

October 1, 2020



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907  
PHONE (719) 531-5599  
FAX (719) 531-5238

Clear View Properties, LLC  
1410 Ford Street  
Colorado Springs, CO 80915

Attn: Kevin Ferguson

Re: Subsurface Soil Investigation – Detention Pond  
3966 Clear View Loop South  
Lot 4A, Clear View Industrial Park  
Colorado Springs, Colorado

This report does not include all property subject to this subdivision.

Dear Mr. Ferguson:

Entech Engineering, Inc. performed a subsurface soil investigation for the proposed detention pond. The location is indicated on the Vicinity Map, Figure 1. The project is to consist of construction of a detention pond at the above referenced site. Two test borings were drilled in the area of the proposed detention pond. The location of the test borings is shown on Site Plan/Test Boring Location Map, Figure 2. This letter provides recommendations for the embankment improvements based on the site conditions encountered in this investigation and the above referenced report.

#### **SITE CONDITIONS:**

The site is currently vacant. Adjacent properties consist of undeveloped land to the north, commercial properties to the east and south, and the Fountain Municipal Canal to the west. Topography of the site is gradually sloping to the west southwest. Vegetation consists of scattered field grasses and weeds.

#### **FIELD INVESTIGATION AND LABORATORY TESTING:**

The subsurface conditions in the detention pond area were investigated by drilling two (2) exploratory test borings. The test borings were drilled to depths of 20 feet. The approximate locations of the test borings are indicated on the Site Plan/Test Boring Location Map, Figure 2.

The test borings were advanced with a power-driven continuous flight auger drilling rig to depths of 20 feet below the existing ground surface. Samples were obtained during drilling using the Standard Penetration Test, ASTM D-1586, utilizing a California sampler. Results of the Standard Penetration Tests are shown on the Test Boring Logs. The Test Boring Logs are included in Appendix A, Laboratory Test results are summarized in Table 1 and Laboratory Test Results are included in Appendix B.

#### **SOIL AND GROUNDWATER CONDITIONS:**

One soil type was encountered in the test borings. Soil Type 1: silty to very silty sand (SM). The soils were classified using the Unified Soil Classification System (USCS).

Clear View Properties, LLC  
Subsurface Soil Investigation – Detention Pond  
3966 Clear View Loop South  
Lot 4A, Clear View Industrial Park  
Colorado Springs, Colorado

Soil Type 1 classified as silty to very silty sand (SM). The sand was encountered in Test Boring Nos. 1 and 2 at the existing ground surface and extending to the termination of the test borings (20 feet). Standard Penetration Testing conducted on the sand resulted in N-values ranging between 10 to 30 bpf, which indicated medium dense to dense states. Moisture content and grain size testing resulted in moisture contents of 7 to 18 percent with 22 to 39 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits Testing resulted in non-plastic values. Sulfate testing resulted in less than 0.01 percent soluble sulfate by weight, indicating negligible to severe potential for below grade concrete degradation due to sulfate attack.

Groundwater was encountered in the test borings at 11 and 12 feet bgs. Groundwater conditions may vary due to variations in rainfall, drainage, and other factors not readily apparent at this time. Unstable soil conditions should be expected where excavations approach the groundwater level. Stabilization utilizing shot rock or geogrids may be necessary. Development of the property, adjacent properties and associated changes in runoff may affect the groundwater surface elevations in the drainage basin.

#### **DEVELOPMENT CONSIDERATIONS AND RECOMMENDATIONS:**

In general, the site soils encountered in the test borings are suitable for the proposed detention pond. Groundwater may be encountered in the deeper cuts. Dewatering of the area may be required during site grading and embankment construction. Saturated unstable soil conditions may be encountered during construction of the basin and embankment. Excavation of saturated soils will be difficult with rubber-tired equipment. Stabilization using shot rock or geogrids may be necessary in areas where groundwater is approached or encountered.

