

August 10, 2017



Athens Township Board of Trustee
313 West Union St
Athens, Ohio 45701

Attn: Mr. Ted J. Linscott
Office: [740] 592 1523
Cell: [740] 707 5182
Email: tlinscott@athenstwp.com

Re: Geotechnical Drilling Services
South Blackburn Road Slip
Athens County, Ohio
Terracon Project No. N475279

Mr. Linscott:

Terracon Consultants, Inc. (Terracon) is pleased to submit the soil boring logs enclosed as Exhibit A-4. We have completed drilling services to perform three test borings along South Blackburn Road in Athens County, Ohio. The approximate boring locations are illustrated on Exhibit A-3.

This services were performed in general accordance with Terracon proposal number PN4175279 dated June 21, 2017, and a supplemental change order dated July 31, 2017, via signed agreement of services.

As part of the subject project, three (3) borings were completed at locations designated by Mr. Donnie Stevens of the Athens County Engineer's Office. The field exploration phase of the current project was completed on July 11, 2017. Final boring logs are presented in Appendix A with this transmittal letter. A field exploration description is also enclosed as Exhibit A-1.

We appreciate the opportunity to be of service to you on this project. Please contact us concerning any questions that may arise during the review of the logs, or if you require additional information about this project.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in blue ink, appearing to read 'Abdul K. Mohammed'.

Abdul K. Mohammed, GISP
Geotechnical Staff Engineer

A handwritten signature in blue ink, appearing to read 'Kevin M. Ernst'.

Kevin M. Ernst, P.E.
Senior Associate/Office Manager



Terracon Consultants, Inc. 800 Morrison Road Columbus, Ohio 43230
P [614] 863 3113 F [614] 863 0475 terracon.com

Geotechnical Engineering Services

South Blackburn Road Slip ■ Athens County, Ohio
August 10, 2017 ■ Terracon Project No. N4175279



Attachments: **Appendix A**

Exhibit A-1

Exhibit A-2

Exhibit A-3

Exhibit A-4 to A-6

Field Exploration

Field Exploration Description

Site Location Plan

Boring Location Plan

Boring Logs

**APPENDIX A
FIELD EXPLORATION**

Field Exploration Description

The subsurface exploration consisted of drilling and sampling a total of three (3) test borings, designated as B-001-0-17 through B-003-0-17, to completion depths ranging from about 29 to 35 feet beneath the existing ground surface.

The boring locations were marked by Mr. Donnie Stevens of Athens County Engineer's office prior to drilling operations. Coordinates at the test boring locations and elevations were collected through GPS by Terracon after the borings were performed. The locations/ elevations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

Borings for the subject project were drilled with truck-mounted rotary drill rigs using continuous flight hollow stem augers to advance the boreholes. Samples of the soil encountered in the borings were obtained using the split-barrel sampling procedure. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound C.M.E. auto-hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is corrected to an equivalent (60 percent) energy ratio (N_{60}) utilizing the drill rod energy ratio. In accordance with the ODOT SGE, the hammer system for the CME-45B truck rig was used for this project was calibrated and has a drill rod energy ratio of 90.3 percent.

An automatic SPT hammer was used to advance the split-barrel sampler in the boring performed on this site. A significantly greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method.

The split-barrel samples were sealed in watertight glass jars. All samples were returned to the laboratory for testing and classification. Upon completion, the borings were backfilled with a cement-bentonite grout.

