

PROJECT DESCRIPTION

THE PROJECT CONSISTS OF REMEDIATING THE ROCK CUT OF THE NORTH SLOPE BY EXCAVATION TO IMPROVE THE ROCK CATCHMENT AREA.

HISTORIC RECORDS

NO HISTORICAL GEOTECHNICAL RECORDS WERE FOUND IN THE VICINITY OF THE PROJECT.

GEOLOGY

THE PROJECT IS LOCATED WITHIN THE UNGLACIATED AND HIGHLY DISSECTED MARIETTA PLATEAU OF THE APPALACHIAN PLATEAU PROVINCE. SOILS IN THIS AREA ARE PRIMARILY COLLUVIUM DERIVED FROM LOCAL BEDROCK AND MAY INCLUDE SCATTERED AREAS OF RESIDIUM. THE CURRENT PROJECT AREA IS CHARACTERIZED BY EXPOSED SILTSTONE AND SANDSTONE UNDERLAIN BY SHALE AND COAL OF PENNSYLVANIAN-AGE THROUGH PERMIAN-AGE WITH THIN OVERBURDEN SOILS.

RECONNAISSANCE

FIELD RECONNAISSANCE WAS COMPLETED BY PERSONNEL FROM THE OFFICE OF GEOTECHNICAL ENGINEERING ON DECEMBER 16, 2022. THE PROJECT IS LOCATED ALONG SR 146 ABOUT 4 MILES EAST OF CHANDLERSVILLE. THE AREA HAS RELATIVELY VARIED TERRAIN WITH SR 146 SITUATED AT THE BASE OF A ROCK SLOPE AND ABOVE A TRIBUTARY OF BUFFALO CREEK. TALUS AND FALLEN VEGETATION COVER THE BASE OF THE ROCK SLOPE WHICH WAS DETERMINED TO BE COMPRISED OF HIGHLY WEATHERED INTERBEDDED SILTSTONE AND SHALE. ABOVE THE INTERBEDDED SILTSTONE AND SHALE LIES A LAYER OF HIGHLY WEATHERED SANDSTONE TOPPED BY SEVERELY TO HIGHLY WEATHERED SILTSTONE WHICH FORMS THE REST OF THE EXPOSED ROCK FACE. SMALL TREES AND OTHER LIGHT FOLIAGE CAN BE FOUND GROWING ALONG THE UPPER PARTS OF THE ROCK SLOPE. THE DRAINAGE DITCH LINE AT THE BASE OF THE SLOPE IS WELL MAINTAINED, DESPITE THE TALUS AND VEGETATION BUILDUP IN IT. A COUPLE OF SMALL PIECES OF ROCK DEBRIS (LESS THAN A FOOT IN DIAMETER) WERE OBSERVED TO HAVE FALLEN INTO THE DITCH FROM THE OVERHANGING SANDSTONE. NO ROCK DEBRIS WAS OBSERVED ON THE EXISTING PAVEMENT. THE ADJACENT PROPERTIES ARE PREDOMINANTLY RURAL RESIDENTIAL LOTS WITH A RECREATIONAL LOT ATOP THE ROCK SLOPE AND A WOODED LOT TO THE SOUTHEAST SIDE OF THE PROJECT. THE EXISTING PAVEMENT ON SR 146 WAS NOTED TO BE IN GOOD CONDITION.

SUBSURFACE EXPLORATION

THREE (3) BORINGS, B-001-0-23 THROUGH B-003-0-23, WERE COMPLETED AS PART OF THE SUBSURFACE EXPLORATION BETWEEN FEBRUARY 27 AND MARCH 7, 2023. THE BORINGS WERE DRILLED WITH A TRACK MOUNTED CME 850R ROTARY DRILL RIG, USING 3 3/8" INCH I.D. HOLLOW STEM AUGERS TO ADVANCE THE BORINGS THROUGH THE SOIL. DISTURBED SAMPLES WERE COLLECTED IN ACCORDANCE WITH THE STANDARD PENETRATION TEST (ASTHO T206) AT CONTINUOUS INTERVALS UNTIL ROCK WAS ENCOUNTERED. ONCE ROCK WAS ENCOUNTERED, THE BORINGS WERE ADVANCED AND SAMPLED AS PER AASHTO T225 USING AN N SERIES WIRELINE CORE BARREL, WATER METHOD TO THE COMPLETION OF THE BORINGS. THE HAMMER SYSTEM USED WAS CALIBRATED ON APRIL 19, 2021, WITH A REPORTED MAXIMUM DRILL ROD ENERGY RATIO (ER) OF 90.9% WHICH WAS CORRECTED TO 90% PER THE SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS (SGE).

EXPLORATION FINDINGS

BORINGS B-001-0-23 THROUGH B-003-0-23 WERE COMPLETED ATOP THE ROCK SLOPE. EACH BORING ENCOUNTERED TOPSOIL RANGING FROM 3 TO 7 INCHES IN THICKNESS. B-002-0-23 ENCOUNTERED ROCK IMMEDIATELY BELOW THE TOPSOIL WHILE B-001-0-23 AND B-003-0-23 ENCOUNTERED OVERBURDEN SOILS RANGING FROM 3 TO 6 FEET IN THICKNESS. THE ENCOUNTERED OVERBURDEN SOILS IN B-001-0-23 CONSISTED OF COHESIVE MATERIALS CONSISTING OF SILT (A-4B) AND SILT AND CLAY (A-6A) WHICH WERE STIFF TO HARD IN CONSISTENCY AND DAMP IN CONDITION. B-003-0-23 ENCOUNTERED A LAYER OF NON-COHESIVE SOIL CONSISTING OF STONE FRAGMENTS WITH SAND AND SILT (A-2-4) WHICH WAS VERY DENSE IN COMPACTNESS AND DAMP IN CONDITION. BENEATH THE SURFACE MATERIALS, ALL THREE BORINGS ENCOUNTERED SILTSTONE BETWEEN ELEVATIONS 841.5 AND 836.7 FEET WHICH WAS SEVERELY TO HIGHLY WEATHERED AND VERY WEAK TO MODERATELY STRONG. POINT LOAD STRENGTH TESTS GAVE VALUES BETWEEN 788 AND 4,326 PSI, THE SLAKE DURABILITY TESTS RETURNED VALUES BETWEEN 92.9% AND 96.9%, AND A COMPRESSIVE STRENGTH TEST RETURNED A VALUE OF 1,905 PSI FOR THE ENCOUNTERED SILTSTONE MATERIAL. SANDSTONE WAS ENCOUNTERED BENEATH THE SILTSTONE BETWEEN ELEVATIONS 821.4 AND 824.9 FEET. THE ENCOUNTERED SANDSTONE WAS MODERATELY TO HIGHLY WEATHERED AND WEAK TO STRONG WITH COMPRESSIVE STRENGTHS BETWEEN 2,691 AND 10,080 PSI, SLAKE DURABILITY RESULTS BETWEEN 93.8% AND 98.9%, AND A POINT LOAD STRENGTH OF 936 PSI. BENEATH THE SANDSTONE, BETWEEN ELEVATIONS 813.1 AND 816.7, INTERBEDDED SILTSTONE AND SHALE WAS ENCOUNTERED THAT WAS HIGHLY WEATHERED AND WEAK TO SLIGHTLY STRONG. THE SILTSTONE MATERIAL WAS DETERMINED TO HAVE POINT LOAD STRENGTHS BETWEEN 893 TO 2,164 PSI WHILE THE SHALE HAD POINT LOAD STRENGTHS BETWEEN 600 AND 2,939 PSI. A THIN LIMESTONE LAYER WAS ENCOUNTERED IN ALL THREE BORINGS BETWEEN ELEVATIONS 802.8 AND 798.3 FEET. THE LAYER RANGED IN THICKNESS BETWEEN 0.6 AND 0.7 FEET AND HAD AN UNCONFINED COMPRESSIVE STRENGTH OF 14,874 PSI. VERY WEAK TO WEAK, HIGHLY TO MODERATELY WEATHERED SHALE WAS ENCOUNTERED BENEATH THE INTERBEDDED SILTSTONE AND SHALE BETWEEN ELEVATIONS 801.6 AND 798.3 FEET WITH POINT LOAD STRENGTHS RANGING FROM 713 TO 1,444 PSI AND SLAKE DURABILITY TEST RESULTS RANGING FROM 46.6% TO 83.4%. A COAL LAYER WAS ENCOUNTERED BETWEEN ELEVATIONS 793.3 AND 798.3 IN WHICH B-003-0-23 WAS TERMINATED. B-001-0-23 AND B-002-0-23 ENCOUNTERED HIGHLY TO MODERATELY WEATHERED, VERY WEAK CLAYSTONE BENEATH THE COAL LAYER BETWEEN ELEVATIONS 796.7 AND 797.6 FEET, POINT LOADS OF 607 AND 506 PSI, AND SLAKE DURABILITY TEST RESULTS OF 75.2% AND 31.9%, RESPECTIVELY. BOTH BORINGS WERE TERMINATED IN THE CLAYSTONE.

