



Memorandum

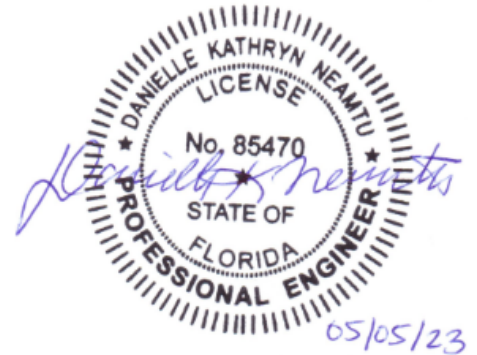
To: *St. Johns River Water Management District*

From: *Seth Foster*

Reviewed By: *Danielle K. Neamtu, PE*

Date: *May 5, 2023*

Subject: *Addendum to Geotechnical Data Report for Aquifer Recharge System
Black Creek Water Resource Development Project in Clay County,
Florida.*



Introduction

This memorandum is an addendum to the previous Black Creek Water Resource Development Project Intake, Pump Station, and Aquifer Recharge System Geotechnical Data Report (GDR) dated May 2022 and the Raw Water Transmission GDR dated June 2022.

Project Background

The Black Creek Water Resources Development (WRD) project consists of three primary components; the Intake and Pump Station, approximately 16 miles of 30-inch-diameter raw water line, and an Aquifer Recharge System (ARS). The ARS has been reconfigured since the original design issued in 2018 and this report provides supplemental geotechnical data for crossing of the gas line easement and the new water storage tank area.

Project Datum

The elevations (El.) noted herein are in feet and referenced to the North American Vertical Datum of 1988 (NAVD 88).

Purpose and Scope

The purpose of this addendum is to provide the supplemental geotechnical data collected during recent investigation at the ARS site. Specifically, the scope of work included the following:

- Review available subsurface information;
- Conduct a subsurface exploration program for the proposed tank site and easement crossing consisting of four (4) test borings to evaluate subsurface conditions and obtain soil samples for laboratory testing;
- Conduct laboratory tests on select soil samples to assist with classification of soils encountered and determine engineering properties; and

- Prepare this memorandum presenting geotechnical data collected as part of the investigation.

Site and Subsurface Conditions

Site Conditions

The gas line easement runs roughly north-south on the west side of Treat Road. The easement is approximately 90-foot-wide and contains three 24- to 30-inch-diameter steel gas lines as shown on the Contract Drawings. The tank site consists of a relatively level tree and grass covered lot located approximately 5,000 feet Southeast of Crystal Lake and 2,000 feet south of Magnolia Lake.

Geologic Setting

The project site lies within the Cypresshead Formation according to the United States Geological Survey (USGS). The Cypresshead Formation is a shallow marine, near shore deposit equivalent to the Citronelle Formation deltaic sediments and the Miccosukee Formation prodeltaic sediments. The Cypresshead Formation consists of reddish brown to reddish orange, unconsolidated to poorly consolidated, fine to very coarse grained, clean to clayey sands." It is common to have cross bedded sands, mica, and discooid quartzite pebbles within this formation. Clay beds are sparsely scattered throughout. The presence of trace fossils is indicative of a marine depositional environment. The permeable sands of the Cypresshead Formation form part of the surficial aquifer system." (USGS, 2023) There are no known active faults in the project site according to the USGS Quaternary Faults Database.

Subsurface Exploration Program

The subsurface exploration program conducted for the tank site and gas easement crossing consisted of four test borings drilled by CSI Geo, Inc. (CSI) of Jacksonville, Florida. Test borings GB-1 and B-2 were drilled on September 16, 2022 and TB-1 and TB-2 on September 19, 2022 using a ATV-mounted CME 45 drill rig. The test borings were drilled using 4 1/4 inch inside-diameter (ID) hollow stem augers. The test borings were drilled to approximate depths ranging from 30.0 to 60.0 feet below ground surface (ft-bgs).

Split spoon sampling was conducted continuously for the first 10 feet and 5-foot intervals thereafter to the depth of boring in accordance with American Society for Testing and Materials (ASTM) D1586 (using a 2-inch OD sampler driven 18 inches by blows from a 140-pound safety hammer falling freely for 30 inches). The number of blows required to drive the sampler each 6-inch increment was recorded, and the Standard Penetration Resistance (N-value) was determined as the sum of the blows for the second and third 6-inch increments. Split spoon refusal, defined as less than 6 inches of penetration for 50 blows from a 140-pound safety hammer, and was not encountered at any of the four boring locations.

A CSI geotechnical engineer visually classified the soil samples in accordance with the Unified Soil Classification Systems (ASTM D2488). Representative soil samples from each split spoon were collected and stored in bags for subsequent review and laboratory testing.

The test borings were located, and ground surface elevations were determined by a field survey. The test boring locations are shown in **Attachment A**.

Groundwater levels at the test boring locations were estimated from the condition of samples obtained and by observed water levels within a borehole at the time of drilling. Upon completion, all test borings were backfilled with soil cuttings to the ground surface.

Boring logs for BG-1, BG-2, TB-1 and TB-2, were prepared by CSI and are included in **Attachment B**.