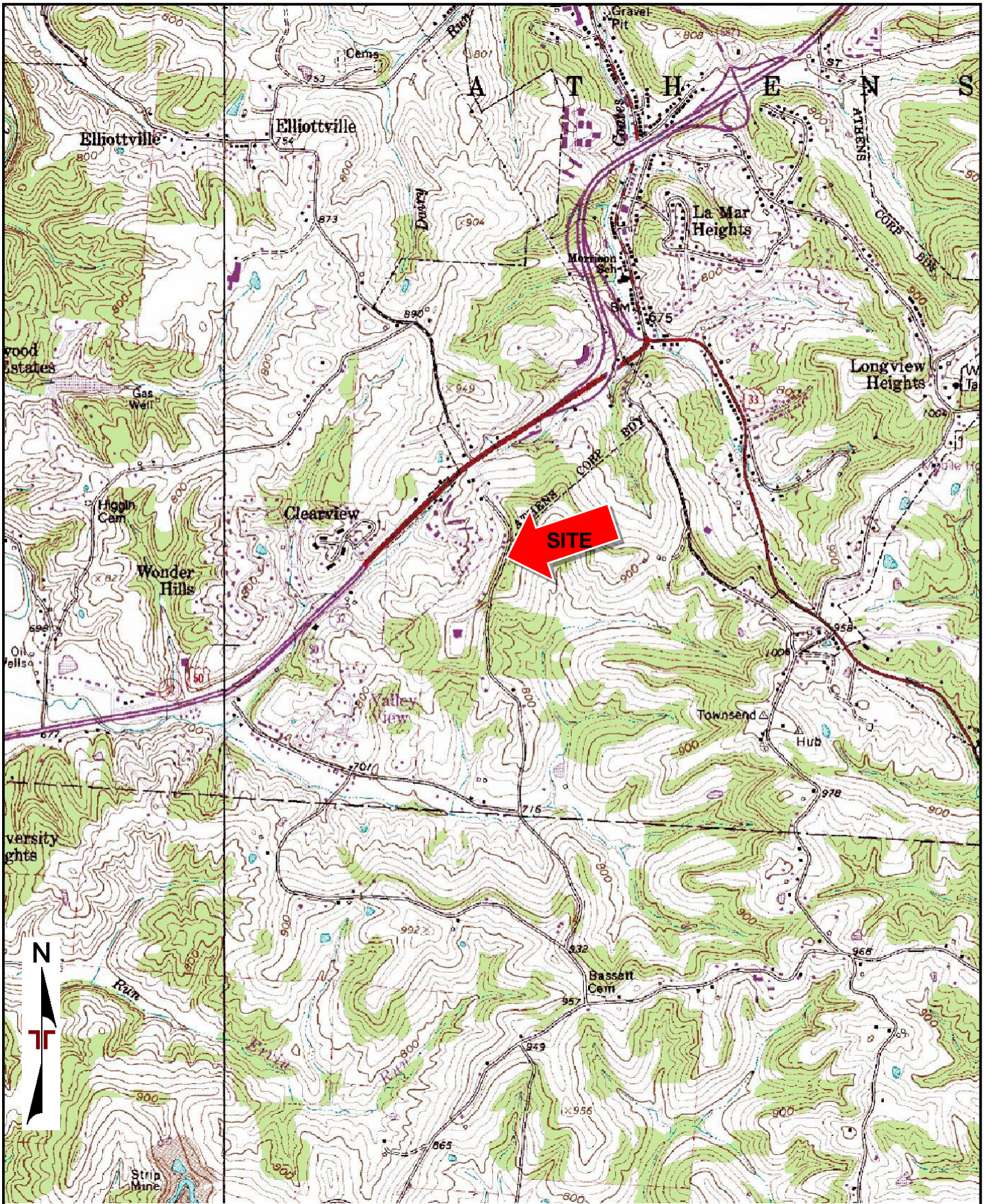
Where competent bedrock was encountered at the boring locations, as defined by auger refusal, a changeover to rock coring techniques was made. Rock coring was performed in the borings using an NQ-size core barrel with water as a circulating fluid. Percent recovery and rock quality designation (RQD) were calculated for the core samples and are noted at their depths of occurrence on the boring logs. RQD is the percent of total length cored consisting only of rock pieces at least 4 inches or more in length and is a measure of the integrity of the rock mass in-situ.

Geotechnical Engineering Services

South Blackburn Road Slip ■ Athens County, Ohio
August 10, 2017 ■ Terracon Project No. N4175279



A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
 QUADRANGLES INCLUDE: THE PLAINS, OH (1/1/1995) and ATHENS, OH (1/1/2002).