THE BORE HOLES WERE NOTED TO BE DRY UPON COMPLETION. NO WATER WAS ENCOUNTERED DURING THE EXPLORATION.

SPECIFICATIONS

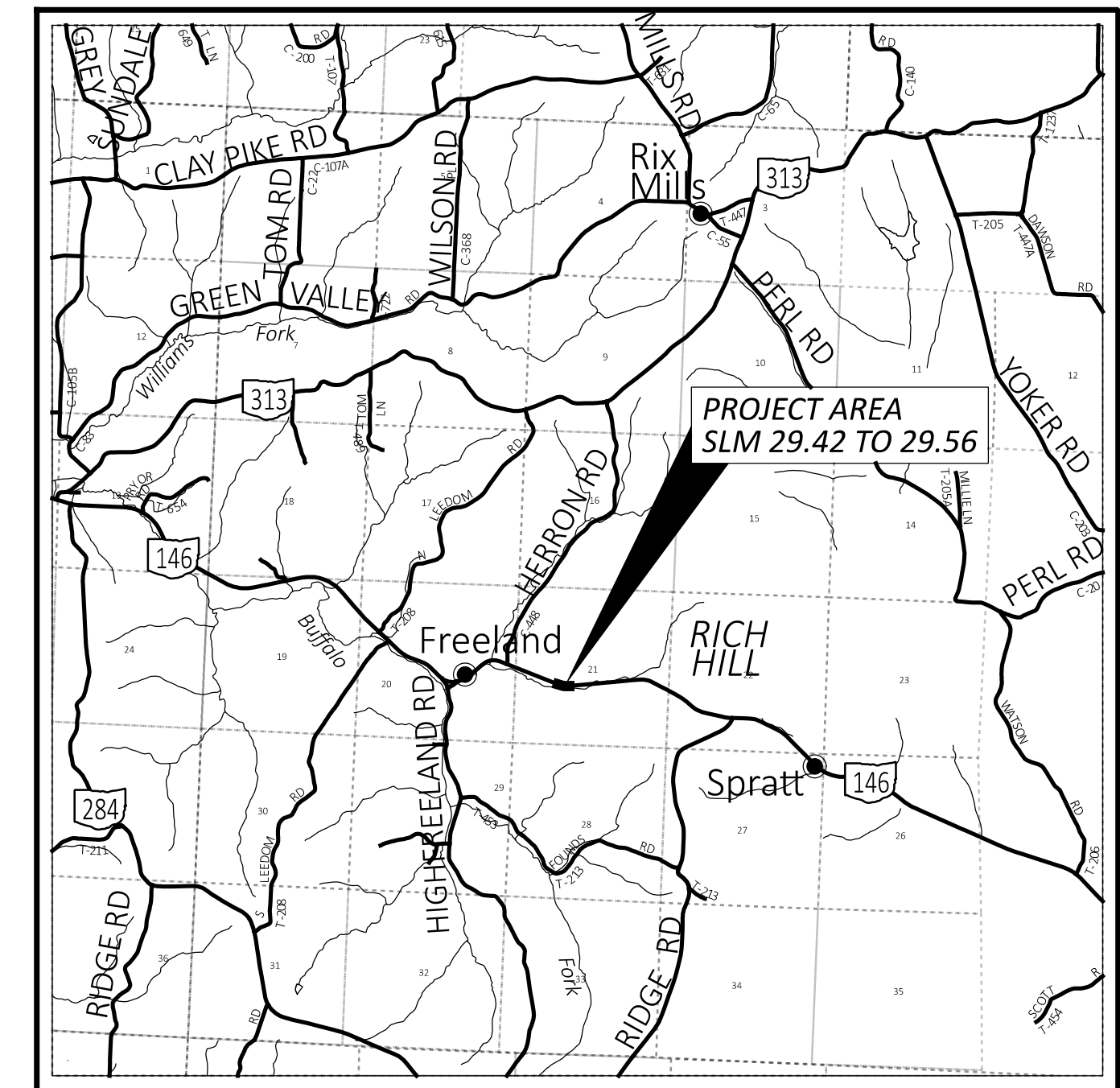
THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, DATED JANUARY 2023.

LEGEND

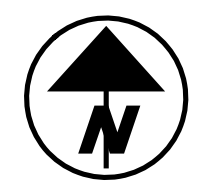
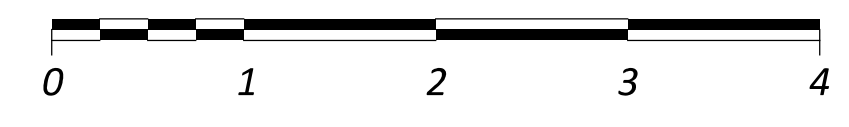
DESCRIPTION	ODOT CLASS	CLASSIFIED MECH./VISUAL
STONE FRAGMENTS WITH SAND & SILT	A-2-4	1 -
SILT	A-4b	1 -
SILT AND CLAY	A-6a	1 1
	TOTAL	3 1
CLAYSTONE	VISUAL	
COAL	VISUAL	
SANDSTONE	VISUAL	
SHALE	VISUAL	
SILTSTONE	VISUAL	
PAVEMENT OR BASE = X = APPROXIMATE THICKNESS	VISUAL	
SOD AND TOPSOIL = X = APPROXIMATE THICKNESS	VISUAL	
BORING LOCATION - PLAN VIEW.		
DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.		
WC	INDICATES WATER CONTENT IN PERCENT.	
N ₆₀	INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.	
X/D"	NUMBER OF BLOWS FOR STANDARD PENETRATION TEST (SPT): X/D"= NUMBER OF BLOWS (UNCORRECTED) FOR D" OF PENETRATION AT REFUSAL.	
γ	INDICATES UNIT WEIGHT OF ROCK.	
Id ₂	INDICATES SLAKE DURABILITY TEST, ASTM D4644.	
NP	INDICATES A NON-PLASTIC SAMPLE.	
S _c	INDICATES POINT LOAD STRENGTH VALUE, ASTM D5731.	
Qu	INDICATES UNCONFINED COMPRESSION TEST, ASTM D7012 (ROCK).	
SS	INDICATES A SPLIT SPOON SAMPLE.	
NQ	INDICATES "N" SERIES ROCK CORE BARREL OF "Q" WIRELINE BIT SIZE.	
TR	INDICATES TOP OF ROCK ELEVATION.	

AVAILABLE INFORMATION

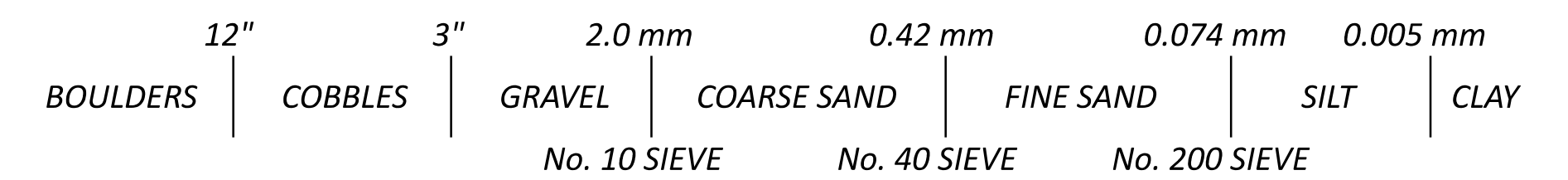
THE SOIL, BEDROCK, AND GROUNDWATER INFORMATION COLLECTED FOR THIS SUBSURFACE EXPLORATION THAT CAN BE CONVENIENTLY DISPLAYED ON THE GEOTECHNICAL PROFILE SHEETS HAS BEEN PRESENTED. GEOTECHNICAL REPORTS, IF PREPARED, ARE AVAILABLE FOR REVIEW ON THE OFFICE OF CONTRACT SALES WEBSITE.



