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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJECT DESCRIPTION REPLACEMENT OF BRIDGE NO. 76 ON SR 1436 (PINEBROOK SCHOOL ROAD)

OVER *I*-40

SITE DESCRIPTION STA. 19+69.97 -L-

 \sim S 71. 0 PROJEC

STATE PROJECT REFERENCE NO. STATE TOTAL SHEETS NO. N.C BR-0152 1

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 SOLT TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-8050. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE ONSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIVESTIGATIONS AND REAS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOISTURE CONDITIONS MAY LARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS NICLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIODER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBJURFACE 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPHION OF THE DEPARTMENT AS TO THE TYPE OF WATERALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR SLAUTONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACULAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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PERSONNEL

M. FOSTER

TRIGON EXPLORATION

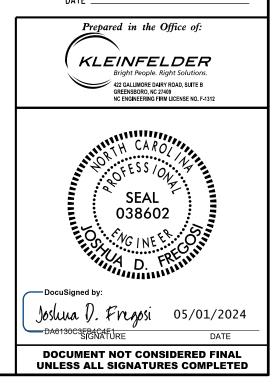
INVESTIGATED BY _____KLEINFELDER, INC

DRAWN BY __M. FOSTER

CHECKED BY _J. FREGOSI

SUBMITTED BY _____KLEINFELDER, INC

DATE _______ 2024



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THA											RADATION		ROCK DESCRIPTION				ESCRIPTION				
BE PENE ACCORD IS I	CONSIDERED TRATED WITH ING TO THE BASED ON TH ENCY, COLOR,	A CON STANDA E AASH	TINUOUS FLI RD PENETRA TO SYSTEM	GHT POW TION TES BASIC DE	ER AUGER T (AASHT(ESCRIPTIO	AND YIE J T 206, INS GENE	ELD LESS ASTM DI	THAN 100 586). SOIL ICLUDE THE	BLOWS PE CLASSIFI E FOLLOWI	ER FOOT CATION NG:	WELL GRADED - INDICAT UNIFORMLY GRADED - IN GAP-GRADED - INDICATE	NDICATE	ES THAT SOIL IXTURE OF UN	PARTICLES ARE AL	L APPROXIMA	TELY THE SAME SIZE.	ROCK LINE SPT REFUSA BLOWS IN N	INDICATES AL IS PEN NON-COAS	5 THE LEVEN NETRATION B TAL PLAIN	L AT WHICH NON-C	F WOULD YIELD SPT REFUSAL IF TESTED COASTAL PLAIN MATERIAL WOULD YIELD S SAMPLER EQUAL TO OR LESS THAN 0.1 F RANSITION BETWEEN SOIL AND ROCK I
A	S MINERALOO	GICAL C	OMPOSITION,	ANGULAR	TY, STRU	CTURE, PL	LASTICITY	,ETC. FOR	EXAMPLE,		THE ANGULARIT	Y OR F		SOIL GRAINS IS D		THE TERMS:				DIVIDED AS FOLL	OWS:
	VERY STIFF.GA										ANGULAR, SUBAN						WEATHERED ROCK (WR)				AIN MATERIAL THAT WOULD YIELD SPT
GENERAL			MATERIALS			LAY MATE						M	INERALOG	CAL COMPOS	ITION			_	2.2		E GRAIN IGNEOUS AND METAMORPHIC ROCI
