July 16, 2019

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
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William Guman and Associates, LTD
731 North Weber Street, Suite 100
Colorado Springs, Colorado 80903

Attn: William Guman

Re: **On-Site Wastewater Study - Addenedum**
Saddlehorn Ranch Subdivision
Curtis Road and Judge Orr Road
Colorado Springs, Colorado

Ref: Entech Engineering, Inc. April 29, 2019. *Soils, Geology, Geologic Hazard and Wastewater Study, Saddlehorn Ranch Subdivision, El Paso County, Colorado.* Entech Job No. 181823.

A Soils, Geology, and Wastewater Study was prepared for the above referenced site by Entech Engineering, Inc., dated April 29, 2019, Entech Job No. 181823. Additional test pits were excavated to complete the OWTS requirements (testing of 20 percent of the proposed lots). This letter presents the results of our OWTS evaluation of the site.

The site was evaluated for individual on-site wastewater treatment systems in accordance with El Paso Land Development Code. Forty-Five (45) tactile test pits were performed on the property (20 percent of the 225 proposed lots). The test pits were located in potential locations of OWTS systems. Table 1 presents a summary of the results of the Tactile Test Pits across the property. Locations of the Test Pits are shown on Figure 1. OWTS tactile test pit results for Test Pit No. 1 through 40 are presented in the original Soils Geology, Geologic Hazard and Waste Water Study referenced above. Test Pit Logs and Laboratory results for Test Pit Nos. 41 through 45 are included in Figures 2 through 8.

The Natural Resource Conservation Service (Reference 2) has mapped the site with four soil descriptions. The Soil Survey Map (Reference 2) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix D of the referenced report. The soils are described as having moderate to very rapid percolation rates. The majority of the soils have been described with rapid permeabilities. The Natural Resource Conservation Service (NRCS) has rated the soil suitability with respect to septic tank absorption fields. The soils in the area have been described as very limited due to seepage, bottom layer, and filtering capacity. These areas are typically associated with shallow groundwater, shallow bedrock, and unsuitable soils which require designed systems. Flooding and depth to saturation zone are limitations on Soil Type 29. The majority of the areas mapped with Soil Type 29 lie within the drainage areas and will be avoided by development.

Soils encountered in tactile test pits 41 through 45 consisted of loamy sand, sandy clay loam, and sandy clay. Weathered bedrock was encountered at 6 feet in Test Pit No. 42, bedrock was not encountered in the other test pits. Signs of groundwater were not observed in these test pits. The limiting layers encountered in the test pits are the sandy loam (Soil Type 2A), sandy clay loam (Soil Type 3A) and sandy claystone and sandstone (Soil Type 4A) which corresponds to LTAR values ranging from 0.5 to 0.15 gallons per day per square foot. Designed systems will be required where bedrock or groundwater are encountered at 6 feet bgs or shallower. Approximately half of

the areas tested would require designed systems due to restrictive clay soils, shallow bedrock or shallow groundwater. Additional investigation of individual lots may identify areas where suitable for conventional systems could be used.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems (OWTS) and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County and State Guidelines and properly maintained. Based on the testing performed as part of this investigation designed systems will likely be required for the majority of the lots. Individual soil testing is required on each lot prior to construction. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any drainages, floodplains or ponded areas and 25 feet from dry gulches.

We trust that this has provided you with the information required regarding the additional information that was requested. If you have any questions or need additional information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Kristen A. Andrew-Hoeser, P.G.
Senior Geologist

Reviewed By:

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

COLORADO LICENSED
JOSEPH COLLIN GOODE JR
23725
7.19.19
PROFESSIONAL ENGINEER

LLL/nc

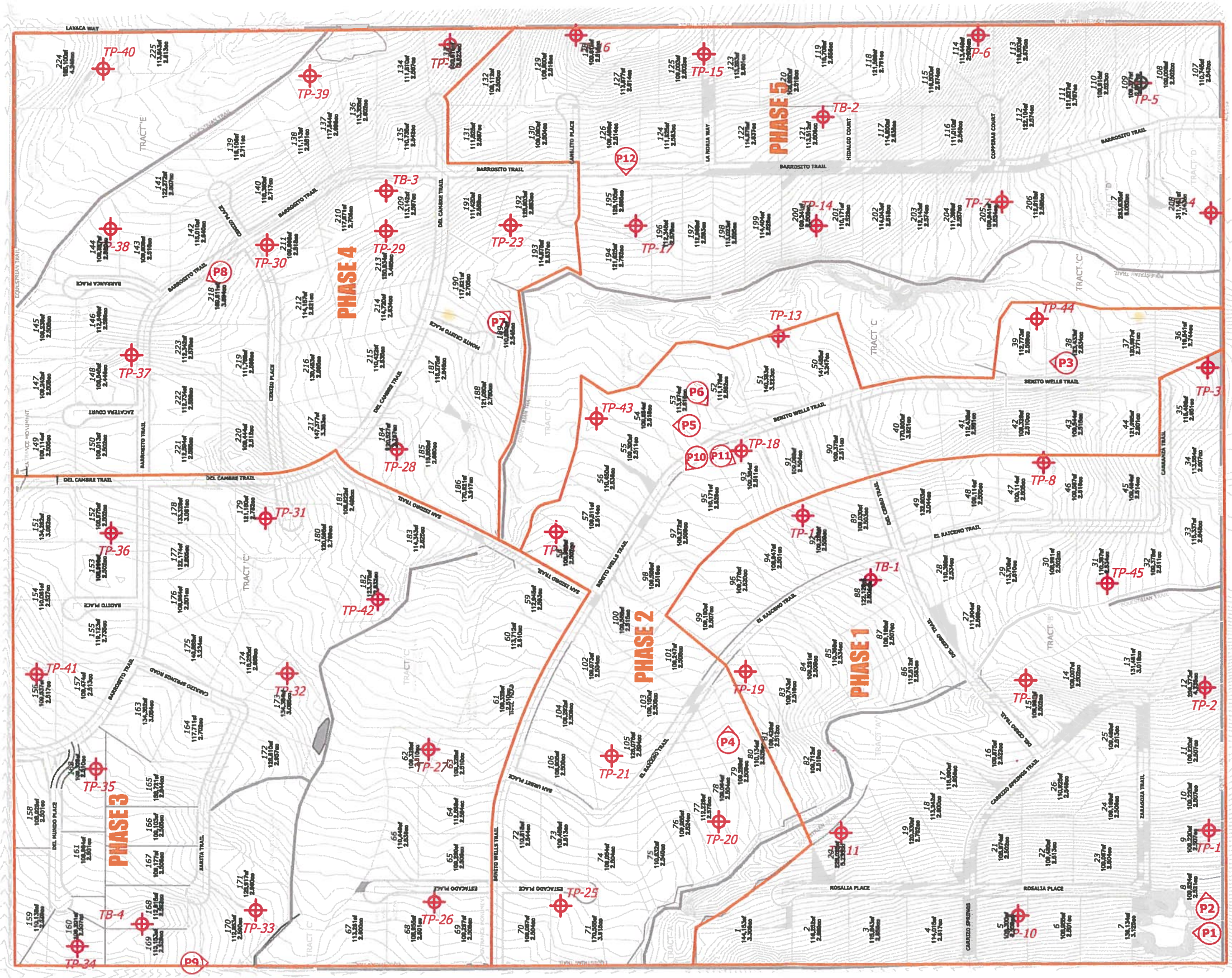
Encl.