LOCATION MAP
SCALE IN MILES



PARTICLE SIZE DEFINITIONS



INDEX OF SHEETS			
BEDROCK TEST SUMMARY, SHEET NO. 2			
LOCATION FROM STA.	TO STA.	PLAN VIEW SHEET	CROSS-SECTION SHEET
SR 146			
STA. 127+50	STA. 140+00	3	-
STA. 140+00	STA. 140+00	-	4
	STA. 145+00	-	5
BORING LOGS, SHEET Nos. 6 - 8			
ROCK CORE PHOTOS, SHEET Nos. 9 - 15			

- RECON. - AMJ 12/16/22
- DRILLING - CEM 02/27/23 - 03/07/23
- DRAWN - AJC 8/02/23
- REVIEWED - SAT 8/02/23

MUS-146-29.36

MODEL: Sheet PAPER: 34x22 (in.) DATE: 8/20/2024 TIME: 10:36:27 AM USER: gmotsche
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GEOTECHNICAL PROFILE - ROCKFALL

DESIGN AGENCY	
DESIGNER	AJC
REVIEWER	SAT 08/02/23
PROJECT ID	115988
SUBSET	1 15
SHEET	P.32 46

BEDROCK TEST SUMMARY							
BORING ID	SAMPLE ELEVATION	SAMPLE DEPTH	Qu (PSI)	S _v (PSI)	Id2	LITHOLOGY	
B-001-0-23	830.7' - 829.5'	12.0' - 13.2'	-	788	92.9%	SILTSTONE	
	825.3' - 824.9'	17.4' - 17.8'	1,905	-	-	SILTSTONE	
	822.7' - 821.8'	20.0' - 20.9'	-	-	97.1%	SANDSTONE	
	822.4' - 822.0'	20.3' - 20.7'	2,691	-	-	SANDSTONE	
	815.4' - 814.7'	27.3' - 28.0'	-	-	94.6%	SILTSTONE	
	815.2' - 814.4'	27.5' - 28.3'	-	893	-	SILTSTONE	
	814.5' - 811.1'	28.2' - 31.6'	-	-	85.8%	SHALE	
	814.5' - 811.0'	28.2' - 31.7'	-	897	-	SHALE	
	810.7' - 806.3'	32.0' - 36.4'	-	-	94.5%	SILTSTONE	
	810.5' - 806.15'	32.2' - 36.55'	-	1,234	-	SILTSTONE	
	809.7' - 808.4'	33.0' - 34.3'	-	-	76.9%	SHALE	
	809.0' - 808.0'	33.7' - 34.7'	-	1,027	-	SHALE	
	799.6' - 798.6'	43.1' - 44.1'	-	1,169	-	SHALE	
	799.5' - 798.6'	43.2' - 44.1'	-	-	58.7%	SHALE	
	796.7' - 795.6'	46.0' - 47.1'	-	-	75.2%	CLAYSTONE	
	796.7' - 795.2'	46.0' - 47.5'	-	607	-	CLAYSTONE	
	B-002-0-23	836.0' - 831.0'	6.0' - 11.0'	-	1,957	95.5%	SILTSTONE
		829.0' - 827.4'	13.0' - 14.6'	-	-	94.0%	SILTSTONE
		824.9' - 824.6'	17.1' - 17.4'	10,080	-	-	SANDSTONE
824.9' - 823.9'		17.1' - 18.1'	-	-	98.9%	SANDSTONE	
819.0' - 817.5'		23.0' - 24.5'	-	936	95.3%	SANDSTONE	
813.8' - 811.9'		28.2' - 30.1'	-	1,057	-	SHALE	
813.0' - 812.2'		29.0' - 29.8'	-	-	89.7%	SHALE	
812.3' - 809.1'		29.7' - 32.9'	-	1,408	-	SILTSTONE	
810.1' - 809.4'		31.9' - 32.6'	-	-	95.3%	SILTSTONE	
809.0' - 806.7'		33.0' - 35.3'	-	-	90.3%	SHALE	
809.0' - 806.5'		33.0' - 35.5'	-	2,939	-	SHALE	
808.1' - 807.0'		33.9' - 35.0'	-	2,164	-	SILTSTONE	
808.0' - 807.4'		34.0' - 34.6'	-	-	95.7%	SILTSTONE	
801.6' - 801.2'		40.4' - 40.8'	-	-	46.6%	SHALE	
801.6' - 800.8'		40.4' - 41.2'	-	713	-	SHALE	
797.6' - 796.5'		44.4' - 45.5'	-	-	31.9%	CLAYSTONE	
797.4' - 796.1'		44.6' - 45.9'	-	506	-	CLAYSTONE	

BEDROCK TEST SUMMARY						
BORING ID	SAMPLE ELEVATION	SAMPLE DEPTH	Qu (PSI)	S _v (PSI)	Id2	LITHOLOGY
B-003-0-23	836.3' - 835.3'	6.5' - 7.5'	-	-	96.1%	SILTSTONE
	836.3' - 830.8'	6.5' - 12.0'	-	4,326	-	SILTSTONE
	830.8' - 829.1'	12.0' - 13.7'	-	2,865	-	SILTSTONE
	830.6' - 829.8'	12.2' - 13.0'	-	-	96.9%	SILTSTONE
	819.6' - 818.1'	23.2' - 24.7'	-	-	98.2%	SANDSTONE
	819.1' - 818.8'	23.7' - 24.0'	8,693	-	-	SANDSTONE
	816.7' - 810.6'	26.1' - 32.2'	-	-	93.8%	SANDSTONE
	812.9' - 810.8'	29.9' - 32.0'	-	1,217	-	SILTSTONE
	810.5' - 808.6'	32.3' - 34.2'	-	-	94.1%	SILTSTONE
	810.0' - 808.4'	32.8' - 34.4'	-	1,641	-	SILTSTONE
	807.5' - 806.3'	35.3' - 36.5'	-	-	63.8%	SHALE
	807.5' - 806.8'	35.3' - 36.0'	-	600	-	SHALE
	798.7' - 798.3'	44.1' - 44.5'	14,874	-	-	LIMESTONE
	796.8' - 795.0'	46.0' - 47.8'	-	-	83.4%	SHALE
	796.2' - 795.2'	46.6' - 47.6'	-	1,444	-	SHALE

GEOTECHNICAL PROFILE - ROCKFALL
 BEDROCK TEST SUMMARY

DESIGN AGENCY



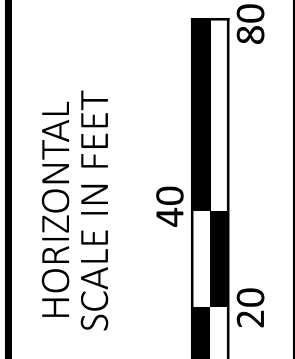
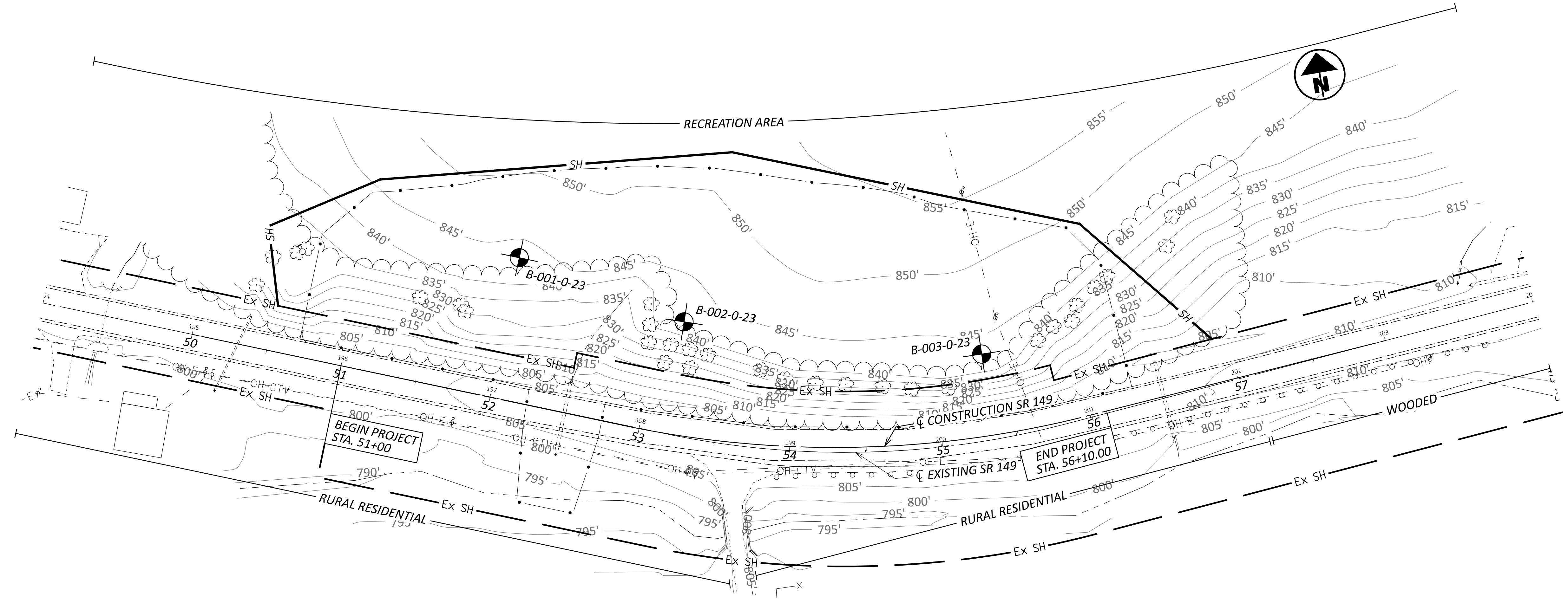
DESIGNER
 AJC