CLASS.			SSING #200)			PASSING		ORC	GANIC MATER	IALS				, FELDSPAR, MICA, T N THEY ARE CONSIE			CRYSTALLIN ROCK (CR)	E			PT REFUSAL IF TESTED. ROCK TYPE INCL
GROUP CLASS.		A-3	A-2		A-4 6	4-5 A-6	A-7	A-1, A-2 A-3	A-4. A-5 A-6. A-7		ARE USED IN			RESSIBILITY	JERED UF SIG	NIFICANCE.	NON-CRYSTA	ALL INF		FINE TO COARSE	GRAIN METAMORPHIC AND NON-COASTAL
	A-1-a A-1-b	A	2-4 A-2-5 A	2-6 A-2-7			A-7-6	H-3	н-6, н-7		SLIG	ATLY C	OMPRESSIBLE		LL < 31		ROCK (NCR)				DCK THAT WOULD YEILD SPT REFUSAL IF .UDES PHYLLITE, SLATE, SANDSTONE, ETC.
SYMBOL				22	1	7.4					MODE	RATELY	Y COMPRESSIB	-E	LL = 31 - LL > 50	50	COASTAL PL SEDIMENTAR			COASTAL PLAIN	SEDIMENTS CEMENTED INTO ROCK, BUT M ROCK TYPE INCLUDES LIMESTONE, SANDST
% PASSING #10	FA MY							GRANULAR	SILT-	MUCK,	11010			GE OF MATER			(CP)	I NOCK		SHELL BEDS, ET	C.
*40	30 MX 50 MX							SOILS	CLAY SOILS	PEAT			GRANULAR	SILT - CLAY						WEA	THERING
	15 MX 25 MX 1	10 MX 3:	0 MX 35 MX 35	5 MX 35 M)	(36 MN 36	5 MN 36 M	1N 36 MN				ORGANIC MATERIAL TRACE OF ORGANIC M	ATTER	<u>SOILS</u> 2 - 3%	<u>SOILS</u> 3 - 5%	<u>OTHER</u> TRACE	MATERIAL 1 - 10%	FRESH		RESH,CRYSTA		NINTS MAY SHOW SLIGHT STAINING. ROCK R
MATERIAL PASSING 40								SOILS	WITU		LITTLE ORGANIC MAT	TER	3 - 5%	5 - 12%	LITTLE	10 - 20%	VERY SLIGHT				ED, SOME JOINTS MAY SHOW THIN CLAY COA
LL PI	- 6 MX		1 MX 41 MN 40 1 MX 10 MX 11					LITTL	E OR	HIGHLY	MODERATELY ORGANIC HIGHLY ORGANIC		5 - 10% > 10%	12 - 20% > 20%	SOME HIGHL Y	20 - 35% 35% AND ABOVE	(V SLI.)	CRYSTA	LS ON A BRO	KEN SPECIMEN FAC	E SHINE BRIGHTLY. ROCK RINGS UNDER HAN
GROUP INDEX	0	0	a a	4 MX		MX 16 M		Mode Amoun		ORGANIC			GRO	JND WATER			SLIGHT		RYSTALLINE		ED AND DISCOLORATION EXTENDS INTO ROCH
USUAL TYPES	STONE FRAGS.	-					_	ORG4	anic	SOILS	∇	WAT	ER LEVEL IN	BORE HOLE IMMEDIA	ATELY AFTER	DRILLING	(SLI.)	1 INCH.	OPEN JOINTS	5 MAY CONTAIN CLA	Y. IN GRANITOID ROCKS SOME OCCASIONAL
OF MAJOR	GRAVEL, AND	FINE SAND	SILTY OR C GRAVEL AND		SILTY		LAYEY SOILS	MAT	TER					VEL AFTER 24			WOODDATE				CRYSTALLINE ROCKS RING UNDER HAMMER
MATERIALS	SAND										 ∑Pw_			ATURATED ZONE, OF		INC STRATA	MODERATE (MOD.)				DISCOLORATION AND WEATHERING EFFECTS. E DULL AND DISCOLORED, SOME SHOW CLAY.
GEN. RATING AS SUBGRADE	E	EXCELLEN	IT TO GOOD		FA	IR TO POO	DR	Fair to Poor	POOR	UNSUITABLE	-			ATOMATED 2010, 01						HAMMER BLOWS AND	D SHOWS SIGNIFICANT LOSS OF STRENGTH (
	P	PIOF A-7	-5 SUBGROUP I	S ≤ LL -	30 ; PI OF	A-7-6 SUE	BGROUP IS	> LL - 30		1		SPRI	ING OR SEEP				MODERATELY		RESH ROCK. CK EXCEPT (OR STAINED. IN GRANITOID ROCKS, ALL FE