Entech Job No. 181823
AA projects\2018\181823 On-Site Wastewater Study

TABLE 1: SUMMARY OF TACTILE TEST PIT RESULTS

Test Pit No.	USDA Soil Type	LTAR Value	Depth to Bedrock (ft)	Depth to Groundwater (ft)	Phase Number
TP-1	4A*	0.15	N/A	N/A	1
TP-2	1	0.8	N/A	N/A	1
TP-3	4A*	0.15	N/A	N/A	1
TP-8	4A*	0.15	2.5	N/A	1
TP-9	3A*	0.3	N/A	N/A	1
TP-10	3A*	0.3	4	N/A	1
TP-11	1	0.8	N/A	N/A	1
TP-12	1	0.8	N/A	N/A	1
TP-19	2A	0.5	N/A	N/A	1
TP-45	3A*	0.3	N/A	N/A	1
TP-13	4A*	0.15	N/A	6	2
TP-18	2A	0.5	N/A	N/A	2
TP-20	2A	0.5	N/A	N/A	2
TP-21	2	0.6	N/A	N/A	2
TP-24	2A	0.5	N/A	N/A	2
TP-25	1	0.8	N/A	N/A	2
TP-43	3A*	0.3	N/A	N/A	2
TP-44	2A	0.5	N/A	N/A	2
TP-26	3A*	0.3	N/A	N/A	3
TP-27	2A	0.5	N/A	N/A	3
TP-31	2A	0.5	N/A	N/A	3
TP-32	4A*	0.15	6	N/A	3
TP-33	2A	0.5	N/A	7.5	3
TP-34	3A*	0.3	4.5	N/A	3
TP-35	2A	0.5	N/A	N/A	3
TP-36	3A*	0.3	N/A	6	3
TP-41	4*	0.2	N/A	N/A	3
TP-42	4A*	0.15	6	N/A	3
TP-22	2A	0.5	N/A	N/A	4
TP-23	4A*	0.3	N/A	N/A	4
TP-28	2A	0.5	N/A	6.5	4
TP-29	2A	0.5	N/A	N/A	4
TP-30	4A*	0.15	N/A	6.5	4
TP-37	3A*	0.3	N/A	N/A	4
TP-38	2A	0.5	N/A	6.5	4
TP-39	2A	0.5	N/A	N/A	4
TP-40	4A*	0.15	2.5	3.5	4
TP-4	3A*	0.3	N/A	N/A	5
TP-5	4A*	0.15	N/A	N/A	5
TP-6	2A	0.5	N/A	N/A	5
TP-7	4A*	0.15	2.5	N/A	5
TP-14	4A*	0.15	2.5	N/A	5
TP-15	4A*	0.15	2.5	N/A	5
TP-16	2A	0.5	N/A	N/A	5
TP-17	4A*	0.15	4	N/A	5

* - CONDITIONS THAT REQUIRE AN ENGINEERED OWTS



LEGEND:

P2 - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

TP- APPROXIMATE TEST PIT LOCATION AND NUMBER

REVISION	BY

ENTECH ENGINEERING, INC.
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COLORADO SPRINGS, CO. 80907

SITE PLAN/TEST BORING LOCATION MAP
SADDLEHORN RANCH SUBDIVISION
CURTIS ROAD AND JUDGE ORR ROAD
EL PASO COUNTY, CO.
FOR: WILLIAM GUMAN AND ASSOCIATES, LTD

DRAWN	LLL/JAG
CHECKED	
DATE	4/30/19
SCALE	AS SHOWN
JOB NO.	161823
FIGURE No.	1

TEST PIT NO. 41
DATE EXCAVATED 5/6/2019
Job # 181823

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1					
loamy sand, fine to coarse grained, tan	2			sg		1
	3					
sandy clay, gray brown	4			gr	m	4
	5					
	6					
	7					
	8					
	9					
	10					

TEST PIT NO. 42
DATE EXCAVATED 5/6/2019
CLIENT GUMAN AND ASSOCIATES, LTD
LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1					
loamy sand, fine to coarse grained, tan	2			sg		1
	3					
	4					
	5					
	6					
weathered sandy claystone, gray brown	7			ma		4A
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	7/2/19

JOB NO.: 181823
FIG NO.: 2

TEST PIT NO. 43
DATE EXCAVATED 5/6/2019
Job # 181823

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1					
sandy loam, fine to coarse grained, tan	2			gr	m	2
	3					
	4					
	5					
sandy clay loam fine to coarse grained, light brown	6			gr	w	3A
	7					
	8					
	9					
	10					

