	CONTENTS		<b>STATE OF NORTH CAROLINA</b> DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT
0000	<u>SHEET NO.</u> 2 3 4 5-8 9-24 25	DESCRIPTION TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE CROSS SECTION(S) BORE LOG(S), CORE LOG(S), CORE PHOTOGRAPH(S) ROCK TEST RESULT(S)	STRUCTURE SUBSURFACE INVESTIGATION
	26	SITE PHOTOGRAPH(S)	COUNTY <u>Cabbarrus</u> SITE DESCRIPTION <u>Bridge No. 57 on US 29%01 NBL</u> over Irish Buffalo Creek

5808

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REFERENCE

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PROJEC

STATE STATE PROJECT REFERENCE NO.	SHEET NQ.	TOTAL SHEETS
N.C. <b>B–5808</b>	1	26

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (99) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAIL

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-FLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOSTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL MOSTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO LIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE NOT CLIMATINE THE THAT FINDE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTWENT DOES NOT WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATION AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL CONDENSITIONS OF FOR ANY EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONTINIONS FOR ON THO THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J.K. Stickney

C.L. Smith

B.E. Foster

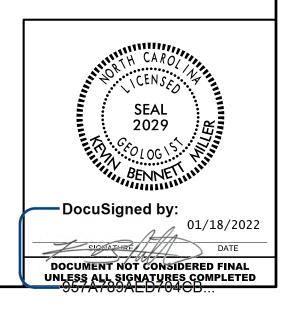
INVESTIGATED BY \_\_\_\_\_\_. Stickney

DRAWN BY <u>T.T.</u> Walker, F&R Inc.

CHECKED BY \_\_\_\_\_\_. Beverly

SUBMITTED BY K.B. Miller

DATE January 2020



# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		SOIL	DES	CRIPT	ION				r		GRADATION			Т			ROCK DES	SCRIPTION	
BE PENETRA ACCORDING	ATED WITH G TO THE S	INCONSOLIDATED, SEMI-CO A CONTINUOUS FLIGHT PI TANDARD PENETRATION T	OWER EST (	AUGER AN AASHTO T	ND YIELD LES F 206,ASTM [	S THAN 100 E	LOWS PER F LASSIFICATI	00T		NDICATES TI	D REPRESENTATION OF PA HAT SOIL PARTICLES AR RE OF UNIFORM PARTICL	E ALL APPROXI	MATELY THE SAME SIZE.	ROCK LINE SPT REFUSA	INDICATES T AL IS PENET	THE LEVEL TRATION BY	AT WHICH NON-COA A SPLIT SPOON SA	OULD YIELD SPT REFUSAL IN STAL PLAIN MATERIAL WOULD MPLER EQUAL TO OR LESS T	D YIELD SI THAN Ø.1 FI
CONSISTENC	CY, COLOR, T	AASHTO SYSTEM, BASIC EXTURE, MOISTURE, AASHT	TO CL#	ASSIFICAT	TION, AND OTH	ER PERTINENT	FACTORS S	ИСН			NGULARITY OF G			REPRESENTE	D BY A ZON	NE OF WEAT	THERED ROCK.	NSITION BETWEEN SOIL AND	J RUCK IS
		CAL COMPOSITION, ANGUL								Y OR ROUN	IDNESS OF SOIL GRAINS		BY THE TERMS:		IALS ARE T	TYPICALLY E	DIVIDED AS FOLLOW		
	SO	IL LEGEND AND		SHTO	CLASSIF				ANGULAR, SUBAN		BROUNDED, OR ROUNDED.			WEATHERED ROCK (WR)			100 BLOWS PER FC		
GENERAL CLASS.		ANULAR MATERIALS 35% PASSING =200)			y Materials Assing #200)	ORGAN	IC MATERIALS			MES SUCH A	AS QUARTZ, FELDSPAR, MI	CA, TALC, KAOLI		CRYSTALLIN ROCK (CR)	e 🎽	LAC LAS	WOULD YIELD SPT	RAIN IGNEOUS AND METAMOR	PHIC ROCK
	A-1 4	A-2-4 A-2-5 A-2-6 A-		4-4 A-5	A-6 A-7		A-4, A-5 A-6, A-7		ARE USED IN	I DESCRIPT	TONS WHEN THEY ARE CO		IGNIFICANCE.	NON-CRYSTA			GNEISS, GABBRO, SC FINE TO COARSE G	RAIN METAMORPHIC AND NON	-COASTAL
	0000000	H-2-4 H-2-5 H-2-6 H			A-7-6					HTLY COMPR	RESSIBLE	LL < 31		ROCK (NCR)			ROCK TYPE INCLUD	THAT WOULD YEILD SPT RE ES PHYLLITE, SLATE, SANDST DIMENTS CEMENTED INTO RO	ONE, ETC.
% PASSING				<u> </u>			CII 7		HIGHL	LY COMPRES	MPRESSIBLE SSIBLE	LL = 31 LL > 51		COASTAL PL SEDIMENTAR (CP)				K TYPE INCLUDES LIMESTONE	
*10 50 M	MX MX 50 MX 51	MN				granular Soils	LLAT	MUCK, PEAT			RCENTAGE OF MA	ſERIAL			E			IERING	
		MX 35 MX 35 MX 35 MX 35	мх зе	5 MN 36 M	N 36 MN 36 MN		SOILS		ORGANIC MATERIAL	<u>.</u>	RANULAR SILT - CLAY SOILS SOILS		ER MATERIAL	FRESH				S MAY SHOW SLIGHT STAINING	3. ROCK RI
MATERIAL PASSING #40									TRACE OF ORGANIC MA LITTLE ORGANIC MATT		2 - 3% 3 - 5% 3 - 5% 5 - 12%	TRACE		VERY SLIGHT		F CRYSTALLI		SOME JOINTS MAY SHOW THIN	
LL	_ 6 MX	- 40 MX 41 MN 40 MX 41 NP 10 MX 10 MX 11 MN 11				SOILS W LITTLE	OR ,	HIGHL Y	MODERATELY ORGANIC HIGHLY ORGANIC		5 - 10% 12 - 20% > 10% > 20%	SOME HIGHL	20 - 35% 7 35% AND ABOVE	(V SLI.)	CRYSTALS	ON A BROKE	EN SPECIMEN FACE S	SHINE BRIGHTLY. ROCK RINGS U	
GROUP INDEX		0 0 4 MX			X 16 MX NO MX	MODERA AMOUNTS		rganic			GROUND WATE	2		SLIGHT		STALLINE NA		AND DISCOLORATION EXTENDS	INTO ROCK
	INE FRAGS. F	INE SILTY OR CLAYEY		SILTY	CLAYEY	ORGANI MATTE	- I	SOILS	$\nabla$	WATER L	EVEL IN BORE HOLE IMM	EDIATELY AFT	R DRILLING	(SL1.)				IN GRANITOID ROCKS SOME OC YSTALLINE ROCKS RING UNDER	
	SAND S	AND GRAVEL AND SAND		SOILS	SOILS				<b>▼</b>	STATIC	WATER LEVEL AFTER 2	4 HOURS		MODERATE	SIGNIFICAN	NT PORTIONS	S OF ROCK SHOW DIS	COLORATION AND WEATHERING	EFFECTS.
GEN. RATING AS SUBGRADE	E)	CELLENT TO GOOD		FAIR	TO POOR	FAIR TO POOR	POOR UN	GUITABLE	<u> </u>	PERCHED	) WATER, SATURATED ZON	S, OR WATER BE	ARING STRATA	(MOD.)				ULL AND DISCOLORED, SOME SH HOWS SIGNIFICANT LOSS OF S	
H5 SUBURHUE	PI	OF A-7-5 SUBGROUP IS ≤ LL	30	PLOF A-7	7-6 SUBGROUP IS				- M-	SPRING (	OR SEEP				WITH FRES			CTAINED IN CRANITOID DOCK	
		CONSISTEN								MIS	SCELLANEOUS SY	MBOLS		MODERATELY SEVERE	AND DISCO	OLORED AND	A MAJORITY SHOW	STAINED. IN GRANITOID ROCK	EVERE LOS
PRIMARY SOIL		COMPACTNESS OR	PF		F STANDARD IN RESISTENCE		OF UNCONF			ANKMENT (	RF) 25/025 DIP & DIF	DIRECTION		(MOD. SEV.)			ED WITH A GEOLOGIS <u>ELD SPT REFUSAL</u>	T'S PICK. ROCK GIVES 'CLUNK'	SOUND WH
		CONSISTENCY		(N-1	VALUE)		TONS/FT <sup>2</sup> )		WITH SOIL DE			STRUCTURES		SEVERE				STAINED. ROCK FABRIC CLEAR	
GENERALLY GRANULAR		VERY LOOSE LOOSE			< 4 TO 10				SOIL SYMBOL			BORING	SLOPE INDICATOR	(SEV.)	TO SOME E	EXTENT. SOM	ME FRAGMENTS OF S	N GRANITOID ROCKS ALL FELD TRONG ROCK USUALLY REMAIN.	JSPHNS HNE
MATERIAL		MEDIUM DENSE DENSE			TO 30 TO 50		N/A		ARTIFICIAL FI	ILL (AF) OT			CONE PENETROMETER	VERY			<u>ELD SPT N VALUES &gt;</u>	<u>100 BPF</u> 8 STAINED. ROCK FABRIC ELEM	NTS ARE
(NON-COHES	SIVE)	VERY DENSE		>	50						$\vdash$			SEVERE (V SEV.)	BUT MASS	5 IS EFFECTI	IVELY REDUCED TO S	OIL STATUS, WITH ONLY FRAGM ROCK WEATHERED TO A DEGR	MENTS OF S
GENERALLY	Y	VERY SOFT SOFT			< 2 TO 4	ø	< 0.25 25 TO 0.5		- INFERRED SOIL	L BOUNDAR	MW -	NG •	SOUNDING ROD	(V 524.)				AIN. <u>IF TESTED, WOULD YIELD</u>	
SILT-CLAY MATERIAL	r	MEDIUM STIFF STIFF			TO 8 TO 15	6	1.5 TO 1.0 1 TO 2		INFERRED ROC	K LINE		Y	WITH CORE	COMPLETE				DISCERNIBLE, OR DISCERNIBLE BE PRESENT AS DIKES OR ST	
(COHESIVE)	)	VERY STIFF HARD			TO 30 30		2 TO 4 > 4		ALLUVIAL SOI	L BOUNDAR	AY A PIEZOMETI INSTALLA		)- SPT N-VALUE		ALSO AN E				
		TEXTURE	OR							REC	COMMENDATION SI	MBOLS						ARDNESS	
U.S. STD. SIEVE	E SIZE	4 10		40	60 200						SSIFIED EXCAVATION - TABLE WASTE		ASSIFIED EXCAVATION - PTABLE, BUT NOT TO BE	VERY HARD			OF THE GEOLOGIST	RP PICK. BREAKING OF HAND SI S PICK.	PELIMENS I
OPENING (MM)		4.76 2.0		Ø.42	0.25 0.07				SHALLOW		SSIFIED EXCAVATION -	USED	IN THE TOP 3 FEET OF	HARD		CRATCHED B		LY WITH DIFFICULTY. HARD HA	AMMER BLO
(BLDR.)	COBE (CO			SAND	SANI (F SE			_AY :L_)				•		MODERATELY	CAN BE SO	CRATCHED B	Y KNIFE OR PICK. GO	DUGES OR GROOVES TO 0.25 IN	
GRAIN MM	305	75 2.0		SE. SD.)	0.25	0.05	0.005		AR - AUGER REFUSAL		ABBREVIATION: MED MEDIUM		- VANE SHEAR TEST	HARD		D BY HARD E RATE BLOWS.	BLOW OF A GEOLOGI	ST'S PICK. HAND SPECIMENS CA	AN BE DET
SIZE IN.	12	3							BT - BORING TERMINATED CL CLAY	C	MICA MICACEOUS MOD MODERATELY	WEA	• • WEATHERED • UNIT WEIGHT	MEDIUM HARD				DEEP BY FIRM PRESSURE OF EICES 1 INCH MAXIMUM SIZE B	
		IL MOISTURE -			TION OF	TERMS			CPT - CONE PENETRATION	N TEST	NP - NON PLASTIC		- DRY UNIT WEIGHT	HHKU		A GEOLOGIS		EICES I INCH MHAIMUM SIZE B	JI NHRU BL
	DISTURE SO RBERG LIMI				GUIDE FOR	FIELD MOIST	JRE DESCRI	PTION	CSE COARSE DMT - DILATOMETER TES	ят	ORG ORGANIC PMT - PRESSUREMETE	R TEST	SAMPLE ABBREVIATIONS	SOFT				NIFE OR PICK. CAN BE EXCAVE BY MODERATE BLOWS OF A PI	
		- SATUR	RATED	) -	USUALLY LI	OUID; VERY W	ET, USUALL'	(	DPT - DYNAMIC PENETRA1 e - VOID RATIO	TION TEST	SAP SAPROLITIC SD SAND, SANDY		BULK - SPLIT SPOON				EN BY FINGER PRESS		
	_ LIQUID L	(SA1	r.)		FROM BELO	W THE GROUN	D WATER T	ABLE	F - FINE FOSS FOSSILIFEROUS		SL SILT.SILTY SLI SLIGHTLY	ST	- SHELBY TUBE - ROCK	VERY SOFT	OR MORE 1	IN THICKNES		AVATED READILY WITH POINT C Y FINGER PRESSURE. CAN BE	
PLASTIC RANGE <		- WET -	- (14)		SEMISOLID;	REQUIRES DR	YING TO		FRAC FRACTURED, FRAC	TURES	TCR - TRICONE REFU	SAL RT	- RECOMPACTED TRIAXIAL		FINGERNAI				DINC
(PI)	_ PLASTIC				ATTAIN OPT	IMUM MOISTL	RE		FRAGS FRAGMENTS HI HIGHLY		₩ - MOISTURE CONTE V - VERY	NI CBR	- CALIFORNIA BEARING RATIO	TERM		RE SPAC	SPACING	TERM	DING <u>T</u> +
		MOIST	- (M	Ð	SOLID:AT C	IR NEAR OPTI	MUM MOIST	JRE	EQI	UIPMENT	T USED ON SUBJ	ECT PROJE	ECT	VERY WII WIDE	JE		THAN 10 FEET O 10 FEET	VERY THICKLY BEDDED THICKLY BEDDED	
	_ OPTIMUM _ SHRINKAC	MUISTURE							DRILL UNITS:	_	NG TOOLS: AY BITS		R TYPE:		ELY CLOSE	1 T	O 3 FEET	THINLY BEDDED	0.16 0.03
		- DRY -	- (D)			DDITIONAL W			CME-450		CONTINUOUS FLIGHT AUGEF	. —		VERY CL	JSE		HAN Ø.16 FEET	THICKLY LAMINATED	0.008
						IMUM MOISTU	nE		CME-55		HOLLOW AUGERS	CORE S					INDUR	THINLY LAMINATED	< 0.
				Y INDEX		004	STRENGTH		CME-550		RD FACED FINGER BITS			FOR SEDIME	NTARY ROCK	KS. INDURATI		ING OF MATERIAL BY CEMEN	TING. HEAT
	LASTIC		e	0-5	<u>xr 1)</u>	VE	RY LOW				NGCARBIDE INSERTS	X-N		FRIA			RUBBING WITH	FINGER FREES NUMEROUS GR BY HAMMER DISINTEGRATES S	RAINS;
MODERA	TLY PLAST RATELY PLA	STIC	16	-15 5-25			SLIGHT 1EDIUM		VANE SHEAR TEST		SING X W/ ADVANCER	HAND T	OOLS: OST HOLE DIGGER					SEPARATED FROM SAMPLE I	
HIGHLY	Y PLASTIC			R MORE			HIGH		PORTABLE HOIST		ICONE STEEL TE		AND AUGER	MODE	RATELY IND	URATED	BREAKS EASILY	WHEN HIT WITH HAMMER.	
			COL						X CME-550X		ICONE TUNGCA	- 」 Ц °	OUNDING ROD	INDUF	RATED			FFICULT TO SEPARATE WITH BREAK WITH HAMMER.	STEEL PR
		CLUDE COLOR OR COLO H AS LIGHT, DARK, STRE						AY).			RE BIT	🗌 V	ANE SHEAR TEST	EVTD	EMELY INDU		SHARP HAMMER	BLOWS REQUIRED TO BREAK	SAMPLE;
		,								=							SAMPLE BREAKS	S ACROSS GRAINS.	