Any areas to receive new fill should have all topsoil, organic material or debris removed. Fill must be properly benched and compacted to minimize potentially unstable conditions in slope areas. Fill slopes should be 3:1 or flatter. The subgrade should be scarified and moisture conditioned to within 2% of optimum moisture content and compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557, prior to placing new fill. Areas receiving fill may require stabilization with shotrock or fabric if water is encountered or approached. Any soft/loose areas should be removed and recompacted.

New fill should be placed in lifts not to exceed 6 inches after compaction while maintaining at least 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. These materials should be placed at a moisture content conducive to compaction, usually  $\pm 2\%$  of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech during construction/grading. Entech should approve any import materials prior to hauling them to the site.

#### **CONCRETE:**

Type II cement may be used for all concrete on 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 excavations prior to the placement of concrete. If standing water is present in the foundation excavations, it should be removed by ditching to sumps and pumping the water away from the foundation area

Clear View Properties, LLC  
Subsurface Soil Investigation – Detention Pond  
3966 Clear View Loop South  
Lot 4A, Clear View Industrial Park  
Colorado Springs, Colorado

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.

**CLOSURE**

The subsurface investigation, geotechnical evaluation and recommendations presented in this report are intended for use by Clear View Properties, LLC with application to the planned Detention Pond on Lot 4A, Clear View Industrial Park. 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. Final embankment /pond plans should be reviewed to determine where additional investigation is recommended. 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.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.  
Geologist



Reviewed by:

Mark H. Hauschild, P.E.  
Senior Engineer

LLL/nc

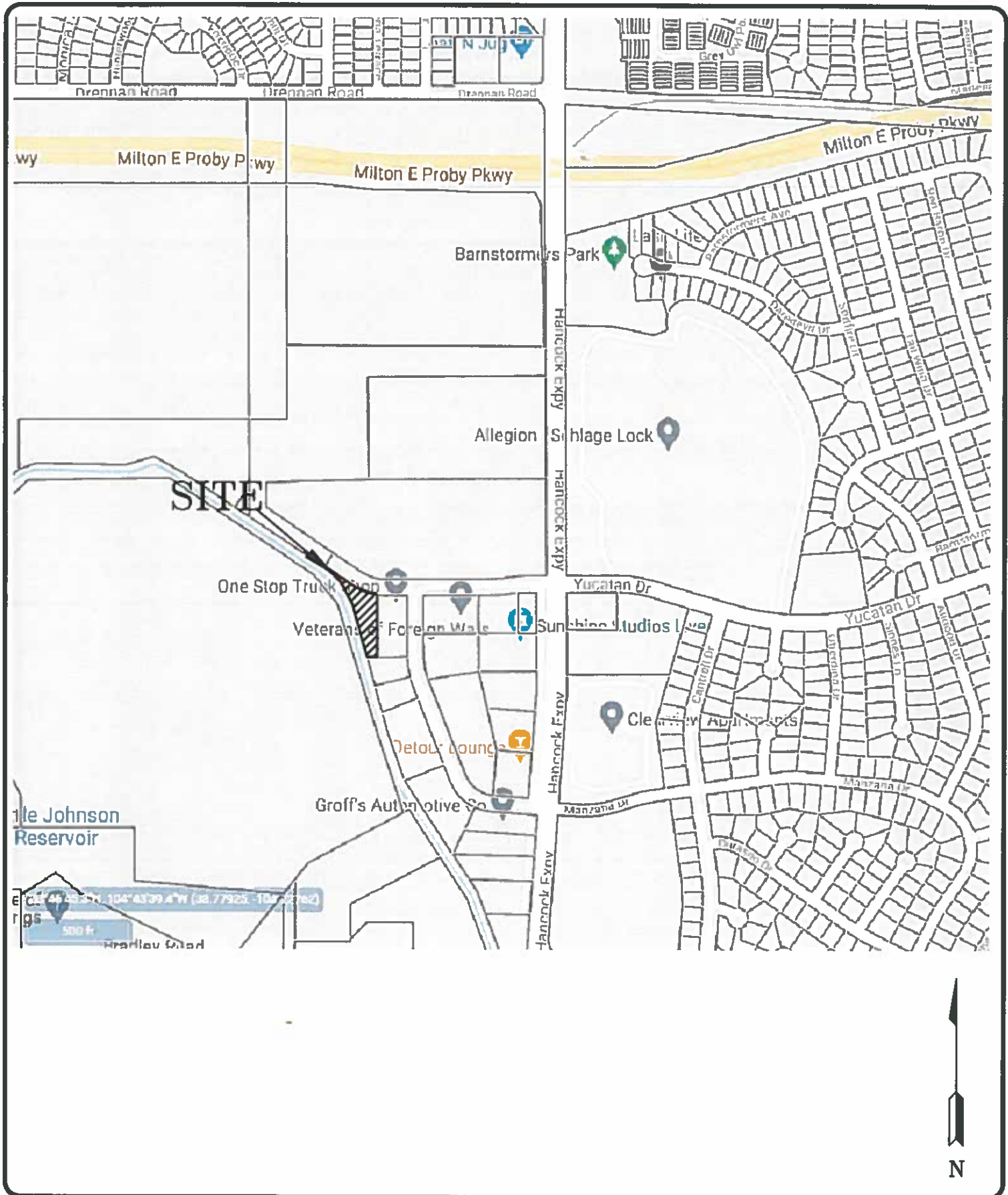
Entech Job No. 201777  
AAPProjects/2020/201777 SSI-Detention Pond