Project Manager:	KME
Project No.:	N4175279
Drawn by:	AKM
Scale:	1"=2,000'
Checked by:	KME
File Name:	BLP
Approved by:	KME
Date:	08.08.2017

Terracon
 800 Morrison Rd
 Gahanna, OH 43230-6643

SITE LOCATION
Athens Township Soil Borings South Blackburn Road Athens, OH

Exhibit
A-2



ATHENS - BLACKBURN RD SLIP
BORINGS

Legend
✦ BORINGS

Google Earth
© 2017 Google

100 ft
N

APPROXIMATE BORING LOCATION
DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	KME	Proposal No.	N4165279
Drawn by:	AKM	Scale:	N.T.S.
Checked by:	KME	File Name:	BLP
Approved by:	KME	Date:	08.08.2017

Terracon
Consulting Engineers & Scientists

800 Morrison Road Columbus, Ohio 43230
PH. (614) 863-3113 FAX. (614) 863-0475

BORING LOCATION PLAN

Athens Township Soil Borings South Blackburn Road
Athens, Ohio

Exhibit
A-3

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 8/10/17 11:21 - N:\PROJECTS\2017\4175279\WORKING FILES\LABORATORY-FIELD DATA-BORING LOGS\4175279 ATHENS TC

PROJECT: <u>BLACKBURN RD SLIP</u>	DRILLING FIRM / OPERATOR: <u>TERRACON / MATT M.</u>	DRILL RIG: <u>CME 45 B (#3924)</u>	STATION / OFFSET: _____	EXPLORATION ID <u>B-001-0-17</u>
TYPE: <u>LANDSLIDE</u>	SAMPLING FIRM / LOGGER: <u>TERRACON / ABDUL M.</u>	HAMMER: <u>CME AUTOMATIC</u>	ALIGNMENT: <u>BLACKBURN RD CENTERLINE</u>	
PID: _____ SFN: _____	DRILLING METHOD: <u>3.25" HSA / NQ2</u>	CALIBRATION DATE: <u>4/16/15</u>	ELEVATION: <u>880.1 (MSL)</u> EOB: <u>30.0 ft.</u>	PAGE 1 OF 1
START: <u>7/10/17</u> END: <u>7/10/17</u>	SAMPLING METHOD: <u>SPT / NQ2</u>	ENERGY RATIO (%): <u>90.3</u>	LAT / LONG: <u>39.293199, -82.111153</u>	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTH	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	HOLE SEALED
								GR	CS	FS	SI	CL	LL	PL	PI	WC		
0.75' - ASPHALT (9.75")	880.1																	
0.35' - AGGREGATE BASE (3.25")	879.4																	
STIFF, BROWN, SILTY CLAY , TRACE FINE TO COARSE SAND, TRACE FINE TO COARSE GRAVEL, DAMP TO MOIST	879.0	1	2	9	78	SS-1	1.50	-	-	-	-	-	-	-	-	-	-	A-6b (V)
		2	2	4														
		3																
		4	1	6	67	SS-2	1.00	-	-	-	-	-	-	-	-	-	-	A-6b (V)
		5	2															
		6																
		7	1	6	72	SS-3	1.00	-	-	-	-	-	-	-	-	-	-	A-6b (V)
		8	2															
		9																
		10			88	ST-4	-	-	-	-	-	-	-	-	-	-	-	A-6b (V)
	869.1	11																
VERY STIFF, BROWN, SILTY CLAY , SOME FINE TO COARSE GRAVEL, TRACE FINE TO COARSE SAND, DAMP		12	5	26	100	SS-5	2.00	-	-	-	-	-	-	-	-	-	-	A-6b (V)
		13	6	11														
	866.6	14	14	84	100	SS-6	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
CLAYSTONE , BROWN, SEVERELY WEATHERED, VERY WEAK.		15	24	32														
		16																
		17																
		18																
		19	24	66	100	SS-7	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
		20	22	22														
		21																
		22																
	856.6	23																
CLAYSTONE , BROWN TO GRAY, SEVERELY WEATHERED, VERY WEAK, VERY THIN TO LAMINATED, MODERATELY FACTURED WITH TIGHT, SLIGHTLY ROUGH JOINTS		24	67		78	NQ2-1												CORE
		25																
@26 TO 30, CORE BARREL STUCK - UNABLE TO RETRIEVE SAMPLE; RQD 67%, REC 78%.		26																
-CORE BARREL STUCK FROM 26' TO 30' - UNABLE TO RETRIEVE SAMPLE		27	0		0	NQ2-2												CORE
		28																
		29																
	850.1	EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED ASPHALT PATCH; TREMIED BENTONITE GROUT