			CONSIS	TENCY	′ OR [DENSE	NESS						MISCELLA	NEOUS SYMBO	OLS		SEVERE	AND DIS	SCOLORED AN	D A MAJORITY SHOW	W KAOLINIZATION. ROCK SHOWS SEVERE LOS
	SOIL TYPE		MPACTNESS			OF STA	NDARD SISTENCE		E OF UNC RESSIVE S				NT (PE) 25/0	25 DIP & DIP DIF			(MOD. SEV.)			ATED WITH A GEOLO ATEL <u>D SPT REFUSAL</u>	GIST'S PICK. ROCK GIVES "CLUNK" SOUND WH
FRIMANT	SUIL TIFE		CONSISTENC	r		N-VALUE		COMPT	(TONS/F1		L WITH SOIL DE			 OF ROCK STRU 			SEVERE				OR STAINED. ROCK FABRIC CLEAR AND EVI
GENERA	LLY		VERY LOOSE			< 4					SOIL SYMBOL			OPT DAT TEST BOR	RING	SLOPE INDICATOR	(SEV.)				IN GRANITOID ROCKS ALL FELDSPARS AR STRONG ROCK USUALLY REMAIN.
GRANUL	AR	м	LOOSE EDIUM DENS	E		4 TO 10 0 TO 30			N/A			111 /05		· · · · · ·	<u> </u>	INSTALLATION CONE PENETROMETER				IELD SPT N VALUES	
MATERI (NON-CC					3	0 TO 50 > 50	0				THAN ROADWA			- AUGER BORING	٨	TEST	VERY				OR STAINED. ROCK FABRIC ELEMENTS ARE
			VERY DENSE			< 2			< 0.25		INFERRED SOI	i BOUN		- CORE BORING	•	SOUNDING ROD	SEVERE (V SEV.)				D SOIL STATUS, WITH ONLY FRAGMENTS OF OF ROCK WEATHERED TO A DEGREE THAT (
GENERA			SOFT			2 TO 4			Ø.25 TO	0.5			, T			TEST BORING					EMAIN. <u>IF TESTED, WOULD YIELD SPT N VA</u>
SILT-CL MATERI		M	EDIUM STIF STIFF	F		4 TO 8 8 TO 15			0.5 TO 1 1 TO 2		INFERRED ROOM	K LINE	e "C		ELL 🕂	WITH CORE	COMPLETE				NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN MAY BE PRESENT AS DIKES OR STRINGERS.
(COHESI			VERY STIFF			5 TO 30			2 TO 4		ALLUVIAL SOI	L BOUN	NDARY 🕹	PIEZOMETER INSTALLATION	\bigcirc	- SPT N-VALUE			N EXAMPLE.		
			HARD		R GRA	> 30	17F		> 4			F		DATION SYMB			-			ROCK	HARDNESS
													NCLASSIFIED E			SIFIED EXCAVATION -	VERY HARD				HARP PICK. BREAKING OF HAND SPECIMENS
U.S. STD. SI OPENING (M			4 4.76	10 2.00	40 0.42	60 0.25	200 0.075	270 0.053					NSUITABLE WAS		ACCEPT	BLE, BUT NOT TO BE	HARD			S OF THE GEOLOGI	ONLY WITH DIFFICULTY. HARD HAMMER BLC
BOULDE		BLE	GRAVEL		COARSE		FINE		SILT	CLAY	SHALLOW UNDERCUT		NCLASSIFIED E	XCAVATION - GRADABLE ROCK		THE TOP 3 FEET OF MENT OR BACKFILL	THIND		ACH HAND SF		UNET WITH DIFFICUETT. HARD HAMMEN DEC
(BLDR.		OB.)	(GR.)		SAND (CSE, SD.	,	SAND (F SD.		SL.)	(CL.)				REVIATIONS			MODERATELY				GOUGES OR GROOVES TO 0.25 INCHES DEE
GRAIN MN	1 305	7	5	2.0		0.25		0.05	0.005		AR - AUGER REFUSAL			MEDIUM	VST -	VANE SHEAR TEST	HARD		ERATE BLOWS		DGIST'S PICK. HAND SPECIMENS CAN BE DET
SIZE IN		3		2.0		ULU		0.00	0.000		BT - BORING TERMINATE	c	MICA.	MICACEOUS	WEA	WEATHERED	MEDIUM				ES DEEP BY FIRM PRESSURE OF KNIFE OR
	S	OIL	MOISTUR	E - C	ORREL	IOITA.	N OF	TERMS			CL CLAY CPT - CONE PENETRATIO	N TEST		MODERATELY		INIT WEIGHT IRY UNIT WEIGHT	HARD		EXCAVATED		D PEICES 1 INCH MAXIMUM SIZE BY HARD B