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT CLEARVIEW PROPERTIES  
 PROJECT 3966 CLEARVIEW LOOP  
 JOB NO. 201777

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	5			38.6	NV	NP	<0.01			SM	SAND, VERY SILTY
1	2	10			22.6						SM	SAND, SILTY

## FIGURES



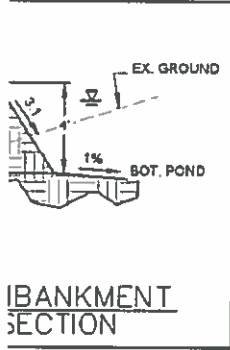
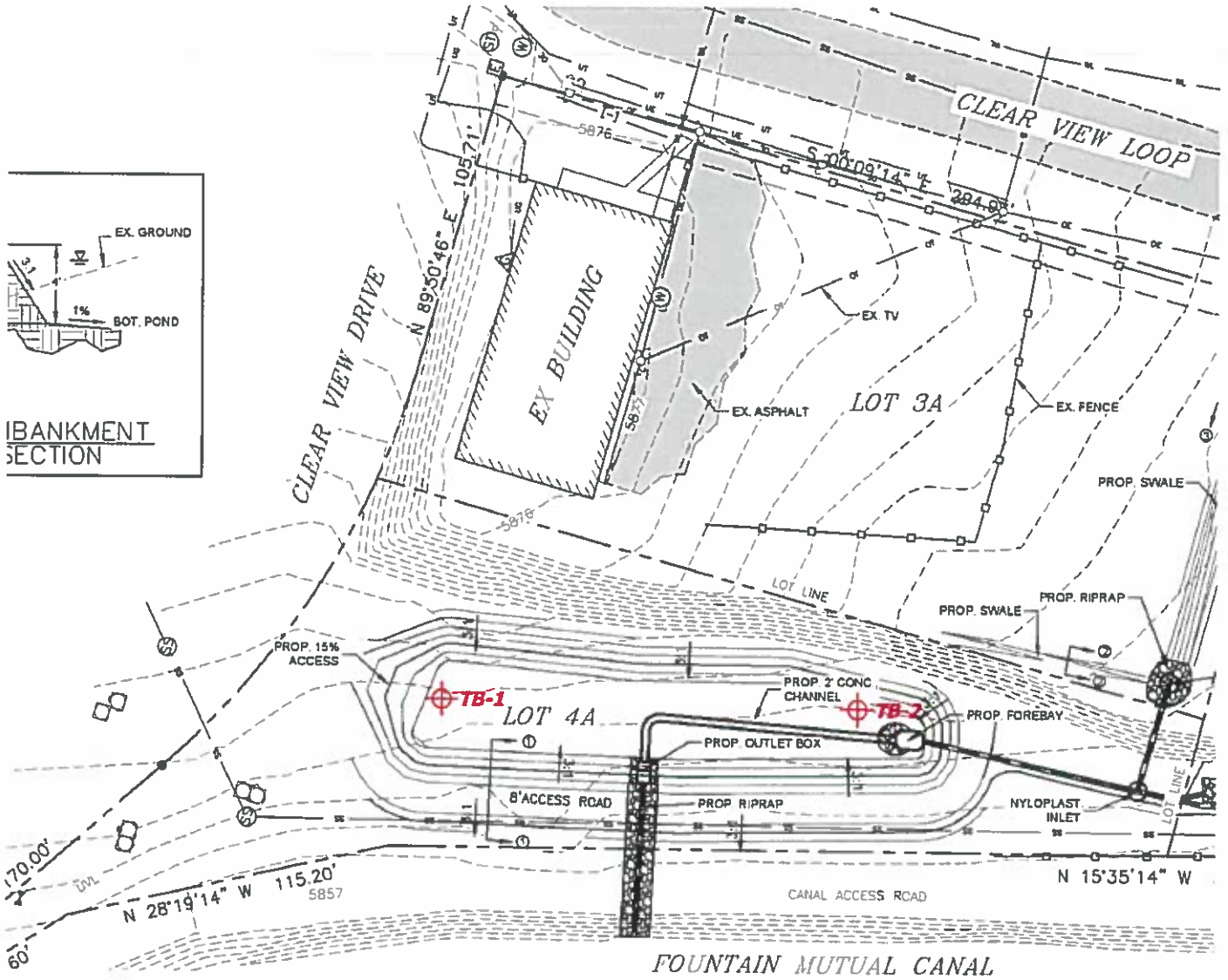
**ENTECH**  
**ENGINEERING, INC.**  
 385 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-3599

