detention facilities.