	MOISTURE S			IELD MOI		GUID	DE FOR F	IELD MOIS	STURE DES	SCRIPTION	CSE COARSE		ORG	ORGANIC	-		SOF T				Y KNIFE OR PICK. CAN BE EXCAVATED IN F
(A1	TERBERG LIM	1115)		DESCRIP	TION						DMT - DILATOMETER TES DPT - DYNAMIC PENETRA			PRESSUREMETER TI SAPROLITIC	ESI <u>SA</u> T S-B	<u>IPLE ABBREVIATIONS</u> JLK				ERAL INCHES IN SI	ZE BY MODERATE BLOWS OF A PICK POINT.
			-	SATURAT	TED -			UID: VERY			e – VOID RATIO		SD 9	SAND, SANDY	SS -	SPLIT SPOON	VERY				XCAVATED READILY WITH POINT OF PICK. P
LL		LIMIT		(SAT.)		FRUI	M BELUW	THE GRO	UND WHIE	RIHBLE	F - FINE FOSS FOSSILIFEROUS			SILT, SILTY SLIGHTLY	ST - RS -	SHELBY TUBE ROCK	SOF T			ESS CAN BE BROKEN	N BY FINGER PRESSURE. CAN BE SCRATCHE
PLASTIC RANGE <				WFT - (พา			EQUIRES C		1	FRAC FRACTURED, FRAC	TURES	TCR -	TRICONE REFUSAL	RT -	RECOMPACTED TRIAXIAL		FINGERN	URE SPA		
(PI) PL						ATT	AIN OPTI	MUM MOIS	TURE		FRAGS FRAGMENTS HI HIGHLY		<i>w</i> - м v - ve	RY	CBR -	CALIFORNIA BEARING RATIO	TERM		URE SPA	SPACING	BEDDING
	T										EO	UIPM	ENT USED	ON SUBJECT	T PROJEC	Т	VERY WI			THAN 10 FEET	VERY THICKLY BEDDED
OM			IURE	MOIST -	(M)	SOLI	ID; AT OF	NEAR OP	TIMUM MC	ISTURE	DRILL UNITS:	ADV	ANCING TOOLS:		HAMMER 1	YPE:	WIDE MODERAT	ELY CLOS		TO 10 FEET TO 3 FEET	THICKLY BEDDED 1.5 THINLY BEDDED 0.16
SL		AGE LIM	111			DEOL		DITIONAL		`	CME-45C		CLAY BITS		X AUT	DMATIC MANUAL	CLOSE		0.	16 TO 1 FOOT	VERY THINLY BEDDED 0.03
			-	DRY - ((וכ			MUM MOIS					6" CONTINUOU	S FLIGHT AUGER	CORE SIZ		VERY CL	USE	LESS	THAN 0.16 FEET	THICKLY LAMINATED 0.008 THINLY LAMINATED < 0
	1			PI A	STICIT	Y					X CME-55		8"HOLLOW AU	IGERS	П-в	П-н				INDU	URATION
					CITY INDE			na	Y STRENG	тн	CME-550		HARD FACED	FINGER BITS			FOR SEDIME	NTARY RC	CKS, INDURA	TION IS THE HARD	DENING OF MATERIAL BY CEMENTING, HEA
	I PLASTIC			. 2.10110	0-5				VERY LOW			1	TUNGCARBID	E INSERTS			FRIA	BLE			H FINGER FREES NUMEROUS GRAINS;
	GHTLY PLAS DERATELY PL				6-15 16-25				SLIGHT MEDIUM		VANE SHEAR TEST		CASING	W/ ADVANCER	HAND TOO						W BY HAMMER DISINTEGRATES SAMPLE.
	HLY PLASTIC			26	OR MOR	E			HIGH		PORTABLE HOIST	11		•STEEL TEETH		T HOLE DIGGER D AUGER	MODE	RATELY I	NDURATED		BE SEPARATED FROM SAMPLE WITH STEE ILY WHEN HIT WITH HAMMER.
				С	OLOR						1			- 7/8 · TUNGCARB.		D AUGER NDING ROD	THE	RATED		GRAINS ARE	DIFFICULT TO SEPARATE WITH STEEL PI
DESCRIP	TIONS MAY I					IONS (T	AN, RED	YFII OW-RF	ROWN, RI U	F-GRAY)			CORE BIT			E SHEAR TEST		NHIEU			O BREAK WITH HAMMER.
	DIFIERS SU														'''`		EXTR	EMELY IN	DURATED		ER BLOWS REQUIRED TO BREAK SAMPLE: AKS ACROSS GRAINS.
-																				JANFLE ORE	