Geotechnical Laboratory Testing

Geotechnical laboratory tests were performed on select split spoon samples obtained from the recent test borings. Moisture content and hydrometer tests was performed in accordance with ASTM D4442 and D7928, respectively. The purpose of these tests was to assist with soil classification and to assign soil parameters to use in engineering analyses. Results of the geotechnical laboratory testing are summarized in **Table 1**. The complete geotechnical laboratory test results are included as **Attachment C**.

Table 1 Geotechnical Laboratory Test Result Summary

Test Boring No	Sample Depth (ft-bgs)	Moisture Content (%)	Grain Size				Soil Classification Symbol
			% Gravel	% Sand	% Silt	% Clay	
GB-1	4.0	4	0.0	97	3	SP	
GB-1	8.0	4	0.0	97	3	SP	
GB-1	13.5	17	0.0	82	18	SM	
GB-1	18.5	9	0.0	87	13	SM	
GB-2	4.0	4	0.0	97	3	SP	
GB-2	8.0	6	0.0	95	5	SP	
GB-2	13.5	16	0.0	93	7	SP-SM	
GB-2	18.5	16	0.0	83	17	SM	
TB-1	4.0	4	0.0	98	2	SP	
TB-1	9.0	1	0.0	97	3	SP	
TB-1	19.0	9	0.0	83	17	SM	
TB-1	21.5	9	0.0	92	8	SP	
TB-1	31.5	21	0.0	89	11	SP-SM	
TB-1	41.5	14	0.0	90	10	SP-SM	
TB-2	4.0	4	0.0	98	2	SP	
TB-2	8.0	4	0.0	96	4	SP	
TB-2	18.5	15	0.0	82	18	SM	
TB-2	21.5	17	0.0	85	13	SM	

Report Limitations

This report has been prepared for the exclusive use of the Black Creek Water Resources Development Project in Clay County, Florida, as understood at this time and described in this report. The data presented in this report are based on subsurface conditions encountered at the time of CDM Smith's study and on experience and engineering judgement. While the data provided in this report is based on investigations and test data, they should not be interpreted as a guarantee or warranty that the conditions encountered during construction will be completely as described. Furthermore, CDM Smith cannot be held responsible for the interpretation by others of the data contained herein.

Within the limitations of scope, schedule, and budget, CDM Smith's services have been performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, expressed or implied, is made.

Attachments

- Attachment A Test Boring Locations
- Attachment B Test Boring Logs
- Attachment C Geotechnical Laboratory Test Results

References

United States Geological Survey (USGS). 2023. *Geology by State, Florida - Cypresshead Formation* <https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=FLPOc%3B0#:~:text=The%20Cypresshead%20Formation%20consists%20of,scattered%20and%20not%20areally%20extensive>. Accessed February 22, 2023.

United States Geological Survey (USGS). 2018. *Quaternary Fault and Fold Database of the United States Website*, <https://earthquake.usgs.gov/hazards/interactive/>. Accessed February 22, 2023.

Attachment A

Test Boring Locations

XREFS: [CWP0000P, CDMS_2234, CWP001ST, ANZ0000PS - Floor Plan - 2D, ANZ0000EB - Floor Plan - 2D, ANZ0000ST, CWP0000S, SWZ0000S, MWZ0000S, CWZ0000S, CWZ0000ST, CWP0000ST, ARA_SOIL BORINGS, CEP0000S] Images: [GoogleEarth_image]
 Last saved by: SCOTTVC Time: 4/15/2023 2:42:17 PM
 pw:\cdm\smith-0202-pw.bentley.com\pw_p119247\221208_PHASE 2 INTAKE PS\04 Design Services NM_100%\02 Civil\10 CADD\05 Aquifer Recharge Area Design\Figures 2021\Fig 4.DWG
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TREATMENT CELL AREA
PLAN

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: C. MONTGOMERY
 DRAWN BY: C. SCOTT
 SHEET CHK'D BY: C. MONTGOMERY
 CROSS CHK'D BY: J. WITIG
 APPROVED BY: S. WOODS
 DATE: MARCH 2023



ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
 BLACK CREEK WATER RESOURCE
 DEVELOPMENT PROJECT
 AQUIFER RECHARGE AREA

BORING LOCATION PLAN
 SHEET NO.
FIG 4

DATE: CRAIG C MONTGOMERY
 PE NO. 45953

PROJECT NO. 9247-221208
 FILE NAME: FIGURE 4

SHEET NO.
FIG 4

Attachment B

Test Boring Logs

CSI Geo, Inc.
 2394 St. Johns Bluff Rd. S
 Jacksonville, Florida 32246

N=1993424.626
E=331488.506

SPT BORING NO. GB-1
 PAGE 1 OF 1

CLIENT CDM Smith, Inc. PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01 PROJECT LOCATION Clay County, Florida

DATE STARTED 9/16/22 COMPLETED 9/16/22

LAT.: 29°48'47.38"N LONG.: 82° 1'13.36"W

GROUND ELEVATION: _____ HAMMER TYPE: Auto Hammer

GROUND WATER LEVEL: 29.81316' 82.02378'

NOTES: _____

▽ ESHWL --- Not Encountered

▽ GWT --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE NUMBER	PENETRATION BLOWS				(N VALUE)	▲ SPT N VALUE ▲					
				1st 6"	2nd 6"	3rd 6"	4th 6"		20	40	60	80		
0														
		Light Brown Fine SAND (SP) with trace of roots	1	1	1	1	1	2						
			2	1/18"			1	1/18"						
5			3	1	1	1	2	2						
		Light Tan Fine SAND (SP)	4	1	1	1	2	2						
			5	2	3	3	5	6						
10														
			6	3	3	3		6						
15														
		Orange and Gray Silty Medium to Fine SAND (SM)												
			7	4	7	10		17						
20														
			8	12	14	14		28						
25														
		Reddish Brown Clayey Medium to Fine SAND (SC)												
			9	10	12	15		27						
30														

Boring Terminated at 30.0 feet.