TEST PIT NO. 44
DATE EXCAVATED 5/6/2019
CLIENT GUMAN AND ASSOCIATES, LTD
LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1					
sandy loam, fine to coarse grained, tan	2			gr	w	2A
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

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TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 181823
FIG NO.: 3

TEST PIT NO. 45
DATE EXCAVATED 5/6/2019
Job # 181823

CLIENT GUMAN AND ASSOCIATES, LTD
LOCATION CURTIS ROAD AND JUDGE ORR ROAD

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil sandy loam, brown	1					
sandy loam, fine to coarse grained, tan	2			gr	w	2A
	3					
	4					
sandy clay loam fine to coarse grained, light brown	5			gr	w	3A
	6					
	7					
	8					
	9					
	10					

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

Soil Structure Shape
granular - gr
platy - pl
blocky - bl
prismatic - pr
single grain - sg
massive - ma

Soil Structure Grade
weak - w
moderate - m
strong - s
loose - l

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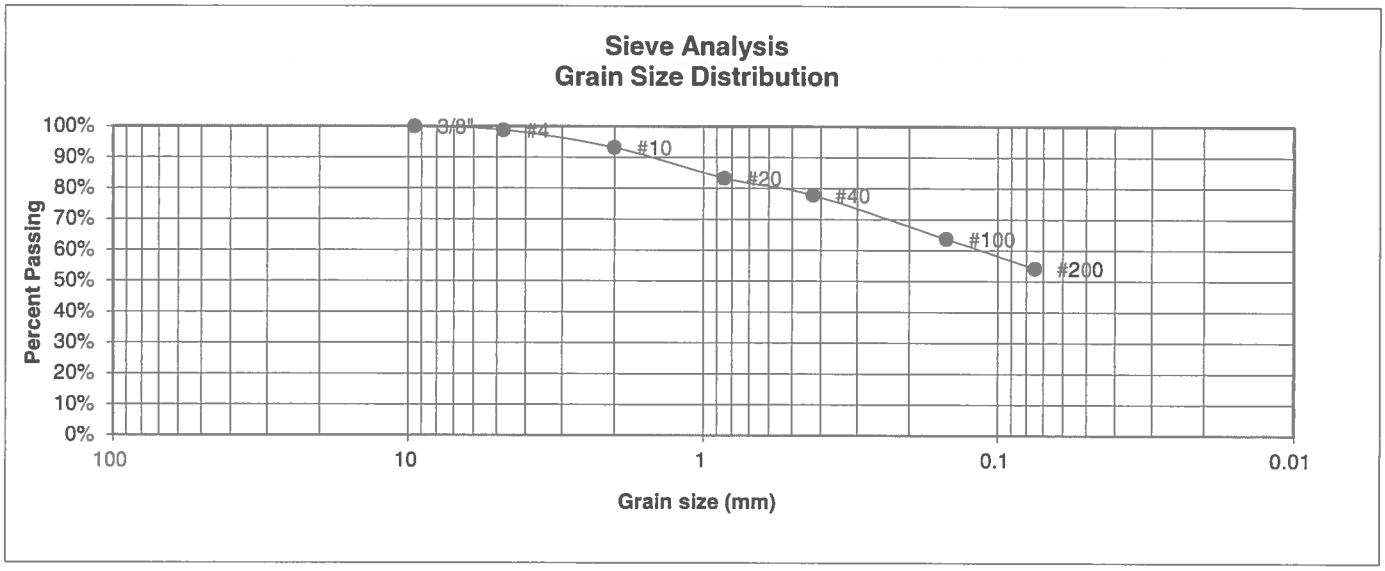
TEST PIT LOG

DRAWN:	DATE:	CHECKED:	DATE:

JOB NO.: 181823
FIG NO.: 4

BORING NO.	41	UNIFIED CLASSIFICATION	CL	TEST BY	BL
DEPTH(ft)	3-6	AASHTO CLASSIFICATION		JOB NO.	181823
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	CURTIS RD AND JUGRE ORR RD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.8%
10	93.2%
20	83.3%
40	77.8%
100	63.7%
200	54.2%