# project reperence no. B-5808



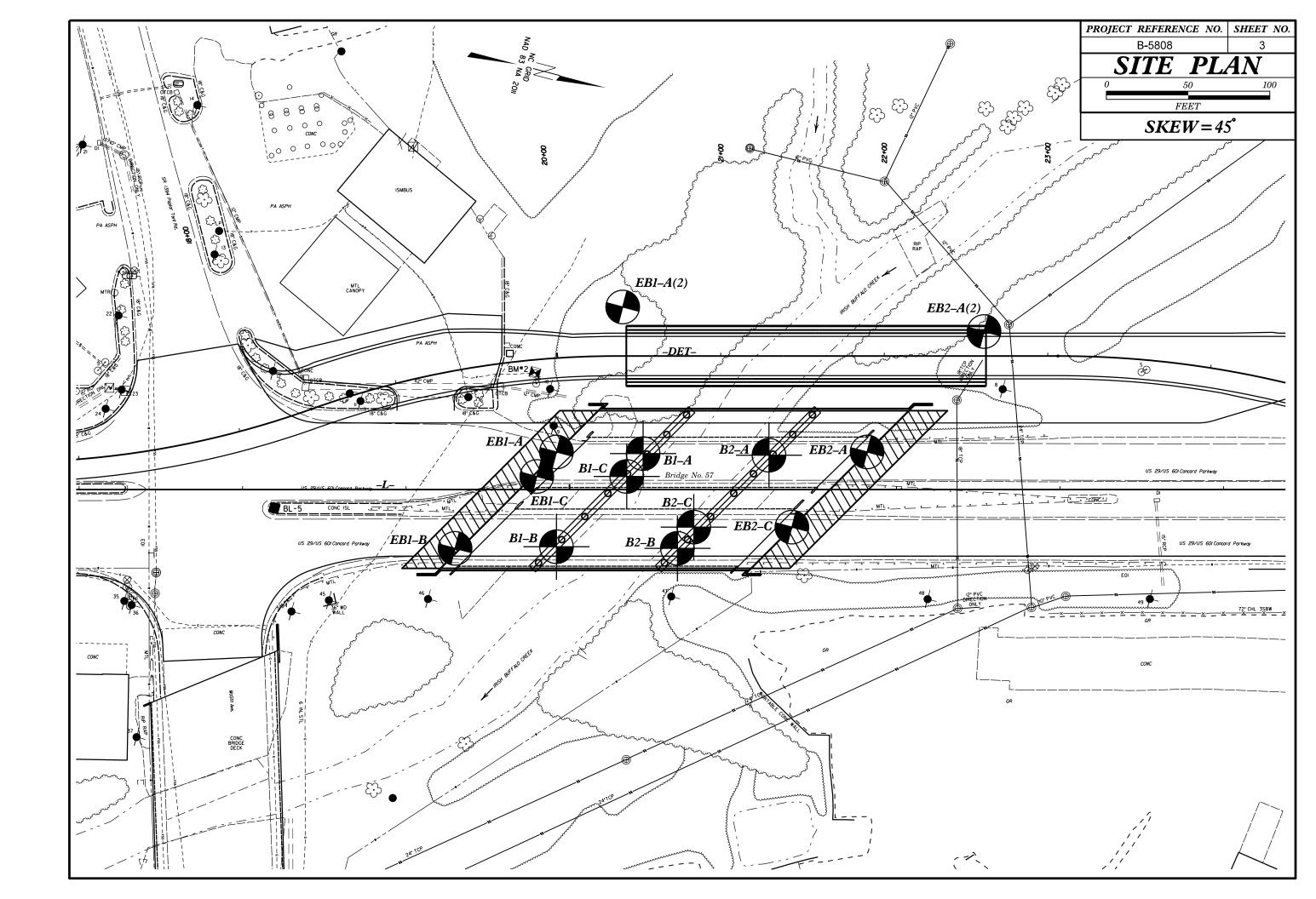
TED. AN INFERRED	TERMS AND DEFINITIONS
D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
0.1 FOOT PER 60 < IS OFTEN	ADUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
PT N VALUES >	ARCILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ROCK THAT INCLUDES GRANITE,	APTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
TAL PLAIN . IF TESTED. TC.	OLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
T MAY NOT YIELD DSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
< RINGS UNDER	$\underline{DIKE}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
COATINGS IF OPEN.	$\overline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ROCK UP TO NAL FELDSPAR	FOULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
ER BLOWS. TS. IN LAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
TH AS COMPARED	PARENT MATERIAL. FLOOD PLAIN (FP)- LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
LOSS OF STRENGTH WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
HIC KHULINIZEU	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
ARE DISCERNIBLE	MOTTLED (MOTJ - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
OF STRONG ROCK AT ONLY MINOR VALUES < 100 BPF	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
Y IN SMALL AND	RESIDUAL (RES.)SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY <u>DESIGNATION (ROD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
RS. SAPROLITE IS	RUCK SCHUTT DESIGNATION (MOD) - A MERSURE OF RUCK BUALIT DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
INS REQUIRES	$\underline{SAPROLITE}$ (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
DEEP CAN BE DETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. D BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
N FRAGMENTS INT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
K. PIECES 1 INCH	<u>STRATA ROCK OUALITY DESIGNATION (SROD)</u> - A MEASURE OF ROCK OUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
CHED READILY BY	TOPSOIL (T.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BM#2: -L- STA. 19+78.83, 71.56' LT
THICKNESS 4 FEET	N: 609,812.6440, E: 1,519,260.6710
1.5 - 4 FEET	ELEVATION: N/A FEET
0.16 - 1.5 FEET .03 - 0.16 FEET	NOTES:
008 - 0.03 FEET < 0.008 FEET	FIAD= FILLED IMMEDIATELY AFTER DRILLING
HEAT, PRESSURE, ETC.	
Ε.	
STEEL PROBE:	
DDODE:	
PROBE;	

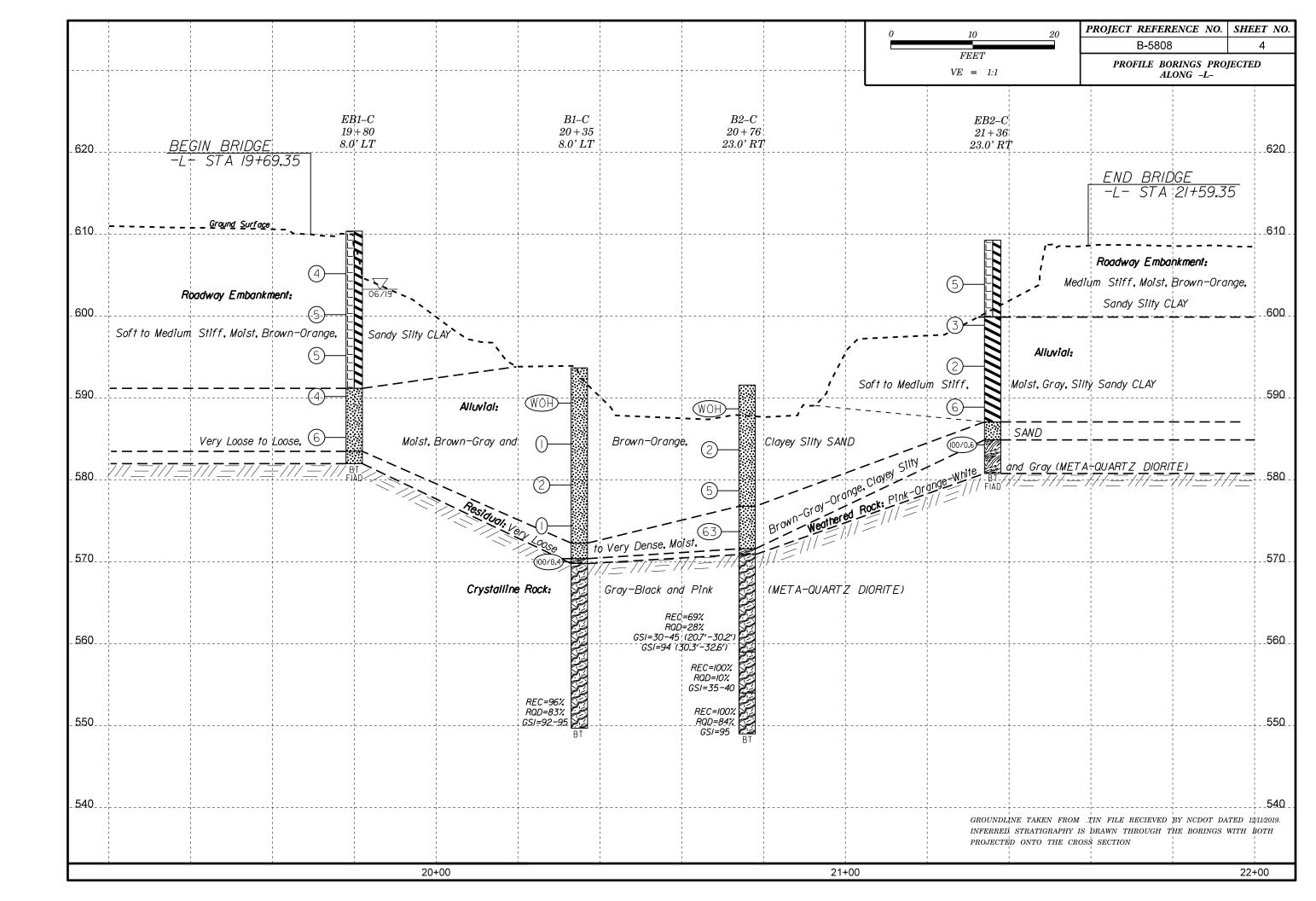
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