CSI Geo, Inc.
 2394 St. Johns Bluff Rd. S
 Jacksonville, Florida 32246

N=1993414.022
E=332684.176

SPT BORING NO. GB-2
 PAGE 1 OF 1

CLIENT CDM Smith, Inc. PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01 PROJECT LOCATION Clay County, Florida

DATE STARTED 9/16/22 COMPLETED 9/16/22 LAT.: 29°48'47.39"N LONG.: 82° 1'12.20"W

GROUND ELEVATION: _____ HAMMER TYPE: Auto Hammer GROUND WATER LEVEL: 29.81316° 82.02001°

NOTES: _____
 ESHWL --- Not Encountered
 GWT --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE NUMBER	PENETRATION BLOWS				(N VALUE)	▲ SPT N VALUE ▲					
				1st 6"	2nd 6"	3rd 6"	4th 6"		20	40	60	80		
0														
1		Light Tan Fine SAND (SP)	1	1	1	1	2	2						
2			2	1	1	1	1	2						
3			3	1	1	1	1	2						
4			4	1	1	1	1	2						
5			5	1	2	2	2	4						
6		Orange and Tan Slightly Silty Fine SAND (SP-SM)	6	2	3	4		7						
7			7	2	5	6		11						
8		Orange and Tan Silty Coarse to Fine SAND (SM) (MARL)	8	7	13	15		28						
9			9	8	15	17		32						
10			10											

Boring Terminated at 30.0 feet.

CSI Geo, Inc.
 2394 St. Johns Bluff Rd. S
 Jacksonville, Florida 32246

N=1993432.221 SPT BORING NO. TB-1
E=332272.005
 PAGE 1 OF 1

CLIENT CDM Smith, Inc. PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01 PROJECT LOCATION Clay County, Florida

DATE STARTED 9/19/22 COMPLETED 9/19/22 LAT.: 29°48'47.52"N LONG.: 82° 1'16.71"W

GROUND ELEVATION: _____ HAMMER TYPE: Auto Hammer GROUND WATER LEVEL: 29.8132° 82.02131°

NOTES: _____ ESHWL --- Not Encountered

GWT --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE NUMBER	PENETRATION BLOWS				(N VALUE)	▲ SPT N VALUE ▲						
				1st 6"	2nd 6"	3rd 6"	4th 6"		20	40	60	80			
0															
		Light Tan Fine SAND (SP)	1	1	1	1	1	6							
			2	1/12"		1/12"		1/12"							
			3	1	1	1	2	2							
			4	1	1	1	1	2							
10			5	1	2	1	2	3							
		6	2	5	9		14								
		Reddish Brown Silty Coarse to Fine SAND (SM) with few clay seams	7	7	8	9	17								
20			8	6	10	18	28								
		Tan and Orange Coarse to Fine SAND (SP) with trace of clay seams	9	7	8	12	20								
30			10	7	10	13	23								
			11	6	11	12	23								
		Light Gray Slightly Silty Fine SAND (SP-SM)	12	4	14	14	28								
40			13	7	10	15	25								
			14	8	12	17	29								
50			15	7	10	15	25								
60															

Boring Terminated at 60.0 feet.

CSI Geo, Inc.
 2394 St. Johns Bluff Rd. S
 Jacksonville, Florida 32246

N=1993454.043
E=332272.198

T BORING NO. TB-2
 PAGE 1 OF 1

CLIENT CDM Smith, Inc. PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01 PROJECT LOCATION Clay County, Florida

DATE STARTED 9/19/22 COMPLETED 9/19/22 LAT.: 29°48'47.73"N LONG.: 82° 1'16.72"W

GROUND ELEVATION: _____ HAMMER TYPE: Auto Hammer GROUND WATER LEVEL: 29.81326° 82.02131°

NOTES: _____

▽ ESHWL --- Not Encountered

▼ GWT --- Not Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE NUMBER	PENETRATION BLOWS				(N VALUE)	▲ SPT N VALUE ▲					
				1st 6"	2nd 6"	3rd 6"	4th 6"		20	40	60	80		
0														
			1	1	1	1	1	2						
			2	1/12"		1/12"		1/12"						
5			3	1	1	1	1	2						
			4	1	1	1	2	2						
			5	2	3	3	5	6						
10														
			6	3	4	7		11						
15														
			7	8	8	8		16						
20														
		8	7	9	12		21							
25														
		9	8	8	11		19							
30														

Boring Terminated at 30.0 feet.