PROJECT REFERENCE NO. BR-0152



	TERMS AND DEFINITIONS
TED. AN INFERRED D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
.1 FOOT PER 60 K IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
PT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ROCK THAT	ARTESIAN - 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.
TAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
IF TESTED. TC.	$\underline{\text{Colluvium}}$ - 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
K RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
COATINGS IF OPEN, 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 IAL FELDSPAR	FAULT - 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	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AY. ROCK HAS	PARENT MATERIAL.
FELDSPARS DULL	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM, FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
LOSS OF STRENGTH	FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIGER OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
ARE DISCERNIBLE OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
AT ONLY MINOR VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.)SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
Y IN SMALL AND RS. SAPROLITE IS	<u>ROCK QUALITY DESIGNATION (ROD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
NS REQUIRES	ROCK. <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
DEEP CAN BE	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
DETACHED	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
OR PICK POINT. D BLOWS OF THE	A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF I FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1FOOT 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 CHED READILY BY	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY 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 GAS A PERCENTAGE.
CHOILI DI	TOPSOIL (TS,) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: GPS-I (BR-0152_1)
THICKNESS 4 FEET	<u>(N: 810,864.75 FT, E: 1,551,763.72 FT, STA. 21+16.09 -L-, 12' LT)</u> ELEVATION: 739.655 FEET
1.5 - 4 FEET 0.16 - 1.5 FEET	NOTES:
.03 - 0.16 FEET 208 - 0.03 FEET < 0.008 FEET	BRIDGE BORING ELEVATIONS WERE SURVEYED BY TRANSYSTEMS CORPORATION USING CONVENTIONAL SURVEYING TECHNIQUES.
EAT, PRESSURE, ETC.	FIAD - FILLED IMMEDIATELY AFTER DRILLING
Ξ.	
 STEEL PROBE;	
00005	
PROBE:	

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

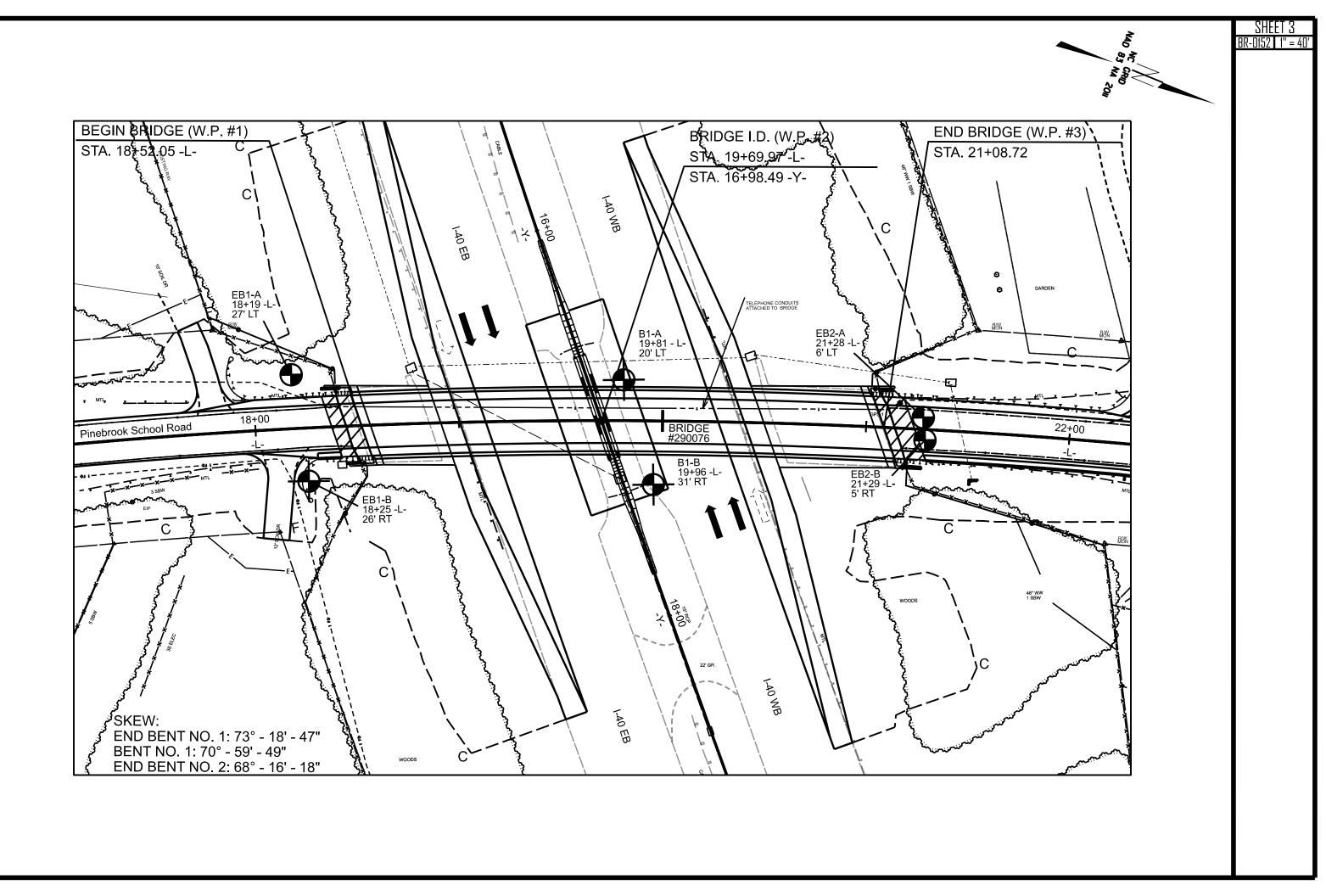
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed F	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	Gook Mass (Mari GOOD rough, fresh unweathered surfaces	ghtly weathered, ıron staıned	moderately weathered and surfaces	ided, highly weathered surfaces pact coatings or fillings ar fragments	JR ided, highly weathered surfaces t 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 valu 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 for
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. STRUCTURE	VERY Very	CREASING SI	FAIR Smooth, altered	POOR Slickenside with compact	VERY POOR Slickensided, F with soft clay	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.
				ΑLITY		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 sandstone 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.
BLOCKY - well interlocked un- disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70 60				B. Sand- stone with thin inter-
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		5	0			layers of siltstone
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			40	30		C, D, E, and G - 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 F and H .
discontinuity sets. Persistence of bedding planes or schistosity 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