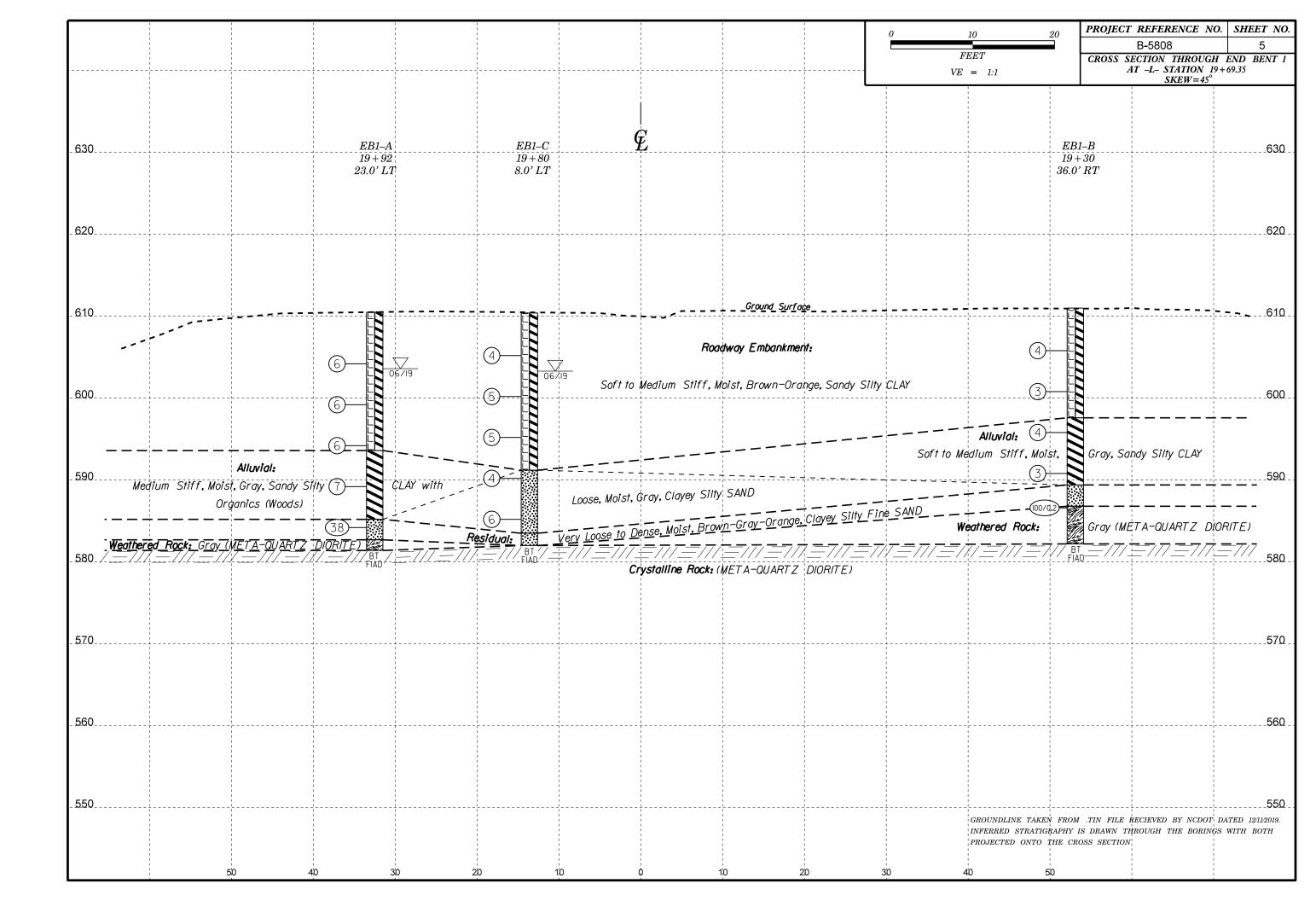
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

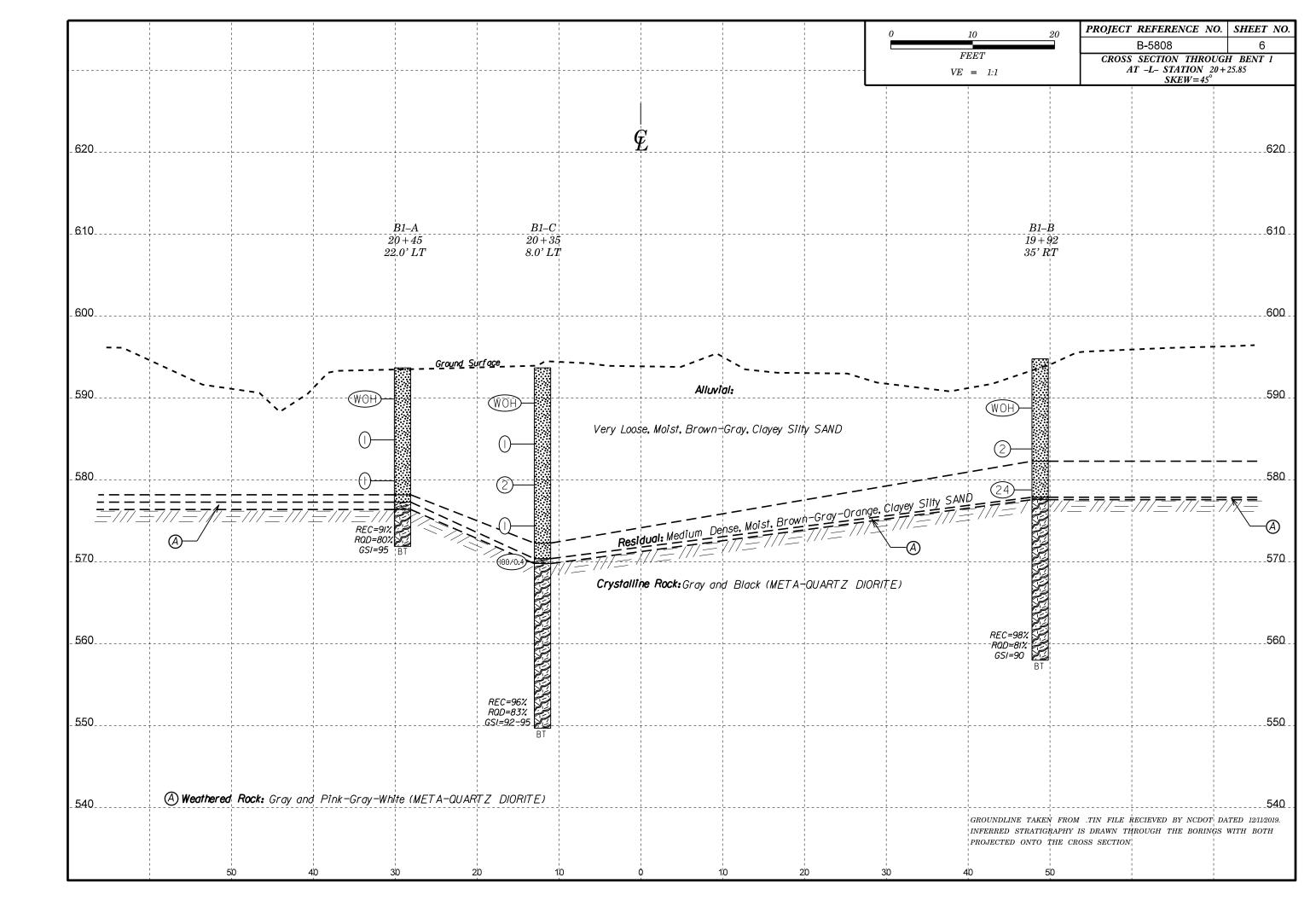
AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed P	Rock Mass (Marı	nos and Hoek,2	2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for T
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	VERY GOOD Very rough, fresh unweathered surfaces	<b>GOOD</b> Rough, slightly weathered, iron stained surfaces	<b>FAIR</b> Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	<b>VERY POOR</b> Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000) From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed fo by a slight shift to the right in the columns for fai poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.
STRUCTURE	DEC	CREASING SI	JRFACE QUA	ALITY 💳	⇒	COMPOSITION AND STRUCTURE
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A	A. Thick bedded, very blocky sondstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70 <sup>°</sup>				B. Sand- stone with thun inter-
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks		5	50			layers of siltstone
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly inter- locked, heavily broken rock mass			40	30		<b>C, D, E,</b> and <b>G</b> - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to <b>F</b> and <b>H</b> .
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces				20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A			10	Means deformation after tectonic disturbance

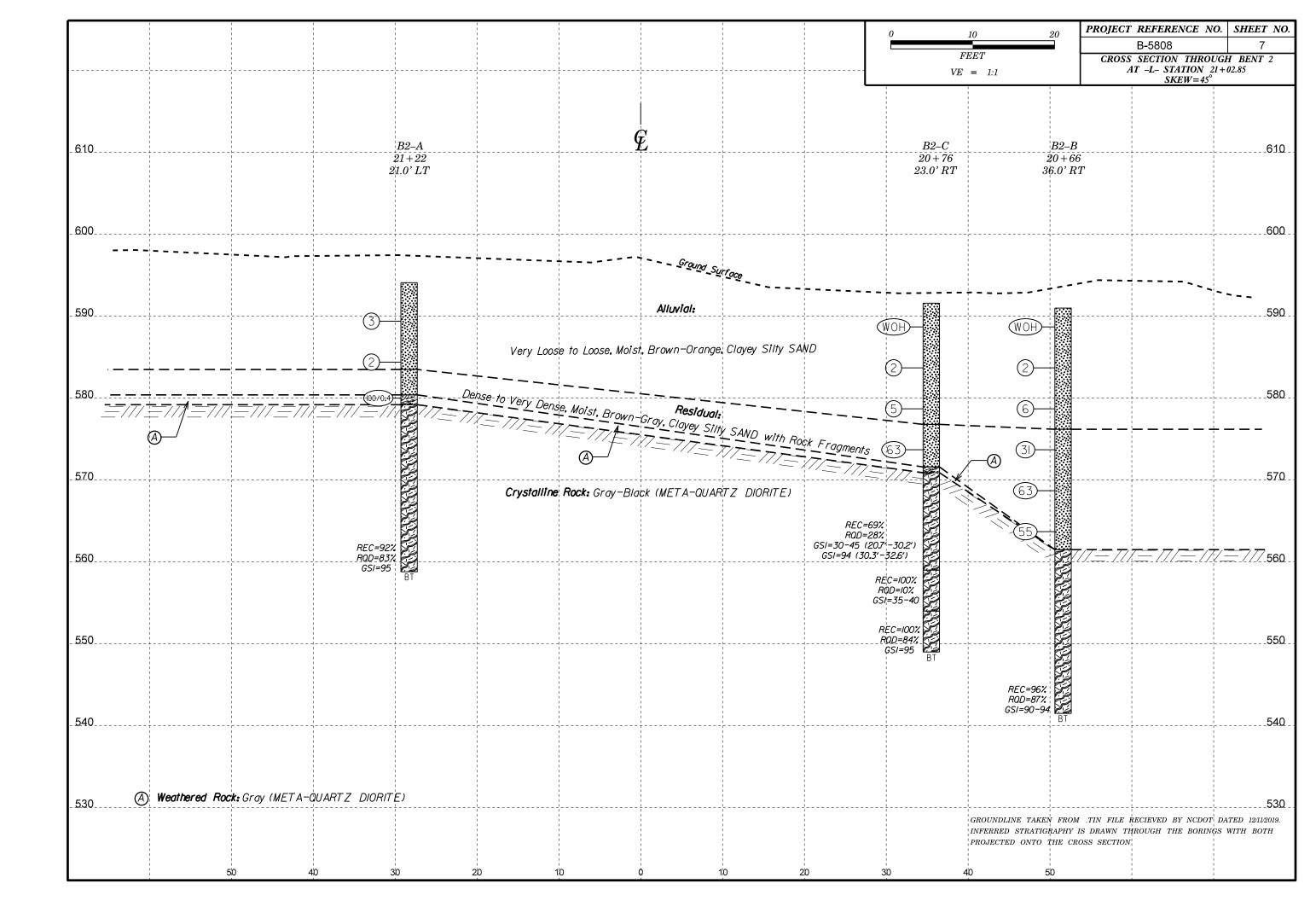
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lue	planes)	r O		ath		ur f.	sior	, Č	, slı	σ L L L
D L	ط ح ص	VERY GOOD - Very Rough, fresh unweathered surfaces		<b>GOOD -</b> Rough, slightly weathered surfaces		FAIR - Smooth, moderately weathered and altered surfaces	smooth, occasionally	fillings with angular	o th	sided or highly weathered surfaces with soft clay coatings or fillings
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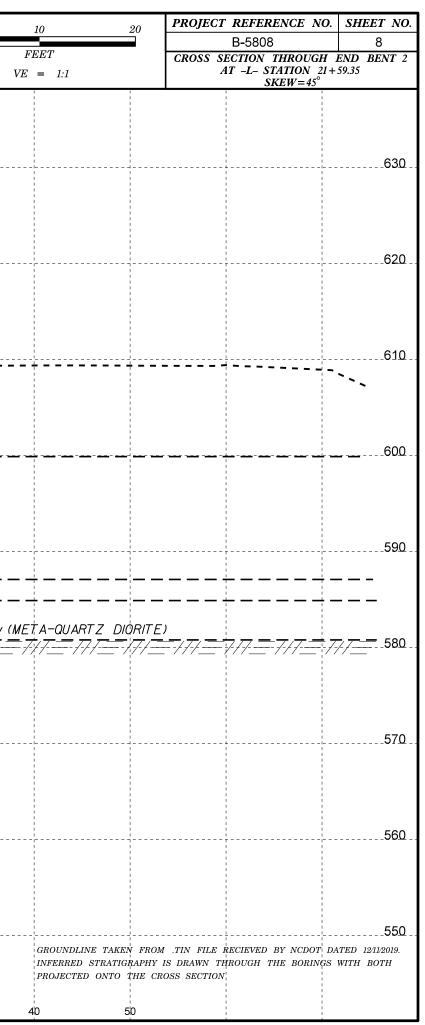