CSI Geo, Inc.
 2394 St. Johns Bluff Road
 Jacksonville, FL 32246
 Telephone: 904-641-1993
 Fax: 904-645-0057

SPT BORING NO. B-12

PAGE 1 OF 1

CLIENT CDM Smith, Inc.
 PROJECT NUMBER 71-17-127-01
 DATE STARTED 10/19/17 COMPLETED 10/19/17
 DRILLING CONTRACTOR CSI Geo, Inc.
 DRILLING METHOD Auto Hammer
 LOGGED BY BM CHECKED BY NA
 NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
 PROJECT LOCATION Clay County, Florida
 GROUND ELEVATION _____ HOLE SIZE 3.0 inches
 GROUND WATER LEVELS:
 ESHWL ---
 GWT --- GNE

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 11/17/17 10:46 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\BLACK CREEK.GPJ

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
1		1	LIGHT BROWN FINE SAND (SP)	-	-	-	-	H.A.						
2		2		-	-	-	-	H.A.						
3		3		1	2	2	2	4						
4		4		1	1	3	4	4						
5		5		4	5	6	7	11						
6		6	REDDISH BROWN CLAYEY FINE SAND (SC)	6	7	9		16						
7		7	LIGHT BROWN SILTY FINE SAND (SM)	8	10	11		21						

Boring Terminated at 20.0 feet.



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SPT BORING NO. B-14

PAGE 1 OF 1

CLIENT CDM Smith, Inc.
 PROJECT NUMBER 71-17-127-01
 DATE STARTED 10/18/17 COMPLETED 10/18/17
 DRILLING CONTRACTOR CSI Geo, Inc.
 DRILLING METHOD Auto Hammer
 LOGGED BY BM CHECKED BY NA
 NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
 PROJECT LOCATION Clay County, Florida
 GROUND ELEVATION _____ HOLE SIZE 3.0 inches
 GROUND WATER LEVELS:
 ESHWL ---
 GWT --- GNE

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 11/17/17 10:46 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\BLACK CREEK.GPJ

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
1		1	LIGHT BROWN FINE SAND (SP)	-	-	-	-	H.A.						
2		2		-	-	-	-	H.A.						
3		3		1	2	2	2	4						
4		4		3	4	6	8	10						
5			REDDISH BROWN CLAYEY FINE SAND (SC)	9	11	13	18	24						
10		5												
15		6	LIGHT BROWN FINE SAND (SP)	10	13	18		31						
20		7	REDDISH BROWN CLAYEY FINE SAND (SC)	10	12	12		24						

Boring Terminated at 20.0 feet.



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SPT BORING NO. B-19

PAGE 1 OF 1

CLIENT CDM Smith, Inc.
 PROJECT NUMBER 71-17-127-01
 DATE STARTED 10/19/17 COMPLETED 10/19/17
 DRILLING CONTRACTOR CSI Geo, Inc.
 DRILLING METHOD Auto Hammer
 LOGGED BY BM CHECKED BY NA
 NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
 PROJECT LOCATION Clay County, Florida
 GROUND ELEVATION _____ HOLE SIZE 3.0 inches
 GROUND WATER LEVELS:
 ESHWL ---
 GWT --- GNE

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 11/17/17 10:46 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\BLACK CREEK.GPJ

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
1		1	LIGHT BROWN FINE SAND (SP)	-	-	-	-	H.A.						
2		2		-	-	-	-	H.A.						
3		3		2	3	2	2	5						
4		4		2	1	3	3	4						
5		5		4	6	7	7	13						
6		6	REDDISH BROWN CLAYEY FINE SAND (SC)	6	10	15		25						
7		7	BROWN FINE SAND (SP-SC) WITH FEW CLAY SEAMS	12	16	17		33						

Boring Terminated at 20.0 feet.



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SPT BORING NO. B-24

PAGE 1 OF 1

CLIENT CDM Smith, Inc.
PROJECT NUMBER 71-17-127-01
DATE STARTED 10/18/17 **COMPLETED** 10/18/17
DRILLING CONTRACTOR CSI Geo, Inc.
DRILLING METHOD Auto Hammer
LOGGED BY BM **CHECKED BY** NA
NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
PROJECT LOCATION Clay County, Florida
GROUND ELEVATION _____ **HOLE SIZE** 3.0 inches
GROUND WATER LEVELS:
ESHWL ---
GWT --- GNE

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 11/17/17 10:46 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\PROJECTS\BLACK CREEK.GPJ

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
1		1	LIGHT BROWN FINE SAND (SP)	-	-	-	-	H.A.						
2		2		-	-	-	-	H.A.						
3		3		1	1	2	1	3						
4		4		2	2	5	6	7						
5		5	REDDISH BROWN TO BROWN FINE SAND (SP) WITH TRACE OF CLAY SEAMS	12	13	13	13	26						
10		6		BROWN TO REDDISH BROWN SILTY FINE SAND (SM) (MARL) WITH TRACE OF CLAY SEAMS	10	12	15		27					
15		7	10		13	16		29						
20														

Boring Terminated at 20.0 feet.