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 8/10/17 11:21 - N:\PROJECTS\2017\N4175279\WORKING FILES\LABORATORY-FIELD DATA-BORING LOGS\N4175279.ATHENS.TC

PROJECT: BLACKBURN RD SLIP		DRILLING FIRM / OPERATOR: TERRACON / MATT M.		DRILL RIG: CME 45 B (#3924)		STATION / OFFSET: _____		EXPLORATION ID												
TYPE: LANDSLIDE		SAMPLING FIRM / LOGGER: TERRACON / ABDUL M.		HAMMER: CME AUTOMATIC		ALIGNMENT: BLACKBURN RD CENTERLINE		B-002-0-17												
PID: _____ SFN: _____		DRILLING METHOD: 3.25" HSA / NQ2		CALIBRATION DATE: 4/16/15		ELEVATION: 875.7 (MSL) EOB: 35.0 ft.		PAGE												
START: 7/11/17 END: 7/11/17		SAMPLING METHOD: SPT / NQ2		ENERGY RATIO (%): 90.3		LAT / LONG: 39.293119, -82.111170		1 OF 2												
MATERIAL DESCRIPTION AND NOTES			ELEV.	DEPTHS	SPT/RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			ODOT CLASS (GI)	HOLE SEALED	
										GR	CS	FS	SI	CL	LL	PL	PI			WC
1.5' - ASPHALT (18")			875.7																	
MEDIUM DENSE, BROWN TO GRAY, GRAVEL WITH SAND, SILT, AND CLAY, CONTAINS ASPHALT FRAGMENTS, DAMP (FILL)			874.2	1	19															
				2	8	17	100	SS-1	-	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)
			872.2	3																
SOFT, REDDISH-BROWN, SILTY CLAY, TRACE FINE TO COARSE GRAVEL, TRACE FINE TO COARSE SAND				4	1	6	67	SS-2	0.75	-	-	-	-	-	-	-	-	-	-	A-6b (V)
				5	2															
				6																
				7	1	5	78	SS-3	1.00	-	-	-	-	-	-	-	-	-	-	A-6b (V)
				8	2															
SHALE, BROWN, SEVERLY WEATHERED, VERY WEAK.			867.2	9	3															
				10	5	21	100	SS-4	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
				11																
				12	4	26	100	SS-5	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
				13	7															
				14	10															
				15	6	30	83	SS-6	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
				16	8															
				17																
				18																
LIMESTONE, GRAY, SEVERLY WEATHERED, MODERATELY STRONG.			857.2	19	8															
				20	14	44	100	SS-7	-	-	-	-	-	-	-	-	-	-	-	Rock (V)
				21	15															
				22																
				23																
				24	50/2"		50	SS-8												Rock (V)
			850.7	25																
CLAYSTONE, REDDISH BROWN, SEVERLY WEATHERED, VERY WEAK, LAMINATED, MODERATELY FRACTURED WITH TIGHT SLICKENSIDED JOINTS; RQD 66%, REC 100%.				26																
				27																
				28	82		100	NQ2-1												CORE
				29																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 8/10/17 11:21 - N:\PROJECTS\2017\N4175279\WORKING FILES\LABORATORY-FIELD DATA-BORING LOGS\N4175279.ATHENS.TC

PID: _____ SFN: _____ PROJECT: BLACKBURN RD SLIP STATION / OFFSET: _____ START: 7/11/17 END: 7/11/17 PG 2 OF 2 B-002-0-17

MATERIAL DESCRIPTION AND NOTES	ELEV. 845.7	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED	
								GR	CS	FS	SI	CL	LL	PL	PI				
CLAYSTONE , REDDISH BROWN, SEVERLY WEATHERED, VERY WEAK, LAMINATED, MODERATELY FRACTURED WITH TIGHT SLICKENSIDED JOINTS; RQD 66%, REC 100%. <i>(continued)</i>																			
			31																
			32	82		100	NQ2-2												
			33																
		840.7	34																
		EOB	35																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED ASPHALT PATCH; TREMIED BENTONITE GROUT