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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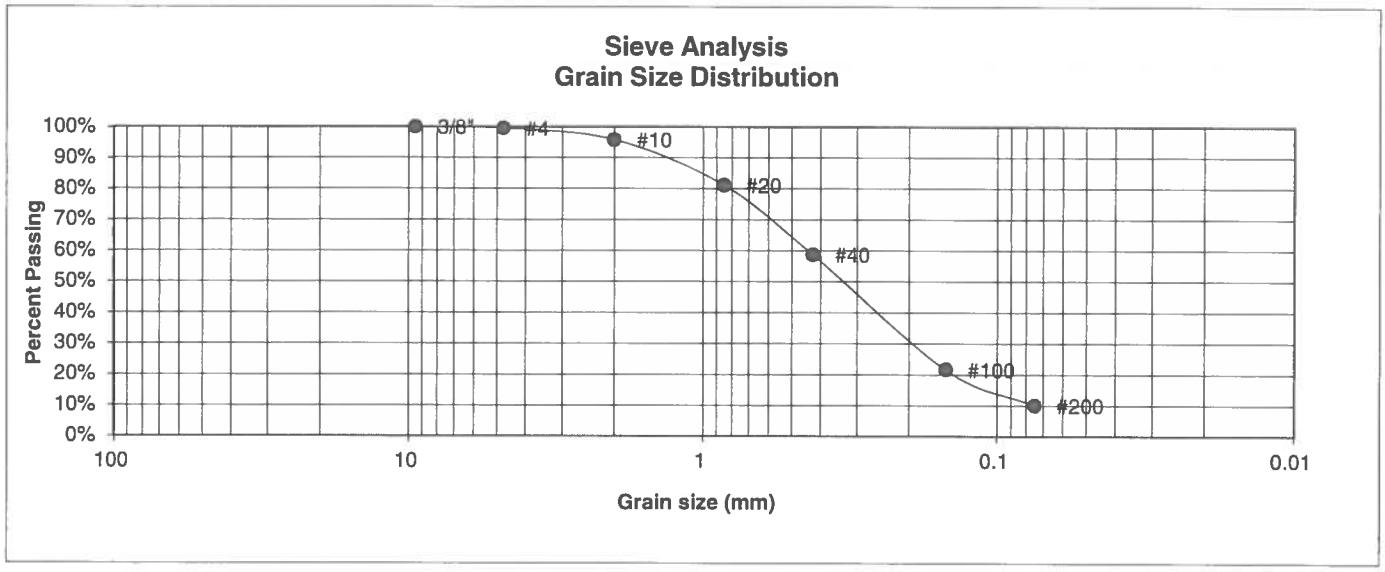
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/17/19

JOB NO.: 181823

FIG NO.: 4

BORING NO.	42	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	181823
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	CURTIS RD AND JUGRE ORR RD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	95.8%
20	81.1%
40	58.7%
100	21.6%
200	10.1%