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SPT BORING NO. B-25

PAGE 1 OF 1

CLIENT CDM Smith, Inc.
PROJECT NUMBER 71-17-127-01
DATE STARTED 10/19/17 **COMPLETED** 10/19/17
DRILLING CONTRACTOR CSI Geo, Inc.
DRILLING METHOD Auto Hammer
LOGGED BY BM **CHECKED BY** NA
NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
PROJECT LOCATION Clay County, Florida
GROUND ELEVATION _____ **HOLE SIZE** 3.0 inches
GROUND WATER LEVELS:
ESHWL ---
GWT --- GNE

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 11/17/17 10:46 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\BLACK CREEK.GPJ

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
		1		-	-	-	-	H.A.						
		2		-	-	-	-	H.A.						
5		3	LIGHT BROWN FINE SAND (SP)	1	1	1	1	2						
		4		2	1	3	3	4						
10		5		4	5	5	6	10						
		6	REDDISH BROWN CLAYEY FINE SAND (SC)	7	7	10		17						
15		7	LIGHT BROWN SILTY FINE SAND (SM)	10	9	9		18						
20														

Boring Terminated at 20.0 feet.



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 Fax: 904-645-0057

SPT BORING NO. B-108

PAGE 1 OF 2

CLIENT CDM Smith, Inc.
 PROJECT NUMBER 71-17-127-01
 DATE STARTED 5/24/18 COMPLETED 5/24/18
 DRILLING CONTRACTOR CSI Geo, Inc.
 DRILLING METHOD Auto Hammer
 LOGGED BY BM CHECKED BY NA
 NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
 PROJECT LOCATION Clay County, Florida
 GROUND ELEVATION _____ HOLE SIZE 3.0 inches
 GROUND WATER LEVELS:
 ▽ ESHWL 4.00 ft
 ▼ GWT 6.00 ft

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲										
									20	40	60	80							
0																			
		1	LIGHT BROWN FINE SAND (SP)	1	1	2	1	3											
		2	TAN FINE SAND (SP)	2	1	1	3	2											
5		3		3	4	4	6	8											
		4	BROWN AND ORANGE CLAYEY FINE SAND (SC)	8	7	7	8	14											
10		5		6	7	9	9	16											
		6		8	9	12		21											
15		7	LIGHT GRAY AND TAN SILTY FINE SAND (SM)	7	9	10		19											
20		8		8	12	13		25											
25		9		8	10	14		24											
30		10		10	12	14		26											
35																			

(Continued Next Page)



CSI Geo, Inc.
 2394 St. Johns Bluff Road
 Jacksonville, FL 32246
 Telephone: 904-641-1993
 Fax: 904-645-0057

SPT BORING NO. B-108

CLIENT CDM Smith, Inc.

PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01

PROJECT LOCATION Clay County, Florida

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
35														
			LIGHT GRAY AND TAN SILTY FINE SAND (SM) <i>(continued)</i>											
40		11		12	10	13		23						
45		12		10	15	18		33						
50		13	LIGHT GRAY FINE SAND (SP)	14	17	20		37						
55		14		10	16	21		37						
60		15		8	15	23		38						
65		16	LIGHT BRYOWN SILTY FINE SAND (SM)	11	13	16		29						
70		17		12	18	22		40						
75		18	LIGHT GRAY FINE SAND (SP)	16	21	24		45						

Boring Terminated at 75.0 feet.



CSI Geo, Inc.
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SPT BORING NO. B-109

PAGE 1 OF 2

CLIENT CDM Smith, Inc.
PROJECT NUMBER 71-17-127-01
DATE STARTED 5/24/18 **COMPLETED** 5/24/18
DRILLING CONTRACTOR CSI Geo, Inc.
DRILLING METHOD Auto Hammer
LOGGED BY BM **CHECKED BY** NA
NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
PROJECT LOCATION Clay County, Florida
GROUND ELEVATION _____ **HOLE SIZE** 3.0 inches
GROUND WATER LEVELS:
 ▽ **ESHWL** 3.00 ft
 ▼ **GWT** 6.00 ft

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
1		1	BROWN FINE SAND (SP)	1	2	2	2	4						
2		2	LIGHT BROWN FINE SAND (SP)	2	2	3	2	5						
3		3		3	4	6	5	10						
4		4		5	5	6	7	11						
5		5	BROWN AND ORANGE CLAYEY FINE SAND (SC)	6	8	8	8	16						
6		6		7	8	10		18						
7		7	LIGHT GRAY AND TAN SILTY FINE SAND (SM)	10	13	16		29						
8		8		9	13	17		30						
9		9		11	13	15		28						
10		10	LIGHT GRAY FINE SAND (SP)	6	12	18		30						
35														

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SPT BORING NO. B-109

PAGE 2 OF 2

CLIENT CDM Smith, Inc.

PROJECT NAME Black Creek Water Resource Development Project

PROJECT NUMBER 71-17-127-01

PROJECT LOCATION Clay County, Florida

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
35														
40		11	LIGHT GRAY FINE SAND (SP) (continued)	12	19	24		43						
45		12		13	19	27		46						
50		13		16	29	32		61						
55		14		18	21	19		40						
60		15	GRAY FINE SAND (SP)	16	19	20		39						
65		16		10	12	17		29						
70		17		12	14	19		33						
75		18		14	19	23		42						

Boring Terminated at 75.0 feet.