REVIEWER
 SAT 08/02/23

PROJECT ID
 115988

SUBSET	TOTAL
2	15

SHEET	TOTAL
P.33	46



GEOTECHNICAL PROFILE - ROCKFALL
STA. 51+00 TO STA. 56+10 S.R. 146

DESIGN AGENCY



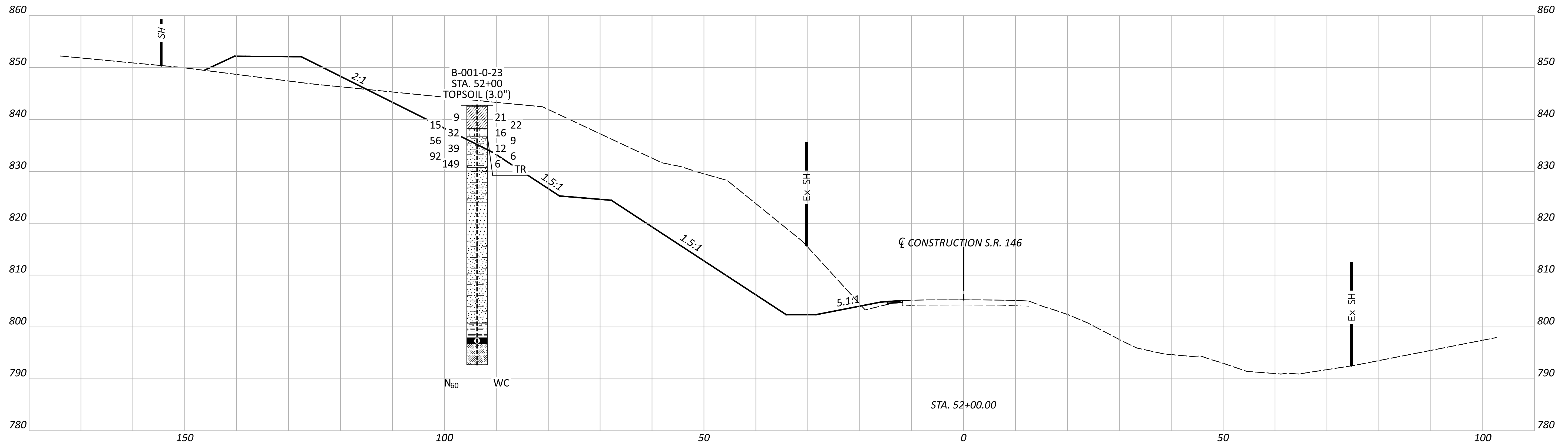
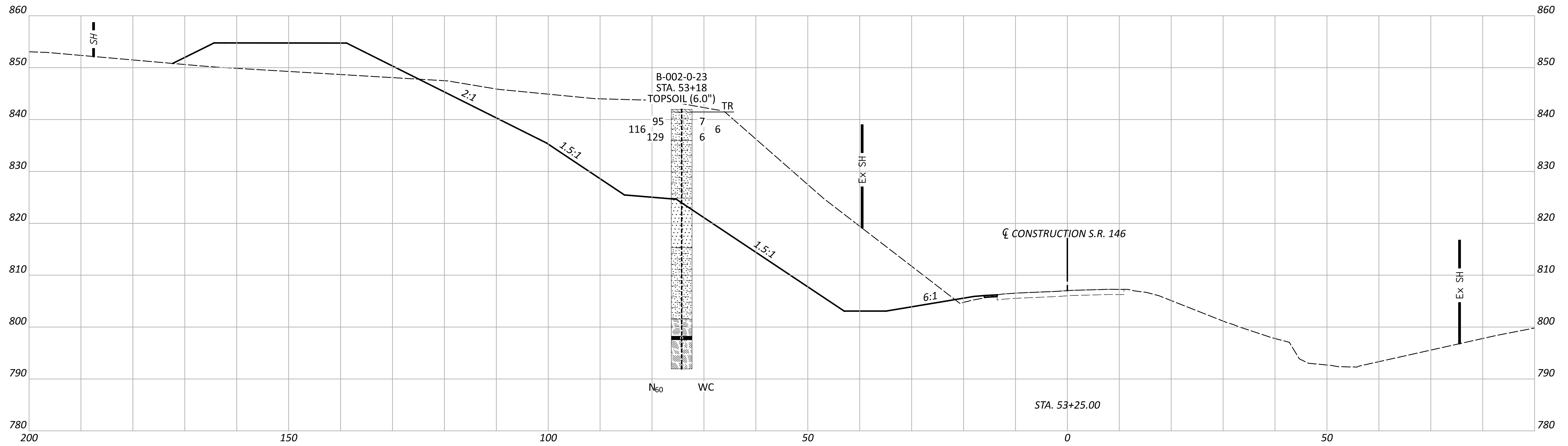
DESIGNER
AJC