**VICINITY MAP**  
**3986 CLEAR VIEW LOOP SOUTH**  
**LOT 4A, CLEAR VIEW INDUSTRIAL PARK**  
**COLORADO SPRINGS, COLORADO**  
**FOR: CLEAR VIEW PROPERTIES, LLC**

DRAWN: LLL	DATE: 9/22/20	CHECKED:	DATE:
---------------	------------------	----------	-------

JOB NO.:  
201777

FIG NO.:  
1



 **TB- APPROXIMATE TEST BORING LOCATION AND NUMBER**



**ENTECH**  
ENGINEERING, INC.  
500 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-5399

SITE PLAN/TEST BORING LOCATION MAP 3966 CLEAR VIEW LOOP SOUTH LOT 4A, CLEAR VIEW INDUSTRIAL PARK COLORADO SPRINGS, COLORADO FOR: CLEAR VIEW PROPERTIES, LLC			
DRAWN: LLL	DATE: 9/22/20	CHECKED:	DATE:

JOB NO.: 201777
FIG NO.: 2

---

## **APPENDIX A: Test Boring Logs**



TEST BORING NO. 1  
 DATE DRILLED 9/11/2020  
 Job # 201777

TEST BORING NO. 2  
 DATE DRILLED 9/11/2020  
 CLIENT CLEARVIEW PROPERTIES  
 LOCATION 3966 CLEARVIEW LOOP

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 12', 9/14/20							WATER @ 11', 9/14/20						
SAND, VERY SILTY TO SILTY, FINE GRAINED, BROWN, MEDIUM DENSE, MOIST TO WET	5		11	6.9	1		SAND, VERY SILTY TO SILTY, FINE GRAINED, BROWN, MEDIUM DENSE TO DENSE, MOIST TO WET	5		29	10.8	1	
	10		10	12.3	1			10		13	15.0	1	
	15		22	8.1	1			15		17	16.7	1	
	20		29	15.2	1			20		30	14.4	1	
	20		15	18.2	1			20		23	16.5	1	



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**TEST BORING LOG**

DRAWN:	DATE:	CHECKED: <i>[Signature]</i>	DATE: 9/17/20
--------	-------	-----------------------------	---------------