SPT (PENETRATION BLOWS) W/OUT ELEV. - GINT STD US LAB.GDT - 5/25/18 12:58 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\BLACK CREEK.GPJ



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SPT BORING NO. B-110

PAGE 1 OF 2

CLIENT CDM Smith, Inc.
 PROJECT NUMBER 71-17-127-01
 DATE STARTED 5/16/18 COMPLETED 5/16/18
 DRILLING CONTRACTOR CSI Geo, Inc.
 DRILLING METHOD Auto Hammer
 LOGGED BY BM CHECKED BY NA
 NOTES _____

PROJECT NAME Black Creek Water Resource Development Project
 PROJECT LOCATION Clay County, Florida
 GROUND ELEVATION _____ HOLE SIZE 3.0 inches
 GROUND WATER LEVELS:
 ESHWL ---
 GWT --- GNE _____

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	1st 6"	2nd 6"	3rd 6"	4th 6"	(N VALUE)	▲ SPT N VALUE ▲					
									20	40	60	80		
0														
		1	GRAY AND BROWN FINE SAND (SP) WITH TRACE OF ROOTS	2	2	2	3	4						
		2	BROWN AND ORANGE SLIGHTLY CLAYEY FINE SAND (SP-SC)	4	3	3	4	6						
5		3		5	9	8	10	17						
		4		12	11	12	13	23						
		5		8	8	8	9	16						
10		6		5	9	9		18						
15		7	8	10	11		21							
20		8	10	13	14		27							
25		9	5	10	15		25							
30		10	11	14	16		30							
35			LIGHT GRAY FINE SAND (SP)											

(Continued Next Page)