	BR–C)152		2A
ed Heteroc	geneous Rock	Masses (Marır	nos and	Hoek, 2000)
VERY GOOD - Very Rough, fresh unweathered surfaces	COOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact	Fragments VERY POOR - Very smooth, slicken- sided or highly weathered surfaces with soft clay coatings or fillings
0 60	A 50 B 40	с	> >	E
		30 (5	F/ 20	H, ¹⁰
	VERY GOOD - Very Rough, fresh unweathered surfaces	very Kough, fresh voweathered surfaces unweathered surfaces coop - Rough, slightly weathered surfaces 20 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	VERY GOOD - Very Rough, fresh unweathered surfaces 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	eq Heterodeneons Bock Wasses (Marinos and Unweathered surfaces VERY 6000 - Very Rough, fresh unweathered surfaces Unweathered surfaces Unweathered surfaces Unweathered surfaces Unweathered surfaces Surfaces Unweathered surfaces Unweathered surfaces Unweathered surfaces O Very smooth, moderately Very smooth, cocastonally POOR - Very smooth, cocastonally POOR - Very smooth, cocastonally Subtenside surfaces Mean and altered surfaces Anoth, cocastonally POOR - Very smooth, cocastonally Subtenside surfaces with addition of the colspan="2">United surfaces

PROJECT REFERENCE NO.

SHEET NO.