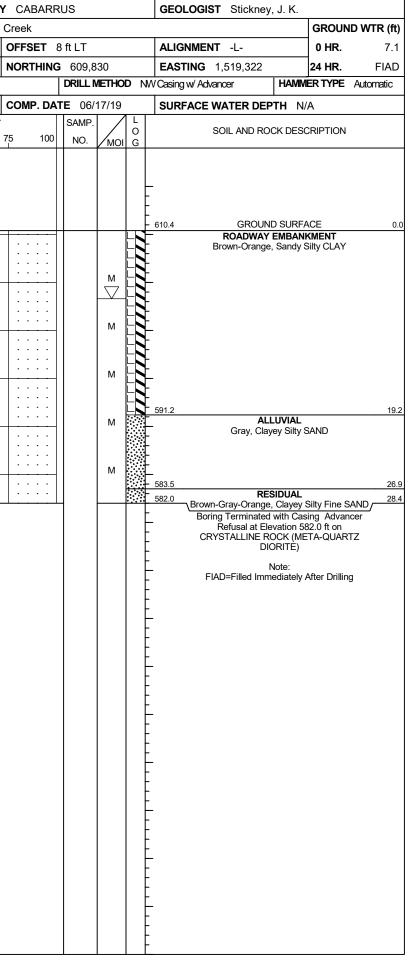




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610     60.5     GROUND SUBTACE     0.0       605     605.2     5.3     1     3       606     600.2     1.0.3     1     2       606     600.2     1.0.3     1     2       606     600.2     1.0.3     1     2       607     600.4     1     1       608     600.2     1.0.3     1     2       600     600.2     1.0.3     1     2       600     600.2     1.0.3     1     2       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1     1       1     1     1       1     1     1       1     1     1       1     1     1       1     1     1       1     1     1       1     1																															
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Gray (META-QUARTZ DIORITE)     Boring Terminated with Casing Advancer     Refusal at Elevation 581.4 ft on     CRYSTALLINE ROCK (META-QUARTZ     DIORITE)     Note:			‡						: <del>' : :</del> :-		÷+:::	÷÷¬			<i>977</i>	9	WEAT	HERED RO	ОСК				-				ļ∐i	· · ·			·
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JNT	Y	С	A	B/	٩R	RI	JS				GEO	LOG	IST	Sti	ckney,	, J. K.		
ffalo	С	ree	эk														GROUN	D WTR (ft)
	C	)FI	FS	E	Т	3	6 ft RT				ALIG	NME	NT	'-L-			0 HR.	NM
	Ν	0	R1	۲H	IIN	G	609,7	93			EAS	ſING	i 1	,519	,377		24 HR.	FIAD
							DRILL N	/IETHO	DN	W	Casing	w/ A	dvar	ncer		HAMM	ER TYPE	Automatic
	С	:0	MI	Ρ.	DA	١T	<b>E</b> 06/	05/19			SUR	FAC	ΞW	/ATE	R DEP	TH N/	A	
юот							SAMP.	▼∕	L O				5				RIPTION	
	75	5			100		NO.	моі	G	E	ELEV. (f	t)						DEPTH (ft)
										-								
										- 6	511.0			G	ROUN	) SURFA	ACE	0.0
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	-	÷	1	00	/0.2	Þ			977	_ 5	86.8			V	/EATHE	RED RC	СК	24.2
				•						-			G	Gray (N	/IETA-Q	UARTZ	DIORITE)	
		•	•	•	•	L		-	H	5	82.2	B	oring	a Torr	ainatod	with Cos	ing Advand	28.8
										_			F	Refusa	al at Ele	vation 58	32.2 ft on	
										-		C	RI	STAL		DCK (IME DRITE)	TA-QUART	2
										-						otes:		
										-		2	. FI/			ot Measu nediately	red After Drillin	ng
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WBS	45762	2.1.1				TIP	B-5808		COUNT	Y CABAR	RUS			GEOLOGI	ST Stickne	y, J. K.				WBS	45762.1.
SITE	DESCR		Bric	dge No	b. 57	on	US 29/601	Over Iris	h Buffalo	Creek							GROUN	D WTR (ft)		SITE	DESCRIPT
BOR	ING NO.	B1-A	۱		;	ST/	ATION 20	)+45		OFFSET	22 ft LT			ALIGNME	NT -L-		0 HR.	NM		BOR	ING NO. E
COL	LAR ELE	<b>EV.</b> 59	93.7 ft		•	то	TAL DEPT	H 21.8 ft	t	NORTHIN	<b>G</b> 609,	889		EASTING	1,519,292		24 HR.	NM		COL	LAR ELEV.
DRIL	RIG/HA	MMER E	FF./DA	TE H	FO00	72 C	CME-550X 92	2% 08/15/2	2018		DRILL	METHO	DD N	W Casing w/ Ad	vancer	HAMM	ER TYPE	Automatic		DRILI	RIG/HAMM
DRIL	<b>LER</b> S	mith, C	5. L.		:	STA	ART DATE	06/03/1	9	COMP. D	<b>ATE</b> 06	/03/19		SURFACE	WATER DE	PTH N/	Ά			DRIL	LER Smit
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	' <b> </b>	OW CO 0.5ft	-	ť	0 2		PER FOOT	75 100	NO.	МО	L O I G	ELEV. (ft)	SOIL AND RO	DCK DESC	CRIPTION	DEPTH (ft)		COR ELEV (ft)	E SIZE NX RUN ELEV (ft)
<b>595</b> 590	590.9	2.8	woн	WOH	WO	H	· · · · ·	· · · · ·	· · · ·	.		м		_ 593.7 -		ND SURF/ LUVIAL Clayey Si		0.0		576.4 575	576.4 - 1 574.6 - 1 571.9 2
585	585.9	- - - 7.8 -	1	0	1	_	• • • • • • • • • • • • • • • • • • • •	· · · · ·		· · · · · · · · · · · · · · · · · · ·	-	м									
580	580.9	12.8 	1	1	0	_		· · · · ·			-	м	4771	578.2 577.3 576.4 Brow	/n-Gray-Orang	ESIDUAL	Silty Fine S	15.5 16.4 AND 7 17.3			
575														571.9	WEATH Gray (META-	iered RC Quartz Alline R Quartz	DIORITE) DIORITE) DIORITE)	21.8			+
		+ + + +												- CF - - -	RYSTALLINE F D	ROCK (ME IORITE) Notes: Not Measu	ETA-QUAR	ΓZ			
	-													- - - -	5	Failure					
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														- - - - -					NCDOT CORE DOUBLE		

**TIP** B-5808 .1 PTION Bridge No. 57 on US 29/601 Over Irish I B1-A **STATION** 20+45 . 593.7 ft TOTAL DEPTH 21.8 ft MER EFF./DATE HF00072 CME-550X 92% 08/15/201 **START DATE** 06/03/19 nith, C. L. TOTAL RUN 4.5 ft ١X RUN REC. F (ft) % DRILL RATE (Min/ft) STF REC. (ft) % OEPTH RUN (ft) (ft) SAMP. NO. RQD (ft) % 17.3 19.1 (1.4) (1.2) 78% 67% (2.7) (2.4) 100% 89% (4.1) 91% 1.8 2.7 21.8

### GEOTECHNICAL BORING REPORT CORE LOG

_												
			CABAR	RUS			GEOLO	GIST	Stickney	, J. K.	r	
B	Buffalo	Cre	ek								GROUN	ID WTR (ft)
		OF	FSET	22 f	t LT		ALIGNM	IENT	-L-		0 HR.	NM
		NO	RTHIN	<b>IG</b> 6	609,889		EASTIN	<b>G</b> 1,5	519,292		24 HR.	NM
18	3			DF	RILL METHOD	NM	/Casing w/	Advance	er	HAMM	ER TYPE	Automatic
		со	MP. D	ATE	06/03/19		SURFAC	E WA	TER DEP	TH N/	A	
							1					
R	ATA	L										
•	RQD (ft) %	O G	ELEV	(ft)		D	ESCRIPTIC	on ane	REMARK	S		DEPTH (ft)
	70			. (10)			Begin Co	oring (	জ 17 3 ft			
)	(3.6)	P	576.4		0 14 6		Begin Co CRYS	FALLIN	EROCK			17.3
)	80%		-		Gray, Very S DIOR	ingntiy	/ wearthere	Wide F	sn, very Ha racture Spa	ard MEL acing; GS	A-QUART. 61=95	Z
			571.9		Boring Tor	minat	ed at Elevat	tion 571	0 ft in CP			21.8
			-		BUTTING TEL	minau	META-C	UARTZ	Z DIORITE)			
			-					Notes				
			-		2. B	orina A	1.NM Abandoned		easured Core Equip	ment Fai	ure	
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# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B1-A 20+45, 22.0' LT