Attachment C

Geotechnical Laboratory Test Results

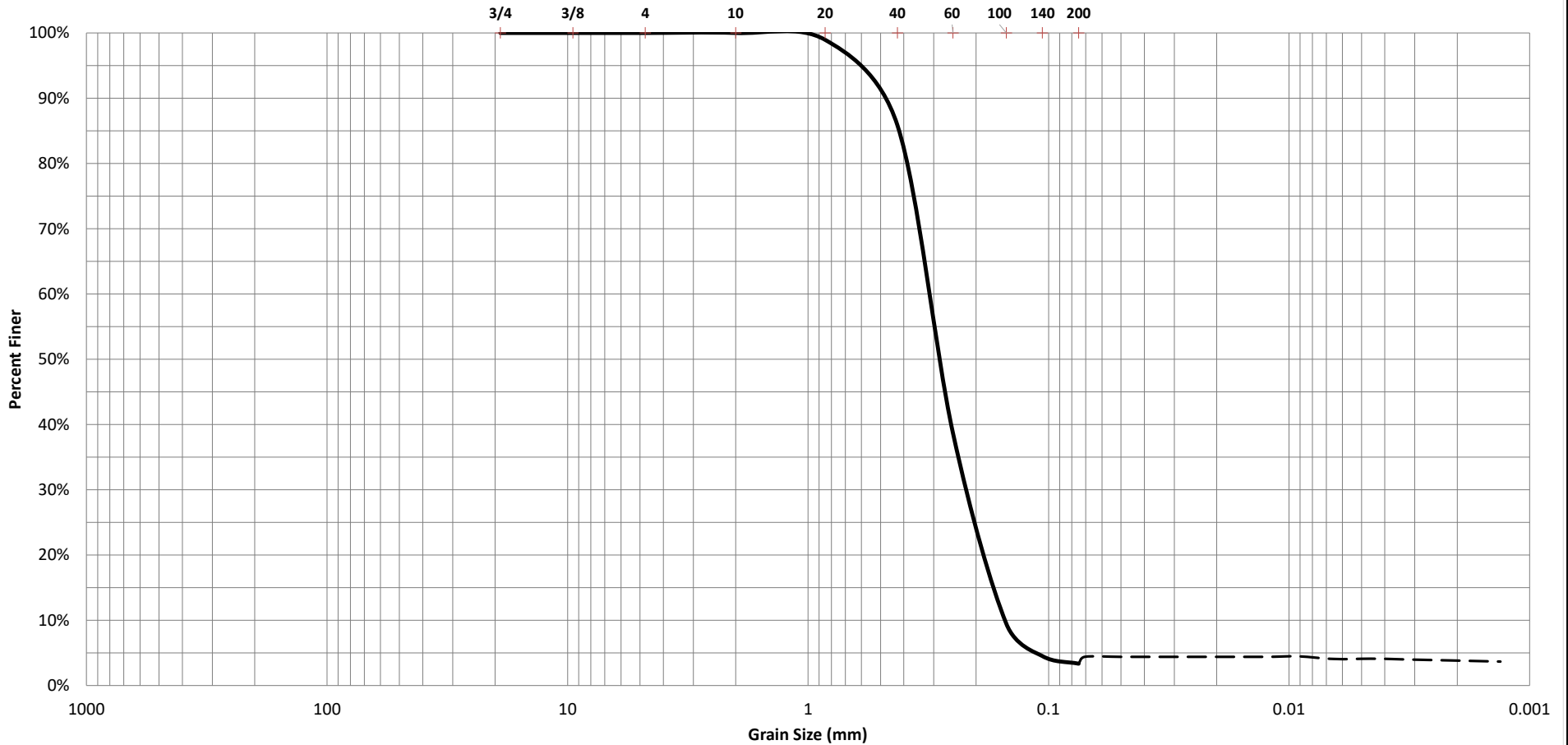
SUMMARY OF LABORATORY TEST RESULTS

**Black Creek Water Resource Development Project
Clay County, Florida**

Boring No.	Sample No.	Approximate Depth (ft)	Natural Moisture Content (%)	Percent Passing Sieve Size (%)										Soil Classification Symbol
				3/4"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200	
GB-1	3	4.0	4	100	100	100	100	99	86	39	9	5	3	SP
GB-1	5	8.0	4	100	100	100	100	99	84	34	7	4	3	SP
GB-1	6	13.5	17	100	100	100	100	99	83	40	21	19	18	SM
GB-1	7	18.5	9	100	100	100	100	91	53	23	14	13	13	SM
GB-2	3	4.0	4	100	100	100	100	100	90	45	12	5	3	SP
GB-2	5	8.0	6	100	100	100	100	98	83	32	7	5	5	SP
GB-2	6	13.5	16	100	100	100	100	99	85	36	11	8	7	SP-SM
GB-2	7	18.5	16	100	100	100	96	71	33	18	17	17	17	SM
TB-1	3	4.0	4	100	100	100	99	88	47	11	4	2	2	SP
TB-1	5	9.0	1	100	100	100	100	97	81	36	8	4	3	SP
TB-1	7	19.0	9	100	100	100	100	88	54	31	19	18	17	SM
TB-1	8	21.5	9	100	100	100	100	86	50	22	11	9	8	SP
TB-1	10	31.5	21	100	100	100	100	99	91	56	15	12	11	SP-SM
TB-1	12	41.5	14	100	100	100	100	99	88	37	14	11	10	SP-SM
TB-2	3	4.0	4	100	100	100	100	99	89	47	11	3	2	SP
TB-2	5	8.0	4	100	100	100	100	97	79	33	9	6	4	SP
TB-2	7	18.5	15	100	100	100	100	93	65	35	20	18	18	SM
TB-2	8	21.5	17	100	100	100	100	97	80	34	15	13	13	SM

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



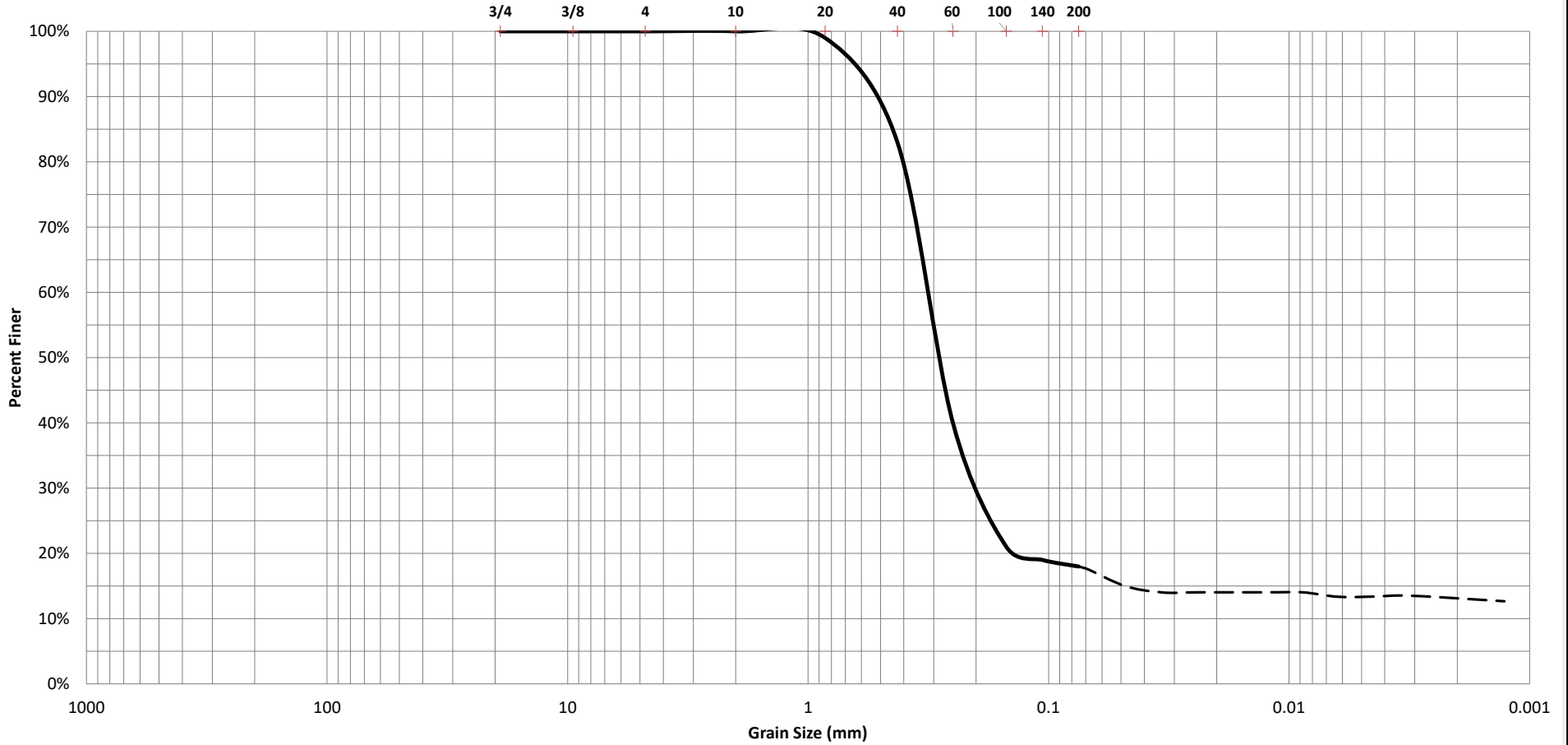
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