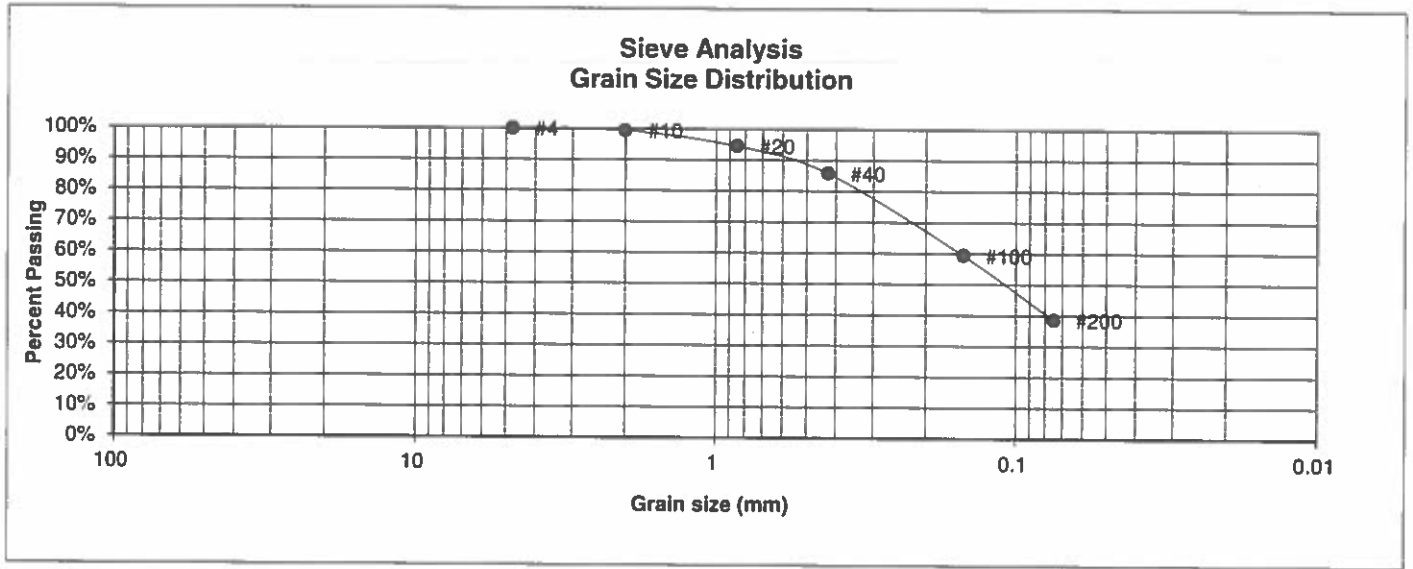
JOB NO:  
201777

FIG NO:  
A-1

## **APPENDIX B: Laboratory Testing Results**

UNIFIED CLASSIFICATION SM  
 SOIL TYPE # 1  
 TEST BORING # 1  
 DEPTH (FT) 5

CLIENT CLEARVIEW PROPERTIES  
 PROJECT 3966 CLEARVIEW LOOP  
 JOB NO. 201777  
 TEST BY BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.4%
20	94.5%
40	85.7%
100	59.4%
200	38.6%

**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)



**ENTECH**  
**ENGINEERING, INC.**

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN:

DATE:

CHECKED:

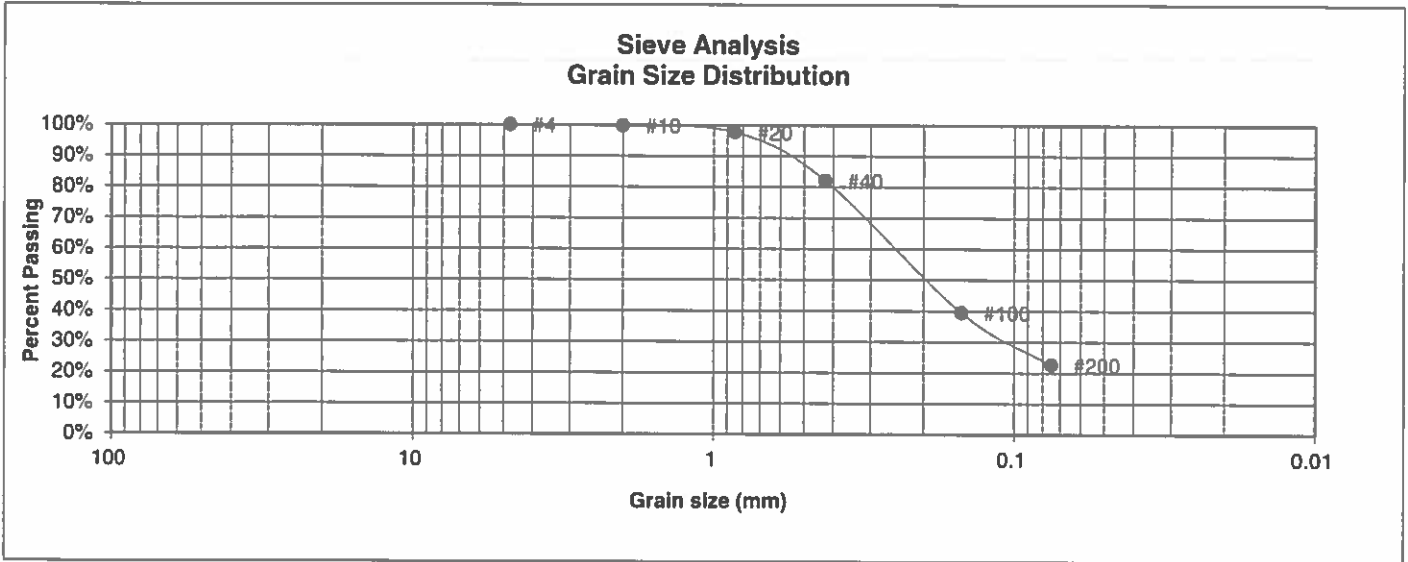
DATE 5/17/20

JOB NO.:  
201777

FIG NO.:  
B-1

**UNIFIED CLASSIFICATION** SM  
**SOIL TYPE #** 1  
**TEST BORING #** 2  
**DEPTH (FT)** 10

**CLIENT** CLEARVIEW PROPERTIES  
**PROJECT** 3966 CLEARVIEW LOOP  
**JOB NO.** 201777  
**TEST BY** BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.8%
20	97.7%
40	82.1%
100	39.4%
200	22.6%

**Atterberg Limits**  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

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



**ENTECH**  
**ENGINEERING, INC.**  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN: \_\_\_\_\_ DATE: \_\_\_\_\_ CHECKED: *[Signature]* DATE: 9/17/20

JOB NO.:  
201777

FIG NO.:  
B-2

CLIENT	<u>CLEARVIEW PROPERTIES</u>	JOB NO.	<u>201777</u>
PROJECT	<u>3966 CLEARVIEW LOOP</u>	DATE	<u>9/16/2020</u>
LOCATION	<u>3966 CLEARVIEW LOOP</u>	TEST BY	<u>BL</u>