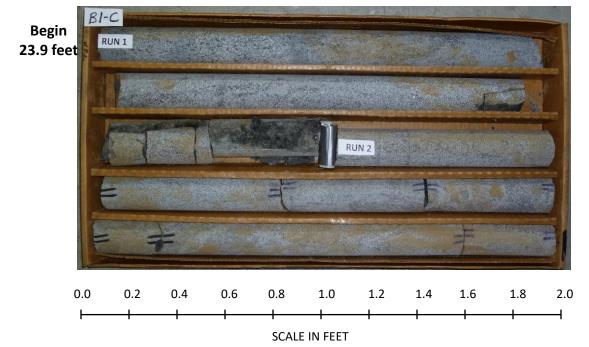
Sheet 12

900       500.4       13.3       1       1       0       133.0         100       100.4       18.3       1       1       0       133.0       133.0         100       100.4       18.3       1       1       0       133.0       133.0       133.0         100       100.4       18.3       1       1       0       133.0       133.0       133.0       133.0         100       100.4       18.3       1       0       100.10       100.10       133.0       100.10       133.0       100.10       133.0										B	SORE I	LOG																	
IODENINO. D. 1-C         STATION. 20:35.         OPFSET 8.1.1         ALLOWERT -L.         UPAR.         Cause           COLLAR ELEY AUX INTO MERTINO. 800:300         CAUSE LES VALUE / TOUR DETHINO. 800:300         PAR.         MAR.         COLLEY SUCK VEX.         COLLEY SU	WBS	45762	2.1.1			Т	TIP E	B-5808		COUNT	<b>FY</b> CABAR	RUS			GEOLO	GIST Stickne	ey, J. K.			WB	<b>S</b> 457	62.1.1			TIP	B-580	)8	C	OU
COLLAR ELX         593 7         TOTAL DEPTH 42.01         MORTHING         REATING         1519.308         MAR.         MM           DRLLR000MMEREPTAINE         FOUZO DE COSC 0000 (2000 1000 (20100))         COME DE CONTO         MARIER TYPE ALCENCE         TOTAL DE PLATE         TOTAL	SITE	DESCR	IPTION	l Brie	dge No	o. 57 c	on US	S 29/601	l Over Ir	ish Buffal	o Creek							GROUN	ND WTR (ft)	SIT	e desc	RIPTIO	N Brid	dge No. 5	57 on U	IS 29/6	601 Over	Irish E	3ufl
DBULL DeptAddReft EFF ADEL H FCOTO         DPALL DEPTA         DPALL DEPTA <th< td=""><td>BOR</td><td>ing no.</td><td>B1-C</td><td>;</td><td></td><td>s</td><td>STATI</td><td><b>ION</b> 20</td><td>)+35</td><td></td><td>OFFSET</td><td>8 ft LT</td><td></td><td></td><td>ALIGNN</td><td>IENT -L-</td><td></td><td>0 HR.</td><td>Caved</td><td>BO</td><td>RING N</td><td><b>O.</b> B1-0</td><td>С</td><td></td><td>STA</td><td>TION</td><td>20+35</td><td></td><td></td></th<>	BOR	ing no.	B1-C	;		s	STATI	<b>ION</b> 20	)+35		OFFSET	8 ft LT			ALIGNN	IENT -L-		0 HR.	Caved	BO	RING N	<b>O.</b> B1-0	С		STA	TION	20+35		
DRULER         START DATE         60/19/10         SUMPACE WATER DEPTH         NA           DRULE 000000000000000000000000000000000000	COL	LAR ELE	<b>EV.</b> 59	93.7 ft		Т	ΌΤΑ	L DEPT	<b>H</b> 44.0	ft	NORTHIN	<b>G</b> 609,	883		EASTIN	<b>G</b> 1,519,308		24 HR.	NM	CO	LLAR E	<b>LEV.</b> 5	93.7 ft		тот	AL DE	<b>PTH</b> 44	.0 ft	
DLD:         DEV:         DEV:         DEV:         DUIL         L         DUIL         L         DUIL         L         DUIL         L         DUIL         DUIL         DUIL         L         DUIL         DUIL         L         DUIL	DRIL	RIG/HAI	MMER E	FF./DA	ATE ⊢	F00072	2 CME	E-550X 92	2% 08/15	/2018		DRILL	METHO	DD N	W Casing w/	Advancer	HAMME	ER TYPE	Automatic	DRI	_L RIG/H	IAMMER	eff./Da	ATE HFO	0072 CN	/IE-550X	(92%) 08	/15/2018	3
(1)       (1)       (1)       (2)       (	DRIL					S	STAR	T DATE	06/19/	'19	COMP. D	<b>ATE</b> 06	6/19/19	)	SURFAC	E WATER DE	PTH N/	4		DRI	LLER	Smith, (	C. L.		STA	rt da	<b>TE</b> 06/1	19/19	
10       00       00       0       00       200       0       200       0       200       0       200       0       000		DRIVE ELEV	DEPTH	BLO									P. <b>▼</b> ∕			SOIL AND R	OCK DESC	RIPTION		CO	RE SIZE	NX					N 20.1		
96         93         94         93         94<	(#)		(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50	75 100	) NO.	/мс		ELEV. (ft)					ELE	/ RUN ELEV	, [DEP ] [	RUN	DRILL RATE	REC.	JN RQD (ft) %	SAMP.	STR REC. (ft) %	
900         500.4         1.3.3         WORI WORI WORI         90.																				(π)		(ft)	(11)	(Min/ft)	(IL) %	(II) %	NO.	(iii) %	
300       33.3       WOH	595		F												- 503 7	GROU		CE	0.0	569.8		3 23.9	51	1.03/1.1	(4.5)	(3.6)		(19.3)	(1
300       500.4       3.3       V.V.       V.V.V.       V.V.	l	-	F				11								-	A	LLUVIAL		0.0			Ŧ		1:07/1.0	88%	71%		96%	8
305       304       4       0       1 <td>590</td> <td>- 590.4 -</td> <td>- 3.3</td> <td></td> <td>-</td> <td>Brown-Gray</td> <td>, Clayey Sil</td> <td>IY SAND</td> <td></td> <td>565</td> <td>564 7</td> <td>, T<sub>290</sub></td> <td></td> <td>1:04/1.0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	590	- 590.4 -	- 3.3												-	Brown-Gray	, Clayey Sil	IY SAND		565	564 7	, T <sub>290</sub>		1:04/1.0					
398       404       1       0       1 <td></td> <td>-</td> <td>F</td> <td> WOH</td> <td>IWOH</td> <td>WOH</td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td>M</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1:06/1.0</td> <td>(5.0)</td> <td>(5.0)</td> <td></td> <td></td> <td></td>		-	F	WOH	IWOH	WOH	•					1	M		-									1:06/1.0	(5.0)	(5.0)			
303       Xxx       X		-	t t												-							Ŧ		I 1:00/1.0		100 %			
500       500.4       113.3       -       -       -       -       -       -       -       1001	585	585.4 -	8.3	1	0	1					- <del></del>		М		-					560	559.7	<u>7 <del> </del> 34.0</u>		I 1:02/1.0		(4.8)			
301       304       133       1 </td <td></td> <td>  -</td> <td>ŧ</td> <td></td> <td></td> <td> </td> <td><b> [</b><sup>'</sup>.</td> <td>· · · · · ·</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Ŧ</td> <td>5.0</td> <td>1:05/1.0</td> <td>100%</td> <td>96%</td> <td></td> <td> </td> <td></td>		-	ŧ				<b> [</b> <sup>'</sup> .	· · · · · ·							-							Ŧ	5.0	1:05/1.0	100%	96%			
1       1	580	- 580.4 -	- 13.3				¦:	•••							-					555	554 7	, <del>†</del> 30 n		1:11/1.0					
575       573.4       113.1       1       0       1001.0       1001.0         570       570.4       123.3       1000.7       1       1       1001.0       1001.0         585       -       -       -       -       -       -       1001.0       1001.0         586       -       -       -       -       -       -       -       1001.0         586       -       -       -       -       -       -       -       -       -       1001.0         586       -		-	+	1	1	1	<b>•</b> 2					11	M		-							+ 39.0		1:15/1.0	(4.8)	(3.3)			
500     500 <td></td> <td>-</td> <td>+</td> <td></td> <td></td> <td></td> <td>  i:</td> <td>· · · ·</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Ŧ</td> <td></td> <td>1:10/1.0</td> <td>96%</td> <td>66%</td> <td></td> <td></td> <td></td>		-	+				i:	· · · ·							-							Ŧ		1:10/1.0	96%	66%			
570     570.4     223.3     1000.7     1 <td>575</td> <td>575.4 -</td> <td>18.3</td> <td>1</td> <td>1</td> <td>0</td> <td>┤╟╷</td> <td>· · ·</td> <td>· · · ·</td> <td></td> <td>- <del></del></td> <td></td> <td>М</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>550</td> <td>549.7</td> <td><u>, 44.0</u></td> <td>_</td> <td>1:06/1.0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	575	575.4 -	18.3	1	1	0	┤╟╷	· · ·	· · · ·		- <del></del>		М		-					550	549.7	<u>, 44.0</u>	_	1:06/1.0					
570     570.4     22.3     1000.8     1000.4     1000.4     23.3       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560     1000.4     1000.4     1000.4     1000.4     1000.4       560.7     1000.4     1000.4     1000.4     1000.4     1000.4       560.7     1000.4     1000.4     1000.4     1000.4     1000.4       1000.4     1000.4     1000.4     1000.4     1000.4     1000.4       1000.4     1000.4     1000.4     1000.4     1000.4     1000.4       10000.4     100		-	+				[	· · · · · ·							- 572.3				21.4			Ŧ							
565	570	- 570.4 <sup>-</sup>	- 23.3					· · · ·	· · · ·	· · · ·					-			v Siltv SAI	ND23.3			Ŧ							
565	010	-	+	100/0.	4		11-				·   · · · ·	•			<u>- 569.8</u> -	WEAT	HERED RO	СК				Ŧ							
300		-	÷				.									- C	DIORITE)		2			Ŧ							
550	565	-	+				-				- <del></del>	41			-	CRYST Gray-Black (ME	ALLINE RO	<b>)CK</b> "Z DIORIT	E)			Ŧ							
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Image: Sector of the sector	550		-				╨	- · · ·	· · · ·			4		<u>کے</u> الب	-	Boring Terminate	ed at Elevati	ion 549.7	ft in			Ŧ							
-     Not:     -     Not:     -     -       -     NM=Not Measured     -     -     -       -     -     NM=Not Measured     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -       -     -     -     -     -		-	+												-			TA-QUAR	RTZ			ŧ							
NM=Not Measured     - <td>l</td> <td>-</td> <td>F.</td> <td></td> <td>-</td> <td></td> <td>Note:</td> <td></td> <td></td> <td>22/20</td> <td></td> <td>‡</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	l	-	F.												-		Note:			22/20		‡							
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#### **GEOTECHNICAL BORING REPORT** CORE LOG

# COUNTY CABARRUS GEOLOGIST Stickney, J. K. Buffalo Creek GROUND WTR (ft) OFFSET 8 ft LT ALIGNMENT -L-0 HR. Caved **NORTHING** 609,883 **EASTING** 1,519,308 24 HR. NM DRILL METHOD NW Casing w/ Advancer HAMMER TYPE Automatic **COMP. DATE** 06/19/19 SURFACE WATER DEPTH N/A TRATA C. RQD (ft) % DESCRIPTION AND REMARKS O G DEPTH (ft) ELEV. (ft) Begin Coring @ 23.9 ft CRYSTALLINE ROCK Gray-Black, Slightly Weathered to Fresh, Very Hard META-QUARTZ DIORITE with Close to Wide Fracture Spacing; GSI=92-95 23.9 549.7 44. Boring Terminated at Elevation 549.7 ft in CRYSTALLINE ROCK (META-QUARTZ DIORITE) Note: NM=Not Measured

# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B1-C 20+35, 8.0' LT



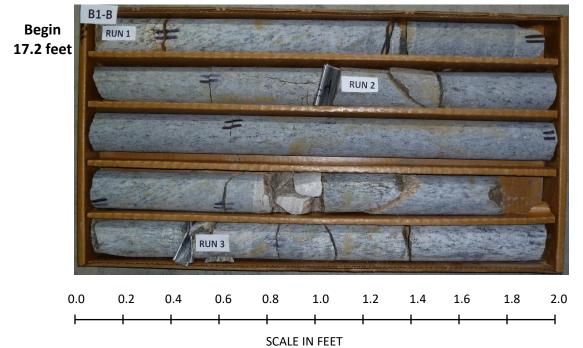


									B	SORE L	_OG																		С
WBS	4576	62.1.1				<b>TIP</b> B-580	)8		COUNT	ry cabar	RUS			GEO	DLOGIST Stickne	y, J. K.				WBS	45762.1	.1			TIP	B-580	)8	C	OUNT
SITE	DESC	RIPTIO	N Bri	dge N	o. 57	on US 29/6	601 Ov	/er Iris	h Buffal	o Creek							GROUN	ND WTR (ft)		SITE	DESCRIP	TION	l Brid	lge No. 5	7 on L	JS 29/6	601 Ove	r Irish I	Buffalo
BORI	NG NO	<b>).</b> B1-E	В			STATION	19+92	2		OFFSET	35 ft R1	-		ALI	GNMENT -L-		0 HR.	Cave 4.0'		BOR	ING NO.	B1-B			STA	TION	19+92		
		<b>.EV.</b> 5				TOTAL DE				NORTHIN	<b>G</b> 609,	853		EAS	<b>STING</b> 1,519,360		24 HR.	NM		COLI	AR ELEV	. 59	94.8 ft		тот	AL DE	<b>PTH</b> 36	6.8 ft	
DRILL	RIG/H	AMMER B	EFF./D/	ATE H	-IFO00	72 CME-550>	(92%)	08/15/2	2018		DRILL	METHO	DD N	W Casir	ng w/ Advancer	HAM	<b>IER TYPE</b>	Automatic		DRILL	RIG/HAMIN	/IER E	FF./DA	TE HFO	0072 CN	/E-550>	K 92% 08	3/15/201	8
DRIL	LER	Smith, C	C. L.			START DA	<b>TE</b> 06	6/05/1	9	COMP. DA	<b>ATE</b> 06	/05/19		SUF	RFACE WATER DE	PTH N	I/A			DRIL	LER Smi	ith, C	. L.		STA	RT DA	<b>TE</b> 06/	05/19	
ELEV	DRIVE	UEPIR	· —						PER FOO		SAMP	· 🔨			SOIL AND RO	OCK DES	CRIPTION			COR	E SIZE N	X					<b>N</b> 19.6		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.51	t 0	25	5	50 I	75 100	NO.	/мс	) G	ELEV.	(ft)			DEPTH (ft)		ELEV	RUN ELEV D	EPTH	RUN	DRILL RATE	REC.	UN RQD	SAMP. NO.	REC.	RATA RQD
																			╞	(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %
595		┿──				++								594.8		ND SURF	ACE	0.0		577.6	577.6 _	17.2	2.6	1:28/1.0	(2.6)	(2.5)		(19.2)	(15.9)
		Ŧ						· · · · · ·						F	Brown to Gra		Silty SAND	1		575	575.0	19.8			100%	96%	_	98%	81%
590	589.8	<u> </u>												F							1		5.0	1:40/1.0 1:35/1.0	(4.9) 98%	(3.2) 64%			
	09.0	<u>+ 0.0</u>	WOH	WOF	1 WO	┦ •					]	м		-						570				1:32/1.0					
		Ŧ						· · · · · ·						F						570	570.0	24.8	5.0	1:45/1.0 1:44/1.0	(4.7)	(4.0)	-		
585	584.8	<u> </u>	1	1	1							м		E							‡			1:48/1.0	94%	80%	RS-2	4	
		Ŧ												582.3				12.5		565	565.0	29.8	50	1:52/1.0	(5.0)	(1.0)	K8-2	1	
580	579.8	<u> </u>												E	Ri Brown-Gray-Orang	E <b>SIDUAL</b> e, Clayey		SAND			‡		5.0	1:50/1.0		(4.2) 84%			
	010.0	Ī	25	15	9		24					м		577.9				16.9		560	560.0	34.8		1:44/1.0					
		Ŧ						· <u> </u>			]		P	577.6	Gray (META-	IERED R				000		36.8	2.0	1:42/1.0	(2.0)	(2.0)	-		
575		Ŧ									1		P	F		ALLINE F	ROCK					50.0		1:37/1.0	100%	100%			
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		ŧ						· · ·	· · ·		RS-2			-							+								
565		÷							<u> </u>		41		P	_							‡								
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560		1												-							‡								
		<u>+</u>											P	558.0				36.8			‡								
		ŧ												_	Boring Terminate CRYSTALLINE	ROCK (M	ation 558.0 ETA-QUAF	ft in RTZ			+								
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#### **GEOTECHNICAL BORING REPORT** CORE LOG