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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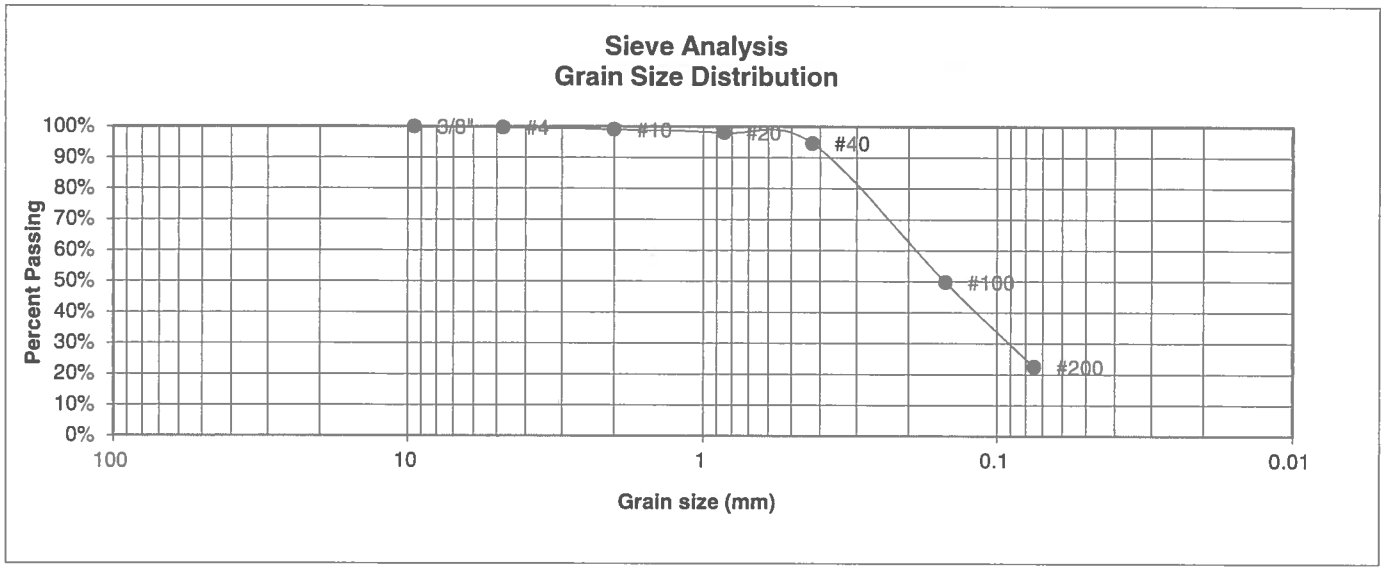
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/17/19

JOB NO.: 181823

FIG NO.: 5

BORING NO.	43	UNIFIED CLASSIFICATION	SC	TEST BY	BL
DEPTH(ft)	7-9	AASHTO CLASSIFICATION		JOB NO.	181823
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	CURTIS RD AND JUGRE ORR RD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.7%
10	99.0%
20	98.0%
40	94.7%
100	49.8%
200	22.5%

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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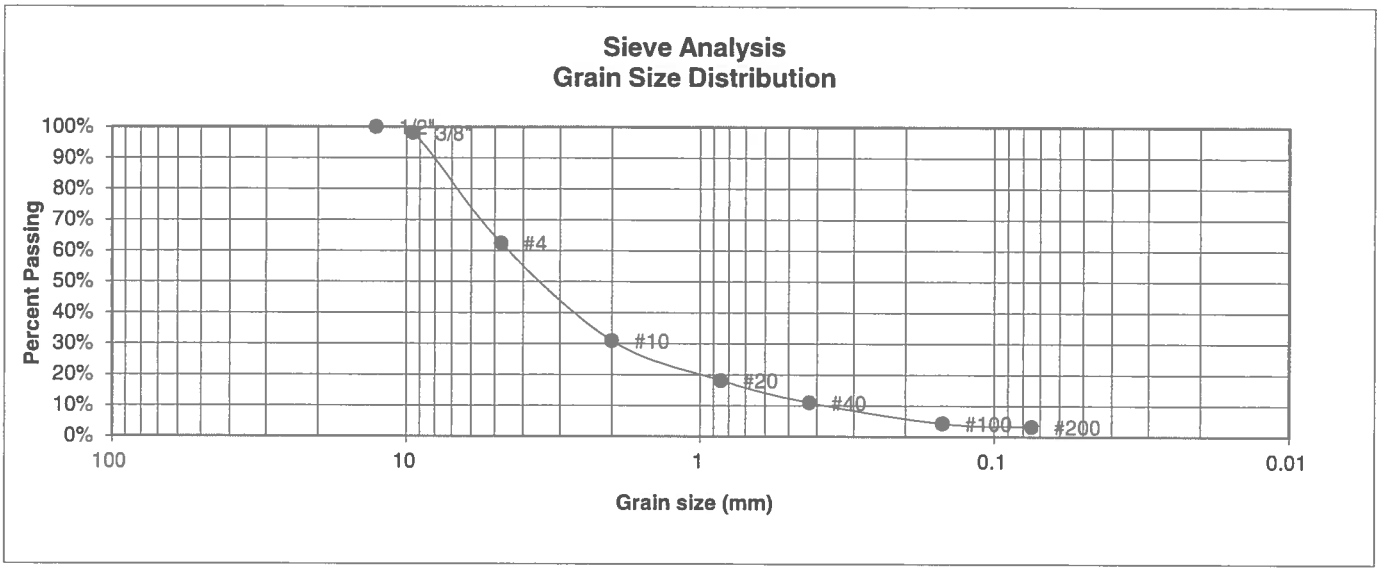
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/17/19