BORING NO. EB1-A STATION 18+19 OFFSET 27 ft LT ALIGNMENT -L- 0 HR. COLLAR ELEV. 728.5 ft TOTAL DEPTH 23.2 ft NORTHING 810,583 EASTING 1,551,865 24 HR. DRILL RIG/HAMMER EFF/DATE TRI0055 CME-55 83% 05/09/2022 DRILL METHOD Mud Rotary HAMMER TYPE Au DRILLER R. Toothman START DATE 03/04/24 COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A ELEV DEPTH BLOW COUNT BLOWS PER FOOT SAMP. NO. SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0.25 50 75 100 NO. MOI ELEV. (ft) SOIL AND ROCK DESCRIPTION 728.5 0.0 2 6 11 17 1 1 17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <t< th=""><th>BORE LOG</th><th><u> </u></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	BORE LOG	<u> </u>									
BORING NO. EB1-A STATION 18+19 OFFSET 27 ft LT ALIGNMENT -L- 0 HR. COLLAR ELEV. 728.5 ft TOTAL DEPTH 92.1 ft NORTHING 810,583 EASTING 1,551,865 24 HR. DRILL ROHAMMER EFF.DATE TRIDSE CME-55 83% 05092022 DRILL METHOD MuR Output HAMMER TYPE A DRILLER TOOTMan START DATE 03/04/24 COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A ELEV DEPTH BLOW COUNT BLOWS PER FOOT N/A SURFACE WATER DEPTH N/A 728 DEPTH BLOW COUNT BLOWS PER FOOT N/A SURFACE RESIDUAL 728 25 0 75 100 N/A SURFACE RESIDUAL 728.5 0.0 2 5 7 100 N/A SURFACE RESIDUAL 728.5 0.0 2 5 7 100 N/A SURFACE RESIDUAL 729 720.1 8.4 31 <td< td=""><td>UNTY DAVIE GEOLOGIST M. Foster</td><td>COUNTY</td><td>52</td><td>IP BR-015</td><td>Т</td><td></td><td></td><td></td><td>2.1.1</td><td>67152</td><td>WBS</td></td<>	UNTY DAVIE GEOLOGIST M. Foster	COUNTY	52	IP BR-015	Т				2.1.1	67152	WBS
COLLAR ELEV. 728.5 ft TOTAL DEPTH 23.2 ft NORTHING 810,583 EASTING 1,551,865 24 HR. DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 S3% 05/09/2022 DRILL METHOD Mud Rotary HAMMER TYPE A DRILLER R. Toothman START DATE 03/04/24 COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A ELEV DRIVE BLOW COUNT BLOWS PER FOOT SAMP. SOIL AND ROCK DESCRIPTION 730 0 0 25 50 75 100 NO. MOI G ELEV. (ft) SOIL AND ROCK DESCRIPTION SOIL AND ROCK DESCRIPTION 730 0 0 2 6 11 17 1.000 /0 NO. MOI G ELEV. (ft) SOIL AND ROCK DESCRIPTION 720 725.1 3.4 9 12 16 100.0 100.0 NM Stiff. Oligit Provider Site Coarse Sandy Sate Provider Site Coarse Sate Provider Site Coarse Sate Provider Sate Provide	6 (Pinebrook School Road) over I-40: STA. 19+69.97 -L- GROUND WTR	1436 (Pine	. 67 on SR 1	Bridge No.	ent of	lacem	Repl	DN F		DESCR	SITE
DRILL RIG/HAMMER EFF./DATE TRIODS CME-55 83% 05/09/2022 DRILL METHOD Mud Rotary HAMMER TYPE A DRILLER R. Toothman START DATE 03/04/24 COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A LEV DRIVE ELEV DRIVE DEPTH BLOW COUNT BLOWS PER FOOT SAMP. NO. Mol G L SOIL AND ROCK DESCRIPTION 730 0 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 25 50 75 100 MOI Componential Start Participation SOIL AND ROCK DESCRIPTION 728.5 0.0 2 6 11 17 728.5 GROUND SURFACE 728.5 0.0 2 6 11 17	OFFSET 27 ft LT ALIGNMENT -L- 0 HR.		18+19	TATION 18	S		4	1-A	EB1-	NG NO.	BORI
DRILLER R. Toothman START DATE 03/04/24 COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT BLOWS PER FOOT SAMP NO. Mol G SOIL AND ROCK DESCRIPTION 730	NORTHING 810,583 EASTING 1,551,865 24 HR. 1	1	TH 23.2 ft	OTAL DEPT	т		8.5 ft	728.5	EV. 72	AR ELE	COLL
ELEV (ft) DRIVE ELEV (ft) DEPTH ELEV (ft) BLOW COUNT 0.5ft DLOWS PER FOOT 0 SAMP 75 NO. MOI 6 SOIL AND ROCK DESCRIPTION ELEV. (ft) 730	DRILL METHOD Mud Rotary HAMMER TYPE Automat	L	05/09/2022	CME-55 83%	0055 C	TE TRI	FF./DA	EFF.	MMER E	RIG/HAM	DRILL
ELEC ELEV DC IIII O.SRI 0.SRI SRI	COMP. DATE 03/04/24 SURFACE WATER DEPTH N/A	4	E 03/04/24	TART DATE	S		man	thma	. Tooth	ER R.	DRILI
728.5 0.0 2 6 11 17 <	FOOT SOIL AND ROCK DESCRIPTION			0 2	-	1		''' 		ELEV	
725 725.1 3.4 9 12 16 720 720.1 8.4 31 37 42 715 715.7 12.8 100/0.4 79 100/0.4 710 710.7 17.8 100/0.4 100/0.4 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4	•••• •••• M 727.3 RESIDUAL	<u></u>	17	17	11	6	2		- <u>0.0</u>	728.5 -	730
720 720.1 8.4 31 37 42 Fine SAND (A-2-4), Saprolitic 715 715.7 12.8 100/0.4 100/0.4 100/0.4 100/0.4 710 710.7 17.8 100/0.5 100/0.5 100/0.5 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4 100/0.4 705.7 22.8 100/0.4 100/0.4 100/0.4 705.7 100/0.4 100/0.4 100/0.4 705.7 100/0.4 100/0.4 100/0.4 705.7 100/0.4 100/0.4 100/0.4 705.3 100/0.4 100/0.4 100/0.4	Stiff, Highly Plastic, Brown, Silty CLAY (A-7), Saprolitic		•28		16	12	9		3.4	725.1	725
715 100/0.4 Gray, METADIORITE 710 710.7 17.8 710 710.7 17.8 700 100/0.5 705.7 22.8 100/0.4 100/0.4 100/0.4 100/0.5 100/0.4 100/0.5 100/0.4 100/0.5 100/0.4 100/0.4 100/0.4 100/0.4	Yery Dense, Olive Yellow, Silty Coarse to Yery Dense, Olive Yellow, Silty Coarse to Fine SAND (A-2-4), Saprolitic Yery Dense, Olive Yellow, Silty Coarse to Yery Dense, Olive Yellow, Silty Yellow,		· · · · · ·		42	37	31	3	8.4	720.1	<u>720</u>
710 100/0.5 100/0.5 100/0.5 705.7 22.8 100/0.4 100/0.4 100/0.4 100/0.4 100/0.4		· · · · ·	· · · · ·			Ī	100/0.4	3 100	<u>12.8</u>	715.7 - - - -	715
100/0.4 100/0.4 100/0.4 100/0.4 100/0.4 100/0.4 Boring Terminated at Elevation 705.3 ft in WEATHERED ROCK: METADIORITE NOTE:			· · · · · ·				100/0.5	3 100	<u>- 17.8</u> - -		<u>710</u>
T WEATHERED ROCK: METADIORITE NOTE:	/05.3	· · · ·				j	100/0.4	3	22.8	705.7 -	F