# NTY CABARRUS GEOLOGIST Stickney, J. K. alo Creek GROUND WTR (ft) OFFSET 35 ft RT ALIGNMENT -L-**0 HR.** Cave 4.0' **NORTHING** 609,853 **EASTING** 1,519,360 24 HR. NM DRILL METHOD NW Casing w/ Advancer HAMMER TYPE Automatic COMP. DATE 06/05/19 SURFACE WATER DEPTH N/A ō DESCRIPTION AND REMARKS Ğ DEPTH (ft) ELEV. (ft) 9) % 777.6 777.6 777.6 Begin Coring @ 17.2 ft CRYSTALLINE ROCK Gray and Black, Very Slightly Weathered to Fresh, Very Hard META-QUARTZ DIORITE with Close to Wide Fracture Spacing; RS-2: 27.7-28.2; GSI=90 36.8 Boring Terminated at Elevation 558.0 ft in CRYSTALLINE ROCK (META-QUARTZ DIORITE) Note: NM=Not Measured

# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B1-B 19+92, 35.0' RT





SCALE IN FEET

#### Sheet 16

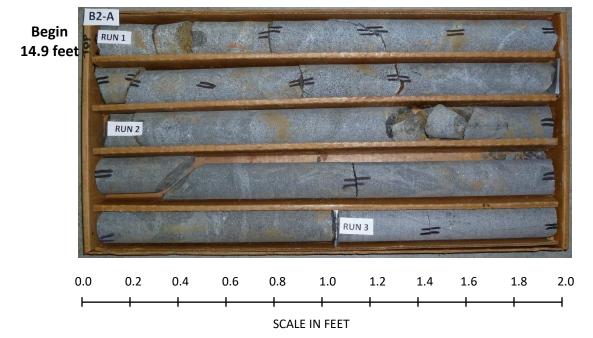
										B	ORE	LOG																	
WBS	<b>3</b> 45762	2.1.1			Т	ΊP	B-5808			COUNT	Y CABA	RUS			G	EOLOGIST Stickne	y, J. K.			) (v	VBS	45762.1.1			TIP	B-580	)8	C	COL
SITE	DESCR	IPTION	Brio	dge No	o. 57 o	on US	S 29/60	1 Ov	er Iris	h Buffal	o Creek							GROU	ND WTR (ft)	s	ITE	DESCRIPTION	N Brio	dge No. 5	7 on L	JS 29/6	601 Over	r Irish I	Buf
BOR	ing no.	B2-A	۱.		s	ТАТ	<b>ION</b> 2	1+22	2		OFFSET	21 ft L1	Г		A	LIGNMENT -L-		0 HR.	Cave 3.0'	В	ORI	NG NO. B2-A	4		STA	TION	21+22		
COL	LAR ELE	<b>EV.</b> 59	94.1 ft		Т	ΌΤΑ	L DEP	тн з	35.3 ft		NORTHI	<b>IG</b> 609	,964		E	<b>ASTING</b> 1,519,273		24 HR.	NM	С	OLL	AR ELEV. 5	94.1 ft		тот	AL DE	<b>PTH</b> 35	5.3 ft	
DRIL	l rig/hai	MMER E	FF./DA	TE H	F00072	2 CM	E-550X 9	92%	08/15/2	018		DRILL	. METH	OD N	NWC	asing w/ Advancer	HAMIN	ER TYPE	Automatic	D	RILL	. RIG/HAMMER E	FF./DA	ATE HFO	0072 CN	/E-550≻	K 92% 08	8/15/201	8
DRIL	LER S	mith, C	). L.		S	TAR		E 06	6/04/1	9	COMP. D	ATE 06	6/04/19	9	s	URFACE WATER DE	PTH N	/A		D	RIL	LER Smith, C	). L.		STA	RT DA	TE 06/	04/19	
ELEV	DRIVE ELEV	DEPTH								PER FOO		SAMF				SOIL AND RO	OCK DES	CRIPTION	l	c	OR	E SIZE NX					N 20.4		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0		25	5	i0	75 10	0 NO.	_/м	DI G	EL	EV. (ft)			DEPTH (ft	EL	LEV	RUN ELEV DEPTH			REC.	UN RQD	SAMP. NO.	STI REC. (ft)	
																					(ft)	(ft) (ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	%	╀
595		F													- 59	.1 GROUN	ID SURF.	ACE	0.0	57	79.2	579.2 - 14.9	5.4		(4.0)	(3.5)		(18.8)	) ( <sup>·</sup>
	-	E					· · · · ·		· · · · · ·						E	AL Brown-Orange	LUVIAL e, Clayey	Silty SANE	)			Ŧ		1:47/1.0	74%	è5%		(18.8) 92%	È
590	590.4	3.7	2					1							E	, i i i i i i i i i i i i i i i i i i i				5	575	573.8 20.3		1:44/1.0					
	-	E		2			3						M		E								5.0	1:35/1.0	(5.0)	(4.4)			
	-																			5	570	Ŧ		1:30/1.0		0070			
585	585.4	8.7	WOH	WOH	2	╡╠	2	+ .					м		- 58	5			10.6			568.8 25.3	5.0	1:41/1.0		(4.8)	-		
	-	ŧ					 		 								SIDUAL	Silty Fine		]		Ŧ		1:28/1.0 1:38/1.0 1:36/1.0	96%	96%			
580	580.4 -	13.7	100/0.4	4			<u> </u>		<u></u>	<u></u>					- 58	0.4			13.7 14.9		65	563.8 30.3		1:42/1.0					
	-	ł	100,0.				 		· · ·	· · ·   · · ·		Ť]				Gray (META-	QUARTZ	DIORITE)				+	5.0	1:36/1.0 1:40/1.0	(5.0)	(4.2) 84%			
575	-	ł				11	· · · · ·		· · · · · ·	· · · ·						Gray-Black (MET	ALLINE R TA-QUAR		ΓE)	5	60	1		1:44/1.0 1:39/1.0		-			
575	-	ł						1.													-	558.8 _ 35.3		1:37/1.0			-		+
	-	+					· · · ·		· · · · · ·	· · · ·												‡							
570	-	ŧ.					· · · ·		· · ·													+							
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565	-	F				11	· · · · ·		· · · · · ·	· · · ·												+							
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560		E						+							55	3.8			35.3			Ŧ							
	-	L									•				E	Boring Terminate CRYSTALLINE F	d at Eleva ROCK (MI	tion 558.8 TA-QUAF	ft in			Ŧ							
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#### **GEOTECHNICAL BORING REPORT** CORE LOG

#### SHEET 17

# COUNTY CABARRUS GEOLOGIST Stickney, J. K. 601 Over Irish Buffalo Creek **GROUND WTR (ft)** OFFSET 21 ft LT ALIGNMENT -L-0 HR. Cave 3.0' **NORTHING** 609,964 **EASTING** 1,519,273 24 HR. NM DRILL METHOD NW Casing w/ Advancer HAMMER TYPE Automatic **COMP. DATE** 06/04/19 SURFACE WATER DEPTH N/A STRATA L REC. RQD O (ft) (ft) G DESCRIPTION AND REMARKS DEPTH (ft) ELEV. (ft) (18.8) (16.9) 92% 83% Begin Coring @ 14.9 ft CRYSTALLINE ROCK Gray-Black, Fresh to Very Slightly Weathered, Very Hard META-QUARTZ DIORITE with Close to Wide Fracture Spacing (Felsic Zone from 32.0'-33.3'); GSI=95 Boring Terminated at Elevation 558.8 ft in CRYSTALLINE ROCK (META-QUARTZ DIORITE) Note: NM=Not Measured

# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B2-A 21+22, 21.0' LT





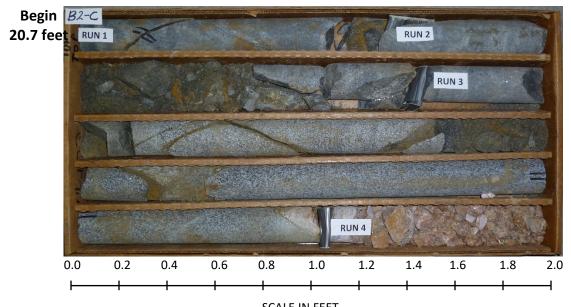
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WBS	45762	2.1.1			1	<b>FIP</b> B-58	80	COUNT	Y CABAR	RUS			GEOLOGIST Stickney, J. K.			WB	<b>S</b> 457	62.1.1
SITE	DESCR		N Brid	lge N	o. 57 c	on US 29/	601 Over	Irish Buffalo	1					GROUND	WTR (ft)	SIT	E DESC	CRIPTI
BOR	NG NO	B2-0	2		5	STATION	20+76		OFFSET	23 ft RT	-		ALIGNMENT -L-	0 HR.	NM	BO	ring n	<b>ю.</b> в2
COLI	AR ELI	<b>EV.</b> 59	91.6 ft		٦	TOTAL DE	<b>PTH</b> 42.	6 ft	NORTHIN	<b>G</b> 609,9	931		EASTING 1,519,327	24 HR.	NM	CO	LLAR E	ELEV.
DRILL	. RIG/HA	MMER E	FF./DA	TE H	IF0007	2 CME-550)	X 92% 08/	15/2018		DRILL	METHO	DD N	W Casing w/ Advancer HAMIN	IER TYPE A	Automatic	DRI	LL RIG/H	AMME
DRIL	LER S	mith, C	). L.		5	START DA	<b>TE</b> 06/1	7/19	COMP. DA	<b>TE</b> 06	/17/19		SURFACE WATER DEPTH N	/A		DR	LLER	Smith
ELEV	DRIVE ELEV	DEPTH	BLC	ow co	DUNT		BLOW	/S PER FOO	r	SAMP	. 🔨	L	SOIL AND ROCK DES	CRIPTION		CO	RE SIZI	E NX
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо		ELEV. (ft)		DEPTH (ft)	ELE		
																(ft)	(ft)	
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	-	ŧ											-			570	569.0	0 + 20. 0 + 22.
500	-	<u> </u>				++							- 591.6 GROUND SURF	ACE	0.0			‡
590	589.7 -	- 1.9	WOH	WOF	I WOF						М		Brown-Orange, Clayey	Silty SAND		565		<u>_</u>
	-	ŧ					· · · · ·						-				564.0	<u>0 <del> </del> 27.</u>
585	584.7 -	6.9						·   · · ·					-					‡
		+	WOH	WOF	1 2	<b>♦</b> 2 · ·	·   · · · ·	· · · ·			м		-			560		0 + 32.
500		ŧ				<u>\</u> ; : :	·   · · · ·   · · ·	·   · · · ·					-					‡
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	-	ŧ					·slaat						576.8		14.8		554.0	<u>0   37.</u>
575	574.7 <del>-</del>	16.9					· · · · · ·	·   · · ·					– RESIDUAL – Brown-Gray, Clayey S	ilty SAND				‡
			16	23	40	]  <u>· · ·</u>	· · · · ·	÷ • • • • • • • • • • • • • • • • • • •			м		-	,		550		0 + 42.
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	-	ŧ					· · · · ·						Gray-Black (META-QUAR					ţ
565	-	ŧ											-					ţ
	-	ŧ											-					+
500	-	ŧ					· · · · ·	· · · · ·	.   .				-					‡
560	-	÷											559.0		32.6			‡
	-	ŧ					· · · · ·	· · · ·	· · · · · ·				_ Pink (META-QUARTZ	DIORITE)				ŧ
555	-	ŧ						· · · ·	·   · · · ·						37.6			ŧ
	-	ŧ						· · · · ·				R	_ Gray-Black (META-QUAR	TZ DIORITE)	57.0			Ŧ
550	-	ŧ					· · · · ·	· · · · ·	·   · · · · ·			P	-					ŧ
550	_	-			_					Ц		Ï	549.0 Poring Termineted at Floyr	tion 540.0 ft i	42.6			Ŧ
	-	ŧ											Boring Terminated at Eleva CRYSTALLINE ROCK (MI DIORITE)	ETA-QUARTZ	2	0		‡
	-	ŧ											_ ,			1/22/20		ŧ
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										-	-
	WBS	45762	2.1.1			TIP	B-580	)8	C	OUNT	Y
					ge No. 5				Irish E	Buffalo	<u> </u>
		ING NO.						20+76			0
								PTH 42.		<u></u>	N
					TE HFOO					<u> </u>	
			mith, C	. L.							C
		E SIZE RUN	NX		DRILL	RI	AL RUI JN		STR		
	ELEV (ft)	ELEV (ft)	DEPTH (ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	Ō   G
	570.9	(1)			(	70	70		70	70	
	570	570.9 569.0	20.7 22.6	1.9		(1.4)	(1.0)		(8.2) 69%	(3.3) 28%	S.
		-	_	5.0	1:11/1.0 1:15/1.0	(1.8)	(0.0)		0070	2070	
	565	-	E		1:03/1.0 1:10/1.0	36%	0%				
		564.0	27.6	5.0	1:19/1.0 1:22/1.0	(5.0)	(2.3)				
		-			1:15/1.0 1:24/1.0	100%	46%				
	560	559.0	32.6		1:30/1.0 1:33/1.0						S.
		-	_	5.0	1:37/1.0	(3.5) 70%	(0.5) 10%		(5.0) 100%	(0.5) 10%	
	555	-	37.6		1:44/1.0						
		554.0	37.0	5.0	1:47/1.0	(5.0)	(4.2)		(5.0)	(4.2)	
	550	-	-		1:40/1.0 1:38/1.0 1:29/1.0	100%	84%		100%	84%	
	000	549.0	42.6		1:35/1.0						يخبط
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DOT CORE DOUBLE B5808_GEO_BH_BRDG0057.GPJ NC_DOT.GDT 1/22/20		-	F								
7			+								