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 8/10/17 11:21 - N:\PROJECTS\2017\N4175279\WORKING FILES\LABORATORY-FIELD DATA-BORING LOGS\N4175279.ATHENS.TC

PROJECT: <u>BLACKBURN RD SLIP</u>	DRILLING FIRM / OPERATOR: <u>TERRACON / MATT M.</u>	DRILL RIG: <u>CME 45 B (#3924)</u>	STATION / OFFSET: _____	EXPLORATION ID: <u>B-003-0-17</u>
TYPE: <u>LANDSLIDE</u>	SAMPLING FIRM / LOGGER: <u>TERRACON / ABDUL M.</u>	HAMMER: <u>CME AUTOMATIC</u>	ALIGNMENT: <u>BLACKBURN RD CENTERLINE</u>	
PID: _____ SFN: _____	DRILLING METHOD: <u>3.25" HSA / NQ2</u>	CALIBRATION DATE: <u>4/16/15</u>	ELEVATION: <u>872.8 (MSL)</u> EOB: <u>29.0 ft.</u>	PAGE: <u>1 OF 1</u>
START: <u>7/11/17</u> END: <u>7/11/17</u>	SAMPLING METHOD: <u>SPT / NQ2</u>	ENERGY RATIO (%): <u>90.3</u>	LAT / LONG: <u>39.293051, -82.111181</u>	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTH	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG				ODOT CLASS (GI)	HOLE SEALED
								GR	CS	FS	SI	CL	LL	PL	PI	WC		
1.5' - ASPHALT (18")	872.8																	
VERY LOOSE TO LOOSE, BROWN TO GRAY, GRAVEL WITH SAND, SILT, AND CLAY, MOIST (FILL)	871.3	1	9															
		2	4	11	56	SS-1	-	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)
		3																
		4	2	1	3	6	SS-2	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)
		5																
		6	2															
		7	2	2	6	56	SS-3	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)
		8																
MEDIUM DENSE, BROWN TO GRAY, GRAVEL WITH SAND, SILT, AND CLAY, MOIST (POSSIBLE FILL)	864.3	9	2	8	36	100	SS-4	-	-	-	-	-	-	-	-	-	-	A-2-6 (V)
		10		16														
SANDSTONE , BROWN, SEVERELY WEATHERED, VERY WEAK.	861.8	11	8	11	35	100	SS-5	-	-	-	-	-	-	-	-	-	-	Rock (V)
		12		12														
		13																
		14	11	24	63	100	SS-6	-	-	-	-	-	-	-	-	-	-	Rock (V)
		15		18														
	16																	
	17																	
	18																	
	19	50/4"			100		SS-7	-	-	-	-	-	-	-	-	-	-	Rock (V)
CLAYSTONE , REDDISH-BROWN TO GRAY, SEVERELY WEATHERED, VERY WEAK TO WEAK, LAMINATED, LOW ANGLE FRACTURES, TIGHT, SLICKEN-SIDED JOINTS; RQD 0%, REC 83%.	853.8	20	0		83		NQ2-1											CORE
		21																
LIMESTONE , GRAY, MODERATELY WEATHERED, MODERATELY STRONG, THIN BEDDED, MODERATELY FRACTURED WITH NARROW SLIGHTLY ROUGH JOINTS; RQD 27%, REC 100%.	850.7	22	27		100		NQ2-2											CORE
		23																
		24																
CLAYSTONE , REDDISH-BROWN TO GRAY, SEVERELY WEATHERED, WEAK, LAMINATED, SLIGHTLY FRACTURED WITH TIGHT SLICKEN-SIDED JOINTS; RQD 90%, REC 90%.	847.8	25																
		26																
		27	73		90		NQ2-3											CORE
		28																
	843.8	29																EOB

NOTES: WATER ENCOUNTERED @ 14.5'.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED ASPHALT PATCH; TREMIED BENTONITE GROUT