REVIEWER
SAT 08/02/23

PROJECT ID
115988

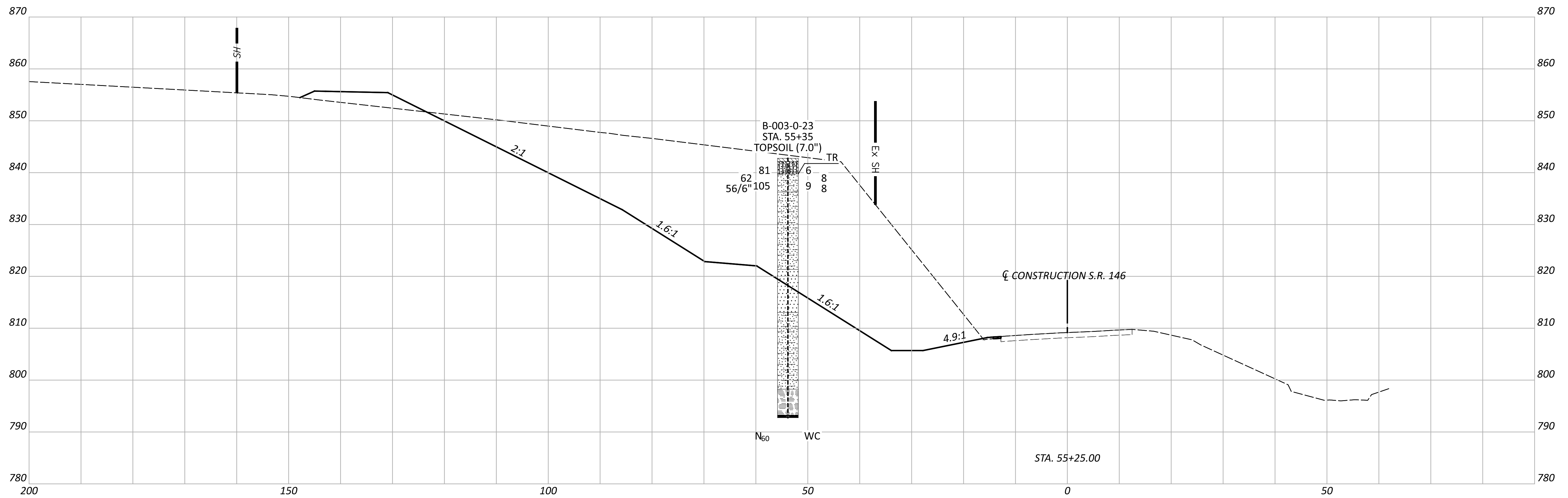
SUBSET	TOTAL
3	15

SHEET	TOTAL
P.34	46



GEOTECHNICAL PROFILE - ROCKFALL
 CROSS SECTION STA. 52+00 & STA. 53+25 S.R. 146

DESIGN AGENCY	
DESIGNER	
AJC	
REVIEWER	
SAT 08/02/23	
PROJECT ID	
115988	
SUBSET	TOTAL
4	15
SHEET	TOTAL
P.35	46



GEOTECHNICAL PROFILE - ROCKFALL
 CROSS SECTION STA. 55+25 S.R. 146

DESIGN AGENCY



DESIGNER

AJC

REVIEWER

SAT 08/02/23

PROJECT ID

115988

SUBSET TOTAL

5 15

SHEET TOTAL


P.36 46

MUS-146-29.36

MODEL SHEET PAPER SIZE: 34x22 (in.) DATE: 8/20/2024 TIME: 10:36:55 AM USER: gmoetsche
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PROJECT: MUS-146-29.46		DRILLING FIRM / OPERATOR: ODOT / SPROUSE		STATION / OFFSET: 52+00, 94' LT.		EXPLORATION ID	
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: ODOT / MCINTOSH		ALIGNMENT: CL SR 146		B-001-0-23	
PID: 115988 SFN:		DRILLING METHOD: 3.75" HSA / NQ2		ELEVATION: 842.7 (ft) EOB: 50.0 ft.		PAGE	
START: 2/27/23 END: 3/1/23		SAMPLING METHOD: SPT / NQ2		LAT / LONG: 39.880413, -81.764263		1 OF 1	
MATERIAL DESCRIPTION AND NOTES		ELEV.		GRADATION (%)		HOLE	
		DEPTHS		ATTERBERG		SEALING	
		1-50		LL PL PI WC		ODOT CLASS (GI)	
		ELEV.		GR		WC	
		842.7		GR		WC	
		842.5		GR		WC	
		838.2		GR		WC	
		836.7		GR		WC	
		830.7		GR		WC	
		823.9		GR		WC	
		816.7		GR		WC	
		800.6		GR		WC	
		797.9		GR		WC	
		796.7		GR		WC	
		792.7		GR		WC	
		EOB		GR		WC	
		50		GR		WC	
TOPSOIL (3.0') STIFF, REDDISH BROWN, SILT AND CLAY, SOME SAND, TRACE STONE FRAGMENTS, DAMP		1					
HARD, BROWN, SILT, SOME CLAY, LITTLE SAND, TRACE STONE FRAGMENTS, DAMP		2-4		SS-1		21	
SILTSTONE, BROWN AND REDDISH BROWN, SEVERELY WEATHERED, VERY WEAK, LAMINATED TO VERY THIN BEDDED, ARENACEOUS.		5-12		SS-2		22	
SILTSTONE, YELLOWISH GRAY AND GRAYISH BROWN, SEVERELY TO HIGHLY WEATHERED, WEAK TO SLIGHTLY STRONG, LAMINATED TO VERY THIN BEDDED, JOINT, FRACTURED, OPEN, SLIGHTLY ROUGH; RQD 29%, REC 90% @ 12.0' - 13.2'; I _{d2} = 92.9% @ 12.0' - 13.2'; S _c = 788 psi		13-14		SS-3		16	
@ 17.4' - 17.8'; γ = 162 pcf; Qu = 1,905 psi		15-17		SS-4		9	
SANDSTONE, GRAY WITH YELLOWISH GRAY, HIGHLY WEATHERED, SLIGHTLY STRONG, VERY FINE TO MEDIUM GRAINED, THIN BEDDED, JOINT, FRACTURED TO MODERATELY FRACTURED, NARROW TO TIGHT, SLIGHTLY ROUGH; RQD 56%, REC 100% @ 20.0' - 20.9'; I _{d2} = 97.1% @ 20.3' - 20.7'; γ = 163 pcf; Qu = 2,691 psi		18-20		SS-5		12	
@ 24.3' - 27.4'; HIGH ANGLE OPEN JOINT		21-23		SS-6		6	
INTERBEDDED SILTSTONE (60%) AND SHALE (40%), JOINT, FRACTURED TO MODERATELY FRACTURED, NARROW, SLIGHTLY ROUGH, RQD 36%, REC. 98% SILTSTONE, YELLOWISH BROWN AND GRAY, HIGHLY WEATHERED, WEAK, ARENACEOUS; SHALE, GRAY AND BROWN, HIGHLY WEATHERED, WEAK. @ 27.3' - 28.0'; SILTSTONE, I _{d2} = 94.6% @ 27.5' - 28.3'; SILTSTONE, S _c = 893 psi @ 27.9'; VERY THIN CLAY SEAM @ 28.2' - 31.6'; SHALE, I _{d2} = 85.8% @ 28.2' - 31.7'; SHALE, S _c = 897 psi @ 32.0' - 36.4'; SILTSTONE, I _{d2} = 94.5% @ 32.2' - 36.55'; SILTSTONE, S _c = 1,234 psi @ 33.0' - 34.3'; SHALE, I _{d2} = 76.9% @ 33.7' - 34.7'; SHALE, S _c = 1,027 psi		24-31		SS-7		6	
@ 38.7'; SEVERELY WEATHERED.		32-34		SS-8		CORE	
@ 40.7' - 41.4'; LIMESTONE LAYER, MODERATELY WEATHERED		35-37		SS-9		CORE	
SHALE, DARK GRAY, HIGHLY WEATHERED, WEAK, LAMINATED TO VERY THIN BEDDED, SLIGHTLY CARBONACEOUS, POORLY FISSILE; RQD 75%, REC 100%. @ 43.1' - 44.1'; S _c = 1,169 psi @ 43.2' - 44.1'; I _{d2} = 58.7% @ 44.5'; CARBONACEOUS. COAL, BLACK WITH WHITE, HIGHLY WEATHERED, IMPURE; RQD 0%, REC 73%. CLAYSTONE, GRAY, HIGHLY TO MODERATELY WEATHERED, VERY WEAK, MEDIUM BEDDED, SLIGHTLY CARBONACEOUS, FOSSILIFEROUS; RQD 33%, REC 98%. @ 46.0' - 47.1'; I _{d2} = 75.2% @ 46.0' - 47.5'; S _c = 607 psi @ 48.1' - 48.3'; COAL LAYER, IMPURE		38-45		SS-10		CORE	
		46		SS-11		CORE	
		47		SS-12		CORE	
		48		SS-13		CORE	
		49		SS-14		CORE	
		50		SS-15		CORE	

NOTES: LAT/LONG/ELEV FROM DISTRICT SURVEY GRADE INSTRUMENTS. HOLE DRY UPON COMPLETION.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: TREMIED 30 GAL. BENTONITE GROUT