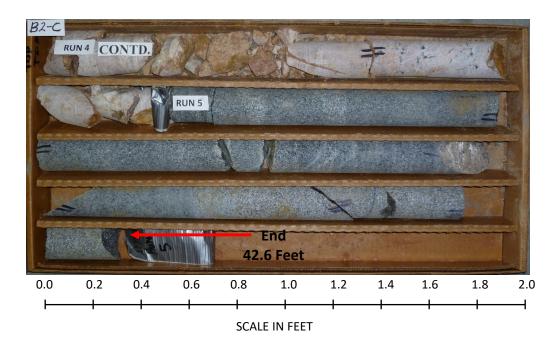
## GEOTECHNICAL BORING REPORT CORE LOG

JNT	ΥC	CABARRUS	GEOLOGIST Stickney, J. K.	
ffalo	Cre	ek		GROUND WTR (ft)
		FSET 23 ft RT	ALIGNMENT -L-	0 HR. NM
			_	
	NO	<b>RTHING</b> 609,931	EASTING 1,519,327	24 HR. NM
		DRILL METHOD NW	Casing w/ Advancer HAM	MER TYPE Automatic
	co	MP. DATE 06/17/19	SURFACE WATER DEPTH	N/A
ra Rod		D	ESCRIPTION AND REMARKS	
(ft) %	G	ELEV. (ft)		DEPTH (ft)
			Begin Coring @ 20.7 ft	
3.3)	SP/	_ 570.9	CRYSTALLINE ROCK	20.7
28%			h to Very Severely Weathered, Very DRITE with Very Close to Moderately	
	بسكم	_	Spacing	
		- GSI=30-4	45 from 20.7'-30.2'; GS=94 at 30.3'-3	32.0
		-		
	P	-		
		-		
0.5)		559.0 Pink Moderately Wea	athered to Slightly Weathered, Mediu	32.6 um to Moderately
0.3)			E with Very Close to Close Fracture	
		-	GSI=35-40	
1 0		554.0		37.6
4.2) 34%		_ Gray-Black, Fresh, Ve	ry Hard META-QUARTZ DIORITE w Fracture Spacing	TUT CIUSE (O WIDE
	52	_	GSI= 95	
	H2	549.0		42.6
		_ Boring Terminate	ed at Elevation 549.0 ft in CRYSTAL (META-QUARTZ DIORITE)	LINE ROCK
		-	, , , , , , , , , , , , , , , , , , ,	
		-	Note: NM=Not Measured	
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# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B2-C 20+76, 23.0' RT

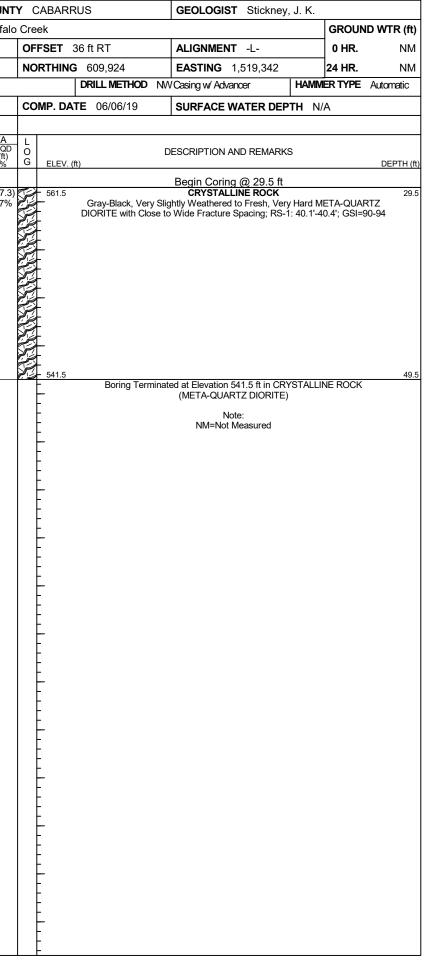


SCALE IN FEET

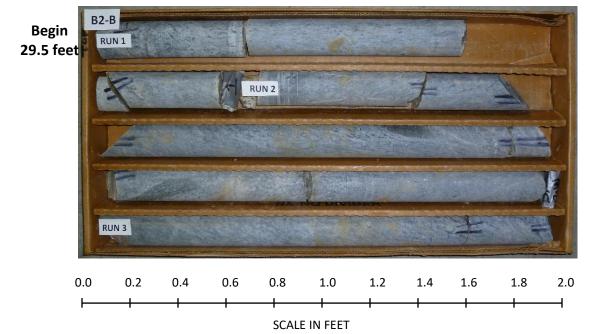


SITE DESCRIPTION       Bridge No. 57 on US 29/601 Over Irish Buffalo Creek       GROUND WTR (ft)         BORING NO. B2-B       STATION 20+66       OFFSET 36 ft RT       ALIGNMENT -L-       0 HR.       NM         COLLAR ELEV. 591.0 ft       TOTAL DEPTH 49.5 ft       NORTHING 609,924       EASTING 1,519,342       24 HR.       NM         DRILL RIGHAMMER EFF./DATE       HFC0072 CME-550X 92% 08/15/2018       DRILL METHOD       NW/Casing w/ Advancer       HAMMER TYPE Automatic       DRILL RIGHAMMER EFF./DATE       HFC0072 CME-550X 92% 08/15/2018       DRILL METHOD       NW/Casing w/ Advancer       HAMMER TYPE Automatic         DRILLER       Smith, C. L.       START DATE       06/06/19       SURFACE WATER DEPTH       N/A         ELEV       DRIVE (ft)       DEPTH       BLOWS PER FOOT       SAMP.       L NO.       SOIL AND ROCK DESCRIPTION ELEV. (ft)       DEPTH (ft)       RATE       REC.       ROUN       RATE       REC.       ROUN       RET         595       95       75       100       NO.       MOI G       ELEV. (ft)       DEPTH (ft)       RATE       REC.       REC. <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>В</th><th>ORE L</th><th>LOG</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>С</th></t<>										В	ORE L	LOG																С
DOBUSINO.         D2:8         EFATION.         D/9-8         D/9-RET         30-RT         ALGAMENT          0 FR.         NUMBER           COLLAR EELY 40010         TOTAL DETH         MORTHMO 00092/E         ESTATOA         24 FR.         NUMBER	WBS	4576	2.1.1			٦	<b>FIP</b> E	3-5808		COUNT	Y CABAR	RUS			GEOLO	GIST Stickney	, J. K.			WBS	45762.1.1			TIP	B-580	08	С	OUNT
COLLAR ELY. 59:01         TOTAL DEPTH 45:1         JORHING: 60:244         EASTING: 1513:22         24.88         NU           DEUL RELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           DEUL RELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           DELLINE GAMME COLL         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           DELLINE GAMME COLL         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           DEVL RELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           DEVL RELY. 59:01         TOTAL DEPTH 45:1         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         TOTAL DEPTH 45:1           SOUCH COLLAR ELY. 59:01           SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01           SOUCH COLLAR ELY. 59:01         SOUCH COLLAR ELY. 59:01         SOUCH	SITE	DESCF	RIPTIO	N Bri	dge N	o. 57 d	on US	6 29/601	Over Iris	h Buffalo	Creek							GROUND WTR (ft	)	SITE	DESCRIPTION	Brid	lge No. 5	7 on U	JS 29/6	601 Over	r Irish E	Juffal
Desc. Beak-wateries per Autor:         FUND: Desc. Gal. Key 1000 (Strep Case)         Desc. Beak-wateries per Autor:         Desc. Beak-wateries per Autor: <th< td=""><td>BOR</td><td>ING NO</td><td>). B2-E</td><td>3</td><td></td><td>5</td><td>STATI</td><td><b>ON</b> 20</td><td>)+66</td><td></td><td>OFFSET</td><td>36 ft RT</td><td></td><td></td><td>ALIGNN</td><td>IENT -L-</td><td></td><td>0 HR. NN</td><td></td><td>BOR</td><td>ING NO. B2-B</td><td></td><td></td><td>STA</td><td>TION</td><td>20+66</td><td></td><td></td></th<>	BOR	ING NO	). B2-E	3		5	STATI	<b>ON</b> 20	)+66		OFFSET	36 ft RT			ALIGNN	IENT -L-		0 HR. NN		BOR	ING NO. B2-B			STA	TION	20+66		
Deckler         State: Date:         Deckler         Subscreece         Subscreece<											NORTHIN																	
HEP:         Difference         BACKWERER FOOT         BACKWERER FOOT         Soil AND RECK DESCRIPTION         DOP TOTAL REN         20.0 TOTAL	DRIL	L RIG/HA	MMERE	EFF./D/	ATE H	-FO007	2 CME	-550X 92	2% 08/15/2	2018		DRILL	METHO	OD N	W Casing w/	Advancer	HAMN	IER TYPE Automatic		DRIL	L RIG/HAMMER E	FF./DA	TE HFOO	)072 CN	/E-550×	K 92% 08	8/15/2018	3
Image: No.         Image:	DRIL						STAR	T DATE						)	SURFA	CE WATER DEF	<b>PTH</b> N	/A				. L.		STA	rt da	<b>TE</b> 06/0	06/19	
200       1		ELEV		·	_	_		2					17			SOIL AND RO	CK DES	CRIPTION		COR			<b>I</b>			N 20.0		
200	(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft		Z	5		15 100	NO.	/мс	DI G	ELEV. (ft)			DEPTH (	t)	ELEV	ELEV (#)	RUN	RATE	REC.	RQD		STF REC. (ft)	RQD (ft)
100       1																					(ft) (11)	(11)	(Min/ft)	%	<u>%</u>		%	(ft) %
B02         B032         C1         WORK WORK WORK         C         C010	595		Ŧ												F						561.5 - 29.5	2.5	3.08/1.0	(2.1)	(2.0)		(19.2)	(17.3
490       403       1.3       WOH       W			ŧ												-						559.0 32.0	50		84%	80%	-	<b>`96</b> %´	87%
100       1	590	589.7 -	1.3												591.0	AL	LUVIAL		0			0.0	5:40/1.0	96%	90%			
385       n.4.7       n.3       worl       1 <t< td=""><td></td><td></td><td>1</td><td>WOH</td><td>WOF</td><td>I WOF</td><td><b>1</b> ∳0:</td><td>· · ·</td><td>· · · ·</td><td></td><td></td><td></td><td>м</td><td></td><td>1</td><td>Brown-Orange</td><td>Clayey</td><td>Silty SAND</td><td></td><td>555</td><td>554.0 + 37.0</td><td>l</td><td>5:38/1.0</td><td></td><td></td><td></td><td></td><td></td></t<>			1	WOH	WOF	I WOF	<b>1</b> ∳0:	· · ·	· · · ·				м		1	Brown-Orange	Clayey	Silty SAND		555	554.0 + 37.0	l	5:38/1.0					
300       113       1 <td></td> <td></td> <td>ŧ</td> <td></td> <td></td> <td></td> <td></td> <td>· · ·</td> <td></td> <td>-</td> <td>5.0</td> <td>6:10/1.0</td> <td>(4.9)</td> <td>(4.2)</td> <td></td> <td></td> <td></td>			ŧ					· · ·													-	5.0	6:10/1.0	(4.9)	(4.2)			
690       1113       1       2       4       1 <td>585</td> <td>584.7 -</td> <td>6.3</td> <td>WOH</td> <td>  1</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>М</td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td>550</td> <td>ļ Ŧ</td> <td>l</td> <td>5:45/1.0</td> <td>3070</td> <td>0470</td> <td></td> <td>_</td> <td></td>	585	584.7 -	6.3	WOH	1	1							М		<u> </u>					550	ļ Ŧ	l	5:45/1.0	3070	0470		_	
500       p737       11.3       -			‡				<b>  \</b> <sup>2</sup> .   <b>\</b>	· · · · · ·	· · · · ·	· · · ·					-						549.0 42.0	5.0	6:24/1.0	(5.0)	(4.2)		_	
975     670     70     70     1     2     4     6     1 <t< td=""><td>580</td><td>579.7 -</td><td>+ + 11.3</td><td></td><td></td><td></td><td>ļļ</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>L </td><td></td><td></td><td></td><td></td><td></td><td>+</td><td> </td><td>6:41/1.0 6:43/1.0</td><td>100%</td><td>84%</td><td></td><td></td><td></td></t<>	580	579.7 -	+ + 11.3				ļļ								L 						+		6:41/1.0 6:43/1.0	100%	84%			
37       774       13       20       18       13       10       11       10       11       10 <t< td=""><td></td><td></td><td>‡</td><td>  1</td><td>2</td><td>4</td><td>   •</td><td>6</td><td>· · · ·</td><td></td><td></td><td></td><td>M</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td>545</td><td>544.0 47.0</td><td>l</td><td>6:40/1.0 6:45/1.0</td><td></td><td></td><td></td><td></td><td></td></t<>			‡	1	2	4	•	6	· · · ·				M		-					545	544.0 47.0	l	6:40/1.0 6:45/1.0					
300       57/2       16.3       20       16       13       16       13       16       17       16       31       32       16       16       16       17       16       31       32       16       16       17       16       31       32       16       16       17       16       31       32       16       16       16       16       16       16       17       16	575		‡						· · · ·						576.2	DE		14	8		541 5 40 5	2.5	6:34/1.0	(2.4)	(2.4) 96%	1		
270       560 7       21.3       16       31       32         660       564 7       20.3       28       28       27         660       564 7       20.3       28       28       28         660       664       66       664       66       664       7         660       7       7       7       7       7       7         660       7       7       7       7       7       7         660       7       7       7       7       7       7       7         660       7       7       7       7       7       7       7       7         560       7       7       7       7       7       7       7       7         560       7       7       7       7       7       7       7       7         560       7       7       7       7       7       7       7       7       7       7       7         561       7       7       7       7       7       7       7       7       7       7       7         561       7       7       7	515	574.7 -	+ 16.3 +	20	18	13	11.		31 · ·			11	м		В	rown-Gray-Orange	, Clayey	Silty Fine SAND								-		<u> </u>
570       580 7 2 213       16       31       32         585       564.7. 263       28       28       27			‡													with Roc	к гауш	ents			Ī	l						
105       504 7. 203       28       28       28       27	570	569.7 -	+ 21.3		01										-						±	l						
560       561.7       28.       28       27			ŧ	16	31	32	.		· · · · · · · ·	<b>1</b> 63			M		+						$\pm$	l						
001       28       28       28       27	565		‡				11		· · · · · · · ·						-						±	l						
560	505	564.7 -	<u>+ 26.3</u> +	28	28	27	-  -:			955		11	м		<u> </u>						<u> </u>	l						
355       1			‡							<u> </u>	<u> </u>				- - 561.5				5		<u>+</u>	l						
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Image: Sector of the sector	-		Ŧ												E							l						
Image: Second			<u> </u>			-						Ц		X		Boring Torminated	at Flova		5 D. L									
	1	-	Ŧ												F	CRYSTALLINE R	OCK (ME			1	+	l						
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#### GEOTECHNICAL BORING REPORT CORE LOG