PROJECT NAME:	Black Creek	BORING NO. / SAMPLE NO.:	GB-1 (3)
CSI GEO PROJECT NUMBER:	71-17-127-01	DEPTH (FT.):	4'

<u>W%</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>DESCRIPTION / CLASSIFICATION</u>	CSI Geo, Inc.
4	-	-	-	Light Tan Fine SAND SP	

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

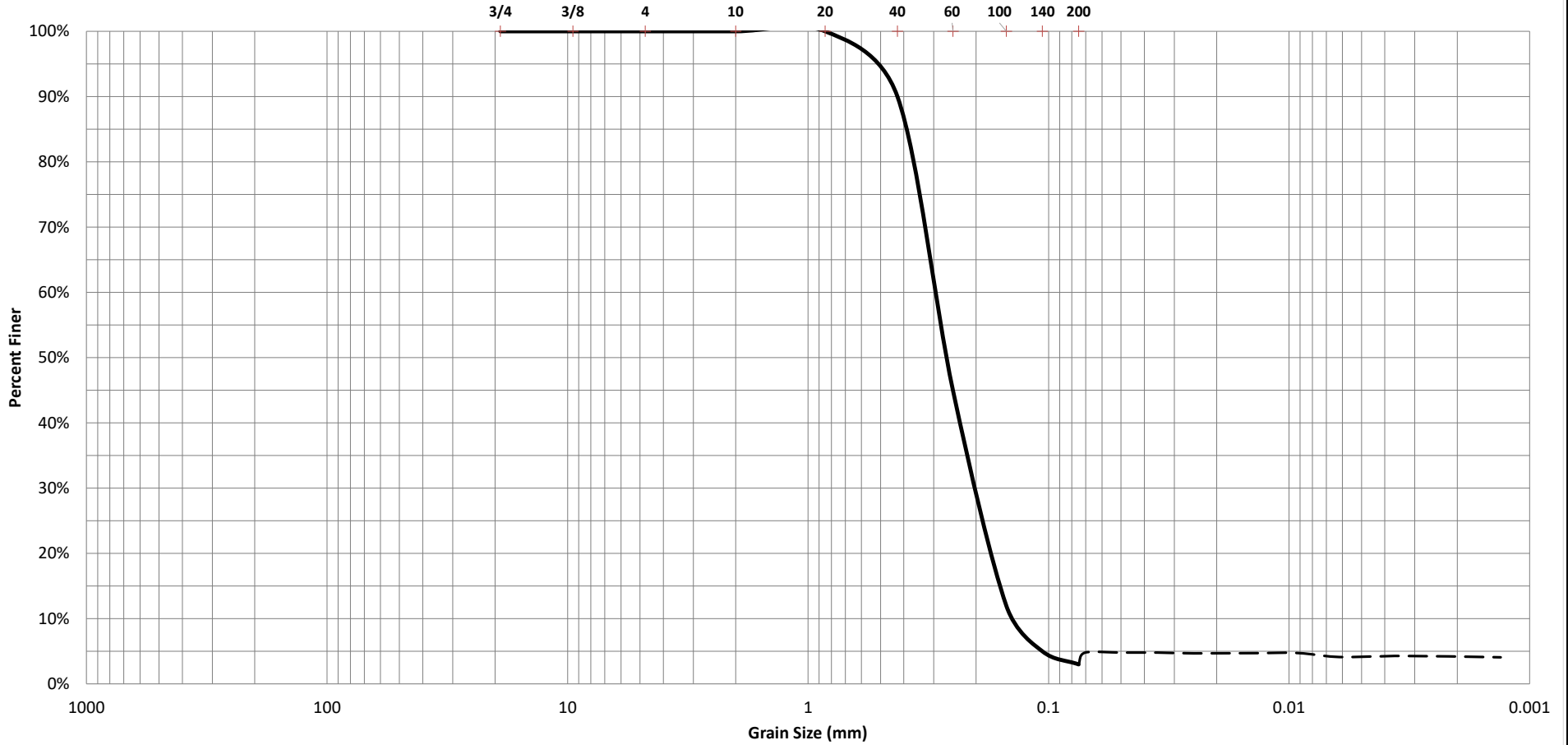
PROJECT NAME:	Black Creek	BORING NO. / SAMPLE NO.:	GB-1 (6)
CSI GEO PROJECT NUMBER:	71-17-127-01	DEPTH (FT.):	13.5'

<u>W%</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>DESCRIPTION / CLASSIFICATION</u>	
17	-	-	-	Orange and Gray Silty Medium to Fine SAND	SM

CSI Geo, Inc.

GRAIN SIZE DISTRIBUTION GRAPH

US STANDARD SIEVE SIZES



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

PROJECT NAME:	Black Creek	BORING NO. / SAMPLE NO.:	GB-2 (3)
CSI GEO PROJECT NUMBER:	71-17-127-01	DEPTH (FT.):	4'

<u>W%</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>DESCRIPTION / CLASSIFICATION</u>	
4	-	-	-	Light Tan Fine SAND	SP

CSI Geo, Inc.