DESIGN AGENCY

 DESIGNER
 AIC
 REVIEWER
 SAT 08/02/23
 PROJECT ID
 115988
 SUBSET TOTAL
 6 15
 SHEET TOTAL
 P.37 46

**GEOTECHNICAL PROFILE - ROCKFALL
 BORING LOG B-001-0-23**


STANDARD ODOT SOIL BORING LOG (11 X 17) - OH DOT GDT - 8/11/23 15:03 - X:\GINT\PROJECTS\2023 COMPLETE\601041.GPJ

MUS-146-29.36

MODEL SHEET PAPER SIZE: 34x22 (in.) DATE: 8/20/2024 TIME: 10:37:30 AM USER: gmoetsche
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PROJECT: MUS-146-29.46		DRILLING FIRM / OPERATOR: ODOT / SPROUSE		STATION / OFFSET: 53+18.74' LT.		EXPLORATION ID	
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: ODOT / MCINTOSH		ALIGNMENT: CL SR 146		B-002-0-23	
PID: 115988 SFN:		DRILLING METHOD: 3.75" HSA / NQ2		ELEVATION: 842.0 (ft) EOB: 50.0 ft.		PAGE	
START: 3/1/23 END: 3/6/23		SAMPLING METHOD: SPT / NQ2		LAT / LONG: 39.880247, -81.763909		1 OF 1	
MATERIAL DESCRIPTION AND NOTES		ELEV.		GRADATION (%)		ATTERBERG	
		DEPTHS		GR		WC	
		TR		LL		PI	
		1		CL			
		2		FS			
		3		SI			
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		48					
		49					
		50					
		EOB					
		842.0					
		841.5					
		836.0					
		824.9					
		815.4					
		801.6					
		798.3					
		797.6					
		792.0					
		TOPSOIL (6.0')					
		SILTSTONE, BROWN AND REDDISH BROWN, SEVERELY WEATHERED, VERY WEAK, LAMINATED TO VERY THIN BEDDED, ARENACEOUS.					
		SILTSTONE, YELLOWISH GRAY AND GRAYISH BROWN, SEVERELY TO HIGHLY WEATHERED, SLIGHTLY STRONG, ARENACEOUS, JOINT, HIGHLY FRACTURED, OPEN, SLIGHTLY ROUGH; RQD 0%; REC 76%. @ 6.0' - 11.0'; I _{d2} = 95.5% @ 6.0' - 11.0'; S _c = 1,957 psi					
		@ 13.0' - 14.6'; I _{d2} = 94.0%					
		SANDSTONE, GRAY WITH YELLOWISH GRAY, MODERATELY TO HIGHLY WEATHERED, STRONG, VERY FINE TO MEDIUM GRAINED, THIN BEDDED, JOINT, FRACTURED, NARROW TO OPEN, SLIGHTLY ROUGH; RQD 19%; REC 84%. @ 17.1' - 17.4'; γ = 172 pcf; Q _u = 10,080 psi @ 17.1' - 18.1'; I _{d2} = 98.9% @ 19.2'; THIN CLAY SEAM @ 20.2'; THIN CLAY SEAM @ 21.2'; THIN CLAY SEAM @ 21.7'; HIGHLY FRACTURED					
		@ 23.0'; HIGHLY WEATHERED, WEAK. @ 23.0' - 24.5'; S _c = 936 psi @ 23.0' - 24.5'; I _{d2} = 95.3% @ 24.8' - 26.2'; HIGH ANGLE JOINT					
		INTERBEDDED SILTSTONE (60%) AND SHALE (40%), JOINT, FRACTURED, NARROW TO OPEN, SLIGHTLY ROUGH, RQD 9%; REC. 89%. SILTSTONE, YELLOWISH BROWN AND GRAY, HIGHLY WEATHERED, WEAK TO SLIGHTLY STRONG, VERY THIN TO THIN BEDDED, ARENACEOUS. SHALE, YELLOWISH BROWN AND GRAY, HIGHLY WEATHERED, WEAK TO SLIGHTLY STRONG, LAMINATED. @ 28.2' - 30.1'; SHALE, S _c = 1,057 psi @ 29.0' - 29.8'; SHALE, I _{d2} = 89.7% @ 29.7' - 32.9'; SILTSTONE, S _c = 1,408 psi @ 30.4' - 30.6'; CLAY SEAM @ 31.9' - 32.6'; SILTSTONE, I _{d2} = 95.3% @ 33.0' - 35.3'; SHALE, I _{d2} = 90.3% @ 33.0' - 35.5'; SHALE, S _c = 2,939 psi @ 33.9' - 35.0'; SILTSTONE, S _c = 2,164 psi @ 34.0' - 34.6'; SILTSTONE, I _{d2} = 95.7%					
		@ 39.2' - 39.8'; LIMESTONE LAYER, MODERATELY WEATHERED					
		SHALE, DARK GRAY, HIGHLY WEATHERED, VERY WEAK TO WEAK, LAMINATED, SLIGHTLY CARBONACEOUS, POORLY FISSILE; RQD 55%; REC 100%. @ 40.4' - 40.8'; I _{d2} = 46.6% @ 40.4' - 41.2'; S _c = 713 psi @ 42.8'; CARBONACEOUS.					
		COAL, BLACK, IMPURE; RQD 0%; REC 100%. CLAYSTONE, GRAY, MODERATELY TO HIGHLY WEATHERED, VERY WEAK, SLIGHTLY CARBONACEOUS, FOSSILIFEROUS; RQD 22%; REC 100%. @ 44.4' - 45.5'; I _{d2} = 31.9% @ 44.6' - 45.9'; S _c = 506 psi					
		BACK FILL					

NOTES: LAT/LONG/ELEV FROM DISTRICT SURVEY GRADE INSTRUMENTS. HOLE DRY UPON COMPLETION.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 50 LB. BENTONITE CHIPS