# CORE PHOTOGRAPHS: Bridge No. 57 on US 29/601 over Irish Buffalo Creek, B2-B 20+66, 36.0' RT





SCALE IN FEET

									1	URE																		
	45762					<b>P</b> B-5				Y CABAR	RUS			GEC	DLOGIST Stickney,					45762					<b>P</b> B-5808		COUNT	
				ge No					h Buffalo	1				1.				. ,					ge No		n US 29/60		h Buffalo	_
	ING NO.				_	TATION				OFFSET				_	GNMENT -L-		0 HR.	NM		ING NO					TATION 2			OFF
								<b>H</b> 24.7 f		NORTHIN					STING 1,519,256		24 HR.	NM		LAR EL					DTAL DEP			NOF
								% 08/15/							-		<b>ERTYPE</b> AL	utomatic							CME-550X 9			
DRIL	LER S	mith, C						06/04/1		COMP. D					RFACE WATER DEP	TH N/A	4		DRIL	LER S	Smith, C	). L.						CON
ELEV (ft)	ELEV	DEPTH (ft)	·			0			PER FOO <sup>-</sup> 50		SAMP				SOIL AND ROC	K DESC			ELEV (ft)	DRIVE ELEV	DEPTH (ft)	BLC		-	0		PER FOO	
(11)	(ft)	(14)	0.5π	0.5ft	0.5π		25	,		75 10	NO.	_/мо	I G	ELEV.	(ft)			DEPTH (ft)	(14)	(ft)		0.5π	0.5ft	0.511	0	25	50	75
ł																												
610										-				609.2	GROUND			0.0	610		╞							
	-	F												F	ROADWAY E Brown-Orange,						Ŧ							:   :
605	- 604.8	E 4 4											L	F	_	-	-		605	604.9	$I_{44}$							
	- 004.0	<u></u>	4	2	2	<b>●</b> 4 ·	• •					м		£						004.0	Ē	2	3	2	<b>∳</b> 5•••			
	-	F						· · · · ·		.				Ŧ							Ŧ							
600	- 599.8 -	9.4	WOH	WOH	4									F					600	599.9	9.4	1	1	2		+ · · · ·	+ · · ·	
	-	F			-	<b>•</b> 4 .		· · · · ·		.		M	E	Ŧ							Ŧ				$\begin{bmatrix} \mathbf{P}_3 & \cdots & \cdots \\ \mathbf{P}_2 & \cdots & \cdots \end{bmatrix}$			
595	- 	<b>F</b>						· · · · ·					E	594.8				14.4	595	594.9	+ - 14.4				<b> </b> · · · · ·			
	594.8 <u>_</u>	- 14.4	1	1	2	<b>4</b> 3					11	м		<u></u>	ALL			14.4		- 594.9 -	+ 14.4	2	1	1				.   .
	-	ŧ.						· · · · ·	· · · ·	.					Gray, Sand	ly Slity C	LAY				‡							
590	- 589.8 -	19.4			4		•••				_								590	589.9	19.4	1	2	4	<u> </u>			·   ·
	-	ł		1	1	<b>●</b> 2 :	· · ·	· · · · ·	· · · ·			M		587.3				21.9			‡	'	2	4				:   :
585	-	ŧ.					· · ·	· · · · ·	· · ·   · · ·						RES Brown-Gray-Orange,	IDUAL Clavev S	ilty Fine SAN	_	585		‡						· · ·   · · ·	
303		24.4	60/0.1			╽┝╍╼╍				60/0.7	ᆋ		-	584.9 584.5	-⁄ WEATHE	RED RO	СК	$\frac{D_{24.3}}{24.7}$	000	584.9	+ 24.4	72	28/0.1				+	<del>.   .</del>
	-	ł												È.	Gray (META-QU Boring Terminated v	JARTZ L	DIORITE) ng Advancer				‡					· · · · ·	· · · ·	
	-	L.												L	Refusal at Elev CRYSTALLINE RO	ation 584	4.5 ft on			-	<u>+</u>							.   .
	-	Ł												Ł	DIO	RITE)					ŧ							
	-	L												Ł	N NM=Not	ote:	1				ŧ							
	-	Ł												F	INIVI=INOT	weasure	ea			-	Ŧ							
	-	ł												E							ł							
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ידאנ	YC	CAE	BAR	RI	JS			GEO	LOGI	ST S	Stickney,	, J. K.		
falo	Cre	ek											GROUN	D WTR (ft)
	OF	FS	ET	2	3 ft RT			ALIG	INME	NT -	·L-		0 HR.	NM
	NO	RT	HIN	G	609,9	89		EAS	TING	1.51	19,312		24 HR.	FIAD
	_				DRILL N		D N	V Casing				HAMM		Automatic
	<u> </u>	NAL			E 06/			-						
			'. DA	1	-		L	SUR	FACE	WAI	ER DEP	IH N/	4	
ООТ	75		100		SAMP.		0			SOIL	AND ROO	CK DESC	RIPTION	
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	-	10	0/0.6	÷.			10		~		WEATHE	RED RC	CK	
•••	.	•	· · · ·							Gray	(META-Q	UARIZI	DIORITE)	
	<u> </u>	•		1				580.8	Bo	rina Te	erminated	with Cas	ing Advan	28.5 cer
							F			Ref	usal at Ele	vation 58	0.8 ft on	
							ļ		Cr	41517		DCK (ME DRITE)	TA-QUAR	
							Ŀ	-			N	otes:		
							-		0		1. NM=N	ot Measu		
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	45762					<b>FIP</b> B-58					CABAR	RUS			G	EOLO	GIST Stickney		1		45762					<b>IP</b> B-5			COUNT	
				lge No		on US 29			ish Buf										GROUND WTR (ft)					lge No				Over Iris	h Buffalo	
	NG NO.					STATION					OFFSET						MENT -DET-		0 HR. Dry		ING NO.					TATION				OF
						TOTAL D					NORTHIN						<b>IG</b> 1,519,208		24 HR. FIAD									11.8 ft		NC
				TE H		"2 CME-55						DRILL				-			ER TYPE Automatic					TE H				6 08/15/2		
DRIL	LER S					START D	DATE				COMP. DA				S	URFA	CE WATER DEF	PTH N/	A	DRIL	LER S							06/20/1		CC
ELEV (ft)	DRIVE ELEV	DEPTH	BLC		_		05	BLOWS			F 400	SAMP.	1.7	0			SOIL AND RO	CK DESC	CRIPTION	ELEV (ft)	DRIVE ELEV		BLC		-			BLOWS F		
(11)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	)	50	1	5 100	NO.	Имс	DI G	ELE	EV. (ft)			DEPTH (ft)	(11)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50 I	75
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	594.5	- <u>3.9</u> -	2	3	4							1	м				AL Gray, Silty	<b>LUVIAL</b> / Clayey S	SAND		-	-								
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590	- 589.5	- 8.9					• •		·   · ·											595		-		ļ '	ľ		13	· · · ·		
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580	- 579.5 -	- - 18.9					·\·		• • • •												-	F								
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	-	-													-		Boring Terminate Elevation 577.0 ft o	d by Aug n CRYST	er Refusal at		-	-								
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<b>TY</b> CABARRUS	GEOLOGIST Stickney, J. K.	
o Creek		GROUND WTR (ft)
OFFSET 15 ft LT	ALIGNMENT -DET-	0 HR. Dry
NORTHING 610,072	<b>EASTING</b> 1,519,166	24 HR. FIAD
		ER TYPE Automatic
COMP. DATE 06/20/19	SURFACE WATER DEPTH N/	A
T SAMP.		
75 100 NO. MOI G	SOIL AND ROCK DESC	SRIPTION
75     100     NO.     MOI     G       75     100     NO.     MOI     G	SOIL AND ROCK DESC 800.6 GROUND SURFA ALLUVIAL Gray, Silty Clayey S 596.8 RESIDUAL Brown-Gray-Orange, Clayey S 589.8 MEATHERED RC (META-QUARTZ DIC Boring Terminated by Aug Elevation 588.8 ft on CRYST (META-QUARTZ DIC Boring Terminated by Aug Elevation 588.8 ft on CRYST (META-QUARTZ DIC Note: FIAD=Filled Immediately /	ACE 0.0 SAND 3.8 Silty Fine SAND 10.8 DENTE DRITE) Per Refusal at ALLINE ROCK DRITE)

# LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 45761.1.1 TIP: B-5808 COUNTY: CABARRUS Bridge No. 57 on US 29/601 over Irish Buffalo Creek

Γ									Unit	Unconfined
					Geologic	Run			Weight	Compressive
	Sample #	Boring #	Depth (ft)	Rock Type	Map Unit	RQD (%)	Length (in)	Diameter (in)	(PCF)	Strength (PSI)
	RS-1	B2-B	40.1-40.4	Meta-Quartz Diorite	PzZq	87	0.3	1.86	164.0	13,560
	RS-2	B1-B	27.7-28.2	Meta-Quartz Diorite	PzZq	81	0.5	1.86	166.7	16,640

)	Remarks
	Bridge No.57
	Bridge No. 57

# Bridge No. 57 on US 29/601 over Irish Buffalo Creek

# SITE PHOTOGRAPHS



Photograph No. 1: Looking at End Bent 1 toward End Bent 2



Photograph No. 2: Looking at End Bent 1 toward End Bent 2