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

QC BLANK PASS

**ENTECH ENGINEERING, INC.**  
505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

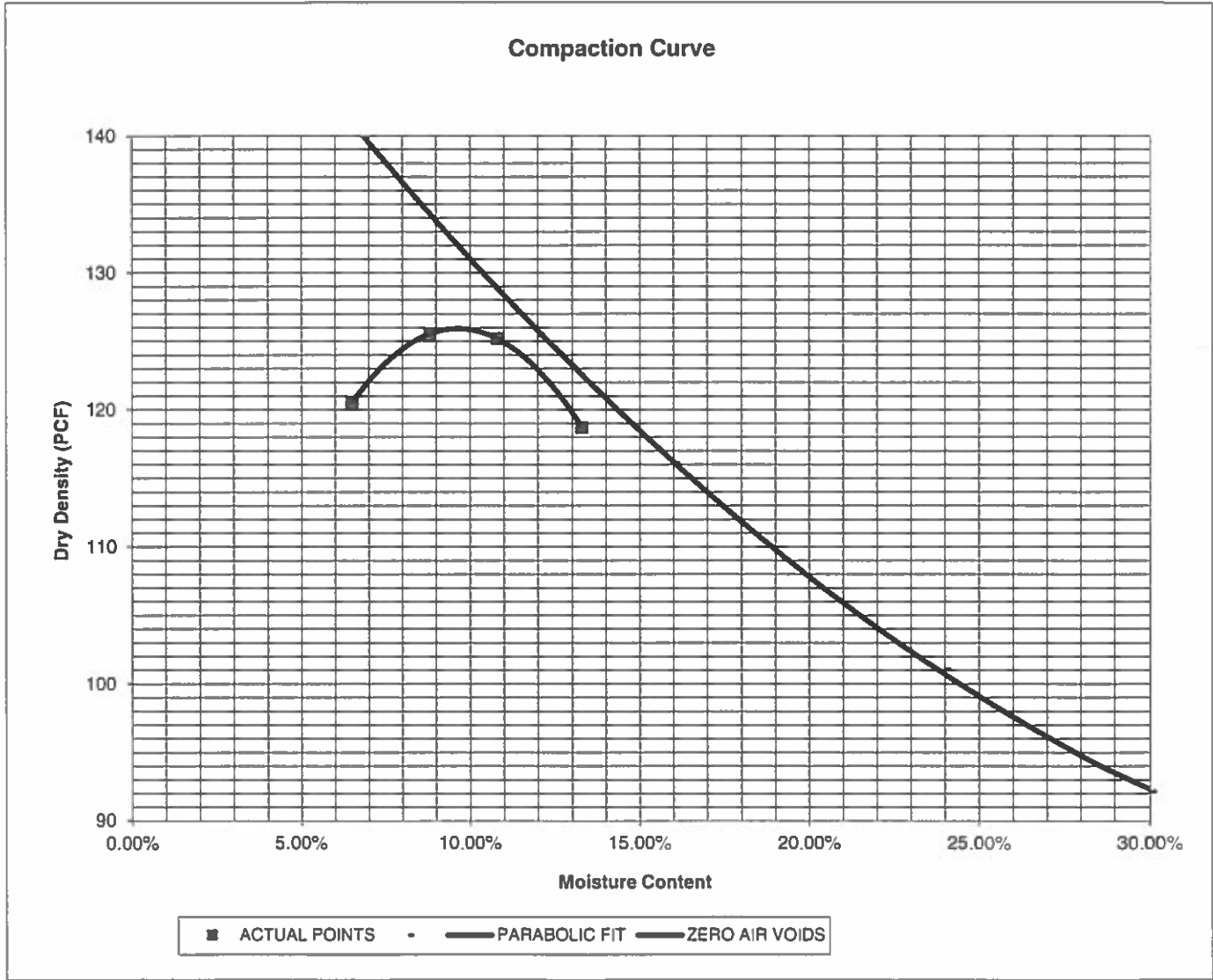
**LABORATORY TEST  
SULFATE RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>[Signature]</i>	9/17/20

JOB NO.:  
201777  
FIG NO.:  
B-3

<b>PROJECT</b>	CLEARVIEW LOOP	<b>CLIENT</b>	CLEARVIEW PROPERTIES
<b>SAMPLE LOCATION</b>	TB'S 1 & 2	<b>JOB NO.</b>	201777
<b>SOIL DESCRIPTION</b>	SAND, SILTY, BROWN	<b>DATE</b>	09/14/20

<b>IDENTIFICATION</b>	SM	<b>PROCTOR TEST #</b>	1
<b>TEST DESIGNATION / METHOD</b>	ASTM D-1557-A	<b>TEST BY</b>	AL
<b>MAXIMUM DRY DENSITY (PCF)</b>	125.9	<b>OPTIMUM MOISTURE</b>	9.7%




**ENTECH  
ENGINEERING, INC.**  
505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**MOISTURE DENSITY RELATION**

DRAWN:	DATE:	CHECKED: <i>[Signature]</i>	DATE: 9/17/20
--------	-------	-----------------------------	---------------

JOB NO.:  
201777  
FIG NO.:  
B-4