DESIGN AGENCY

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GEOTECHNICAL PROFILE - ROCKFALL
 BORING LOG B-002-0-23


STANDARD ODOT SOIL BORING LOG (11 X 17) - OH DOT.GDT - 8/11/23 16:03 - X:\GINT\PROJECTS\2023\COMPLETE\601041.GPJ

MUS-146-29.36

MODEL: Sheet PAPER: 34x22 (in.) DATE: 8/20/2024 TIME: 10:38:06 AM USER: gmotsche
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PROJECT: MUS-146-29.46		DRILLING FIRM / OPERATOR: ODOT / SPROUSE		STATION / OFFSET: 55+35.54' LT.		EXPLORATION ID											
TYPE: ROADWAY		SAMPLING FIRM / LOGGER: ODOT / MCINTOSH		ALIGNMENT: CL SR 146		B-003-0-23											
PID: 115988 SFN:		DRILLING METHOD: 3.75" HSA / NQ2		ELEVATION: 842.8 (ft) EOB: 50.0 ft.		PAGE											
START: 3/6/23 END: 3/7/23		SAMPLING METHOD: SPT / NQ2		LAT / LONG: 39.880097, -81.763236		1 OF 1											
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/ RQD	REC (%)	HP ID	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
TOPSOIL (7.0')		842.8	1	9													
VERY DENSE, BROWN, STONE FRAGMENTS WITH SAND AND SILT, TRACE CLAY, DAMP		842.2	2	21	83	SS-1	44	3	24	20	9	NP	NP	NP	6	A-2-4 (0)	
SILTSTONE, BROWN AND REDDISH BROWN, SEVERELY TO HIGHLY WEATHERED, WEAK, VERY THIN BEDDED, ARENACEOUS.		839.8	3	33													
SILTSTONE, BROWN AND REDDISH BROWN, SEVERELY TO HIGHLY WEATHERED, WEAK, VERY THIN BEDDED, ARENACEOUS.		836.3	4	42	100	SS-2	-	-	-	-	-	-	-	-	8	Rock (V)	
SILTSTONE, YELLOWISH GRAY AND GRAYISH BROWN, HIGHLY WEATHERED, SLIGHTLY TO MODERATELY STRONG, ARENACEOUS, JOINT, FRACTURED, NARROW TO OPEN, SLIGHTLY ROUGH; RQD 0%, REC 75%.			5	23	100	SS-3	-	-	-	-	-	-	-	-	9	Rock (V)	
@6.5' - 7.5'; $l_{d2} = 96.1\%$			6	30	100	SS-3	-	-	-	-	-	-	-	-	9	Rock (V)	
@6.5' - 12.0'; $S_c = 4,326$ psi			7	40	100	SS-4	-	-	-	-	-	-	-	-	8	Rock (V)	
@ 12.2' - 13.0'; $l_{d2} = 96.9\%$			8	0	58	NQ2-1										CORE	
@12.0' - 13.7'; $S_c = 2,865$ psi			9	0	63	NQ2-2										CORE	
SANDSTONE, YELLOWISH GRAY AND GRAYISH BROWN, HIGHLY WEATHERED, WEAK JOINT, FRACTURED TO MODERATELY FRACTURED, NARROW, SLIGHTLY ROUGH; RQD 47%, REC 96%.		821.4	10	0	89	NQ2-3										CORE	
@22.8' - 24.7'; $l_{d2} = 98.2\%$			11	0	88	NQ2-4										CORE	
@ 23.2' - 24.0'; $\gamma = 165$ pcf; $Q_u = 8,693$ psi			12	0	54	NQ2-5										CORE	
@ 23.7' - 24.0'; $\gamma = 165$ pcf; $Q_u = 8,693$ psi			13	0	85	NQ2-6										CORE	
@ 26.1' - 32.2'; $l_{d2} = 93.8\%$			14	0	83	NQ2-7										CORE	
@26.6'; YELLOWISH GRAY AND GRAYISH BROWN, HIGHLY WEATHERED, WEAK, FRACTURED.			15	63	100	NQ2-8										CORE	
INTERBEDDED SILTSTONE (60%) AND SHALE (40%), JOINT, FRACTURED TO MODERATELY FRACTURED, NARROW, SLIGHTLY ROUGH, RQD 15%, REC. 89%.		813.1	16	89	100	NQ2-9										CORE	
SILTSTONE, YELLOWISH GRAY AND GRAYISH BROWN, HIGHLY WEATHERED, WEAK TO SLIGHTLY STRONG, VERY THIN BEDDED, ARENACEOUS.			17	0	92	NQ2-10										CORE	
SHALE, YELLOWISH GRAY AND GRAYISH BROWN, HIGHLY WEATHERED, VERY WEAK, LAMINATED TO VERY THIN BEDDED.			18	0	93	NQ2-11										CORE	
@29.9' - 32.0'; SILTSTONE, $S_c = 1,217$ psi			19	32	82	NQ2-12										CORE	
@32.1' - 32.3'; HEALED HIGH ANGLE JOINT			20	0	97	NQ2-13										CORE	
@32.3' - 34.2'; SILTSTONE, $l_{d2} = 94.1\%$			21	0	82	NQ2-12										CORE	
@32.8' - 34.4'; SILTSTONE, $S_c = 1,641$ psi			22	0	82	NQ2-12										CORE	
@33.0' - 34.9'; HIGH ANGLE FRACTURE			23	0	82	NQ2-12										CORE	
@35.3' - 36.5'; SHALE, $l_{d2} = 63.8\%$			24	0	82	NQ2-12										CORE	
@35.3' - 36.0'; SHALE, $S_c = 600$ psi			25	0	82	NQ2-12										CORE	
@36.9' - 38.3'; HIGH ANGLE JOINT			26	0	82	NQ2-12										CORE	
@43.8' - 44.5'; LIMESTONE LAYER, MODERATELY WEATHERED		798.3	27	0	82	NQ2-12										CORE	
@44.1' - 44.5'; LIMESTONE, $\gamma = 170$ pcf; $Q_u = 14,874$ psi			28	0	82	NQ2-12										CORE	
SHALE, DARK GRAY, HIGHLY TO MODERATELY WEATHERED, VERY WEAK, LAMINATED, SLIGHTLY CARBONACEOUS, POORLY FISSILE; RQD 57%, REC 98%.			29	0	82	NQ2-12										CORE	
@46.0' - 47.8'; $l_{d2} = 83.4\%$			30	0	82	NQ2-12										CORE	
@46.6' - 47.6'; $S_c = 1,444$ psi			31	0	82	NQ2-12										CORE	
@48.2'; CARBONACEOUS.			32	0	82	NQ2-12										CORE	
COAL, BLACK, HIGHLY WEATHERED, IMPURE; RQD 0%, REC 83%.		793.3	33	0	82	NQ2-12										CORE	
		792.8	34	0	82	NQ2-12										CORE	
			35	0	82	NQ2-12										CORE	
			36	0	82	NQ2-12										CORE	
			37	0	82	NQ2-12										CORE	
			38	0	82	NQ2-12										CORE	
			39	0	82	NQ2-12										CORE	
			40	0	82	NQ2-12										CORE	
			41	0	82	NQ2-12										CORE	
			42	0	82	NQ2-12										CORE	
			43	0	82	NQ2-12										CORE	
			44	0	82	NQ2-12										CORE	
			45	0	82	NQ2-12										CORE	
			46	0	82	NQ2-12										CORE	
			47	0	82	NQ2-12										CORE	
			48	0	82	NQ2-12										CORE	
			49	0	82	NQ2-12										CORE	
			50	0	82	NQ2-12										CORE	

NOTES: LAT/LONG/ELEV FROM DISTRICT SURVEY GRADE INSTRUMENTS. HOLE DRY UPON COMPLETION. ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTINGS MIXED WITH 50 LB. BENTONITE CHIPS

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GEOTECHNICAL PROFILE - ROCKFALL
 BORING LOG B-003-0-23



Office of Geotechnical Engineering

B-001-0-23



Run #:	Depth	Recovery	RQD
NQ2-1	12.0'	20/24	0%
NQ2-2	14.0'	23/24	25%
NQ2-3	16.0'	22/24	0%
NQ2-4	18.0'	24/24	0%
NQ2-5	20.0'	24/24	88%

Mus-146-29.46 PID 115988



Office of Geotechnical Engineering

B-001-0-23



Run #:	Depth	Recovery	RQD
NQ2-6	22.0'	24/24	100%
NQ2-7	24.0'	36/36	100%
NQ2-8	27.0'	36/36	100%
NQ2-9	30.0'	22/24	92%

Mus-146-29.46 PID 115988

DESIGN AGENCY



DESIGNER

AJC

REVIEWER

SAT 08/02/23

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115988

SUBSET TOTAL

9 15

SHEET TOTAL

P.40 46

GEOTECHNICAL PROFILE - ROCKFALL
 ROCK CORE PHOTOS FOR B-001-0-23



Office of Geotechnical Engineering

B-001-0-23



Run #:	Depth	Recovery	RQD
NQ2-10	32.0'	60/60	20/60
NQ2-11	37.0'	60/60	31/60
Mus-146-29.46 PID 115988			



Office of Geotechnical Engineering

B-001-0-23



Run #:	Depth	Recovery	RQD
NQ2-12	42.0'	45/48	24/48
NQ2-13	46.0'	11/12	11/12
NQ2-14	47.0'	18/18	5/18
NQ2-15	48.5'	18/18	0/18
Mus-146-29.46 PID 115988			



DESIGN AGENCY		
DESIGNER	AIC	
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SUBSET	TOTAL	
10	15	
SHEET	TOTAL	
P.41	46	