JOB NO.: 181823

FIG NO.: 6

BORING NO.	44	UNIFIED CLASSIFICATION	SW	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	181823
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	CURTIS RD AND JUGRE ORR RD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.1%
4	62.4%
10	30.9%
20	18.2%
40	11.0%
100	4.3%
200	3.3%

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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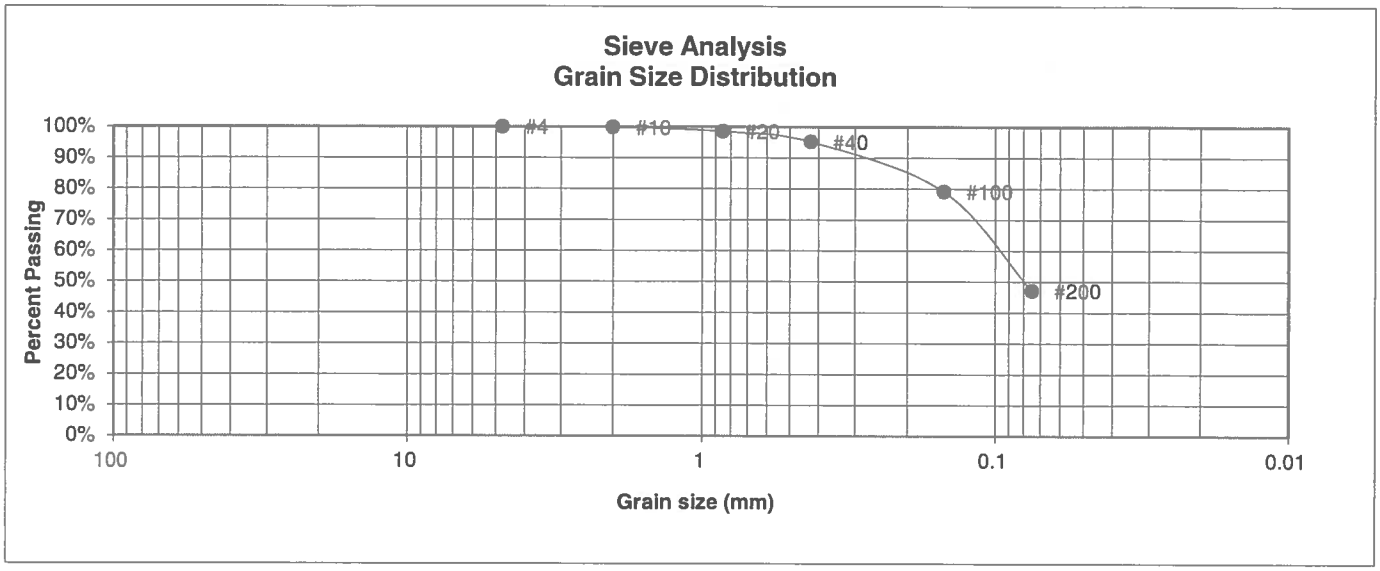
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		LLL	5/17/19

JOB NO.: 181823

FIG NO.: 7

BORING NO.	45	UNIFIED CLASSIFICATION	SC	TEST BY	BL
DEPTH(ft)	5-6	AASHTO CLASSIFICATION		JOB NO.	181823
CLIENT	GUMAN AND ASSOCIATES				
PROJECT	CURTIS RD AND JUGRE ORR RD				



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.9%
20	98.5%
40	95.2%
100	79.1%
200	47.1%

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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LABORATORY TEST RESULTS

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JOB NO.: 181823

FIG NO.: 8