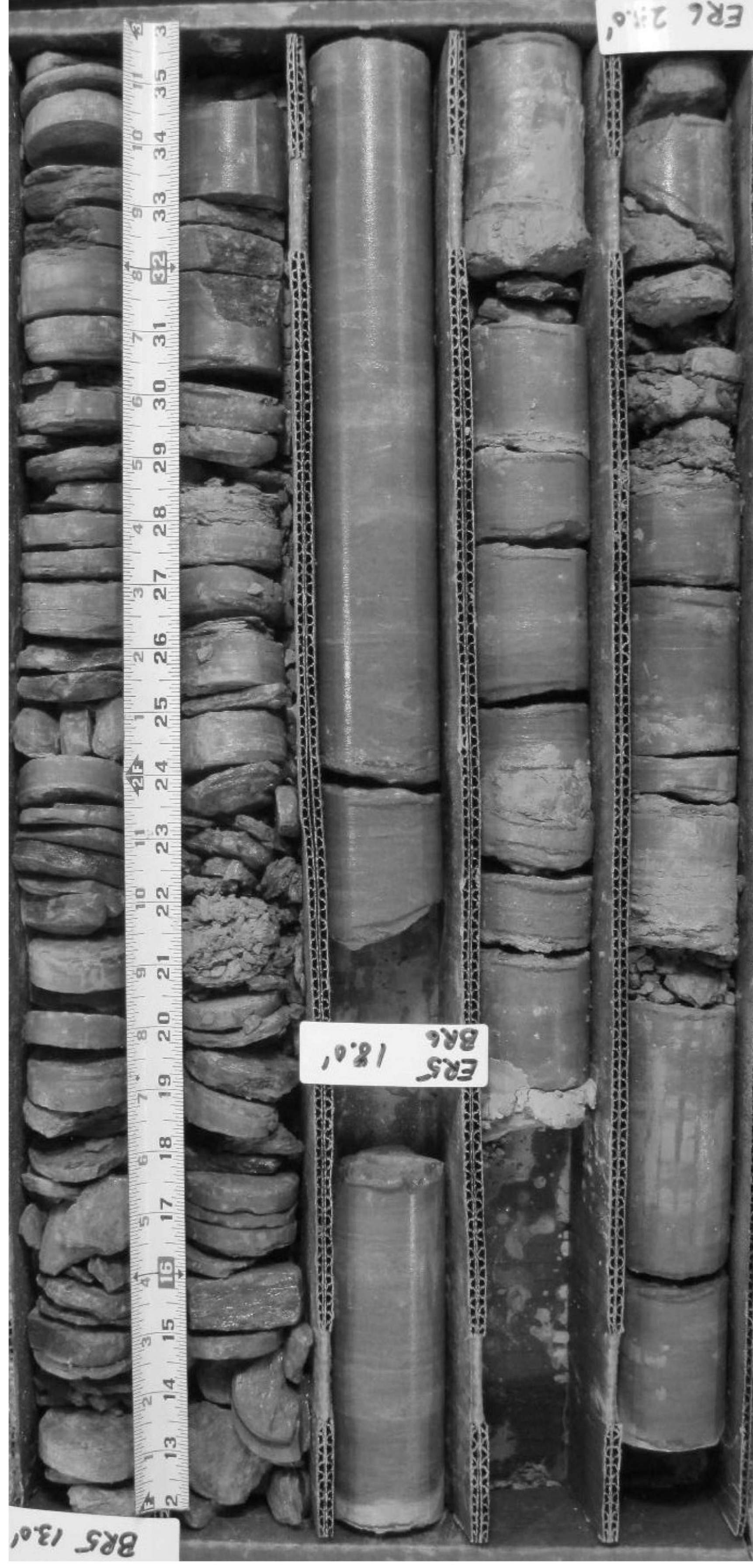
GEOTECHNICAL PROFILE - ROCKFALL
 ROCK CORE PHOTOS FOR B-001-0-23

B-002-0-23



Run #:	Depth	Recovery	RQD
NQ2-1	6.0'	14/24	58%
NQ2-2	8.0'	19/24	79%
NQ2-3	10.0'	16/24	67%
NQ2-4	12.0'	5/12	42%
Mus-146-29.46 PID 115988			

B-002-0-23



Run #:	Depth	Recovery	RQD
NQ2-5	13.0'	53/60	88%
NQ2-6	18.0'	54/60	90%
Mus-146-29.46 PID 115988			



Office of Geotechnical Engineering

B-002-0-23



Run #:	Depth	Recovery	RQD
NQ2-7	23.0'	46/60	0/60 0%
NQ2-8	28.0'	52/60	6/60 10%
Mus-146-29.46 PID 115988			



Office of Geotechnical Engineering

B-002-0-23



Run #:	Depth	Recovery	RQD
NQ2-9	33.0'	24/24	0/24 0%
NQ2-10	35.0'	21/24	0/24 0%
NQ2-11	37.0'	24/24	9/24 38%
NQ2-12	39.0'	44/48	22/48 46%
Mus-146-29.46 PID 115988			

DESIGN AGENCY



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12 15

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P.43 46

GEOTECHNICAL PROFILE - ROCKFALL
 ROCK CORE PHOTOS FOR B-002-0-23



Office of Geotechnical Engineering

B-002-0-23



Run #:	Depth	Recovery	RQD
NQ2-13	43.0'	84/84	15/84
Mus-146-29.46 PID 115988			



Office of Geotechnical Engineering

B-003-0-23



Run #:	Depth	Recovery	RQD
NQ2-1	6.5'	14/24	0/24
NQ2-2	8.5'	15/24	0/24
NQ2-3	10.5'	16/18	0/18
Mus-146-29.46 PID 115988			

DESIGN AGENCY



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SAT 08/02/23

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SUBSET TOTAL
13 15

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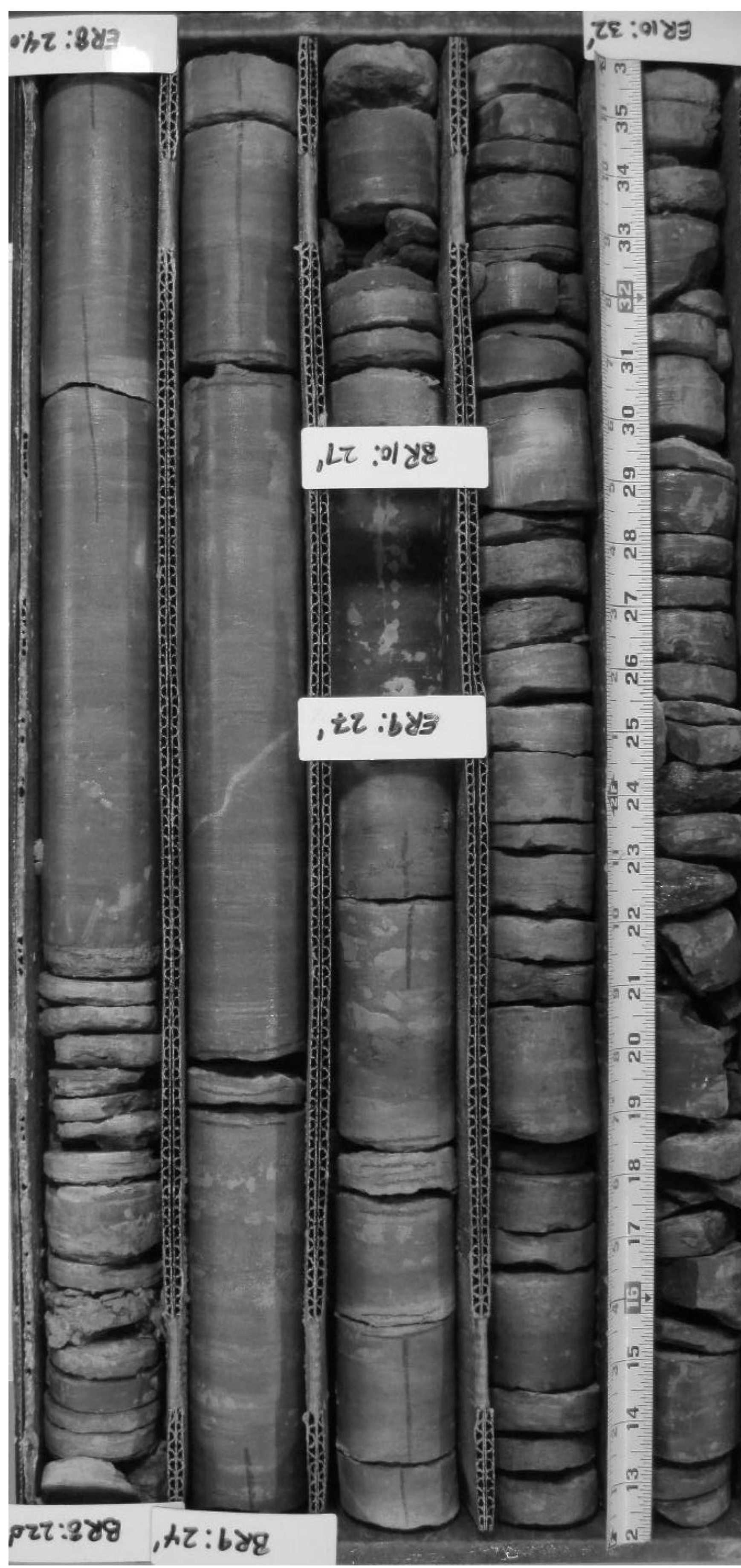
B-003-0-23



Run #:	Depth		Recovery		RQD	
	12.0'	14.0'	21/24	88%	0/24	0%
NQ2-4	12.0'	14.0'	21/24	88%	0/24	0%
NQ2-5	14.0'	16.0'	13/24	54%	0/24	0%
NQ2-6	16.0'	20.0'	41/48	85%	0/48	0%
NQ2-7	20.0'	22.0'	20/24	83%	0/24	0%

Mus-146-29.46 PID 115988

B-003-0-23



Run #:	Depth		Recovery		RQD	
	22.0'	24.0'	24/24	100%	15/24	63%
NQ2-8	22.0'	24.0'	24/24	100%	15/24	63%
NQ2-9	24.0'	27.0'	36/36	100%	32/36	89%
NQ2-10	27.0'	32.0'	55/60	92%	0/60	0%

Mus-146-29.46 PID 115988



Office of Geotechnical Engineering

B-003-0-23



Run #:	Depth	Recovery	RQD
NQ2-11	32.0'	56/60	19/60
NQ2-12	37.0'	49/60	0/60
Mus-146-29.46 PID 115988			



Office of Geotechnical Engineering

B-003-0-23



Run #:	Depth	Recovery	RQD
NQ2-13	42.0'	93/96	41/96
Mus-146-29.46 PID 115988			

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 ROCK CORE PHOTOS FOR B-003-0-23