	<i>E</i>	BORE LOG	1				CORE LOG		
WBS 67152.1.1	TIP BR-0152 COUN	ITY DAVIE	GEOLOGIST M. Foster	WBS 67152.1.1		TIP BR-0152 CO	UNTY DAVIE	GEOLOGIST M. Foster	
SITE DESCRIPTION Replacem	nent of Bridge No. 67 on SR 1436 (F	,	: STA. 19+69.97 -L- GROUND WTR (f) SITE DESCRIPTION	Replacemen		(Pinebrook School Road) over I-4	0: STA. 19+69.97 -L- GRC	
BORING NO. EB1-B	STATION 18+25	OFFSET 26 ft RT	ALIGNMENT -L- 0 HR. N/	BORING NO. EB1-B	3	STATION 18+25	OFFSET 26 ft RT	ALIGNMENT -L- 0 H	R. N/
COLLAR ELEV. 728.8 ft	TOTAL DEPTH 21.1 ft	NORTHING 810,611	EASTING 1,551,910 24 HR. 10.	_		TOTAL DEPTH 21.1 ft	NORTHING 810,611	EASTING 1,551,910 24 H	R. 10
DRILL RIG/HAMMER EFF./DATE TR	10055 CME-55 83% 05/09/2022	DRILL METHOD MU	Id Rotary and Core HAMMER TYPE Automatic	DRILL RIG/HAMMER EF	F./DATE TRI005	55 CME-55 83% 05/09/2022	DRILL METHOD M	Iud Rotary and Core HAMMER TY	PE Automatic
DRILLER R. Toothman	START DATE 03/04/24	COMP. DATE 03/05/24	SURFACE WATER DEPTH N/A	DRILLER R. Toothn	nan	START DATE 03/04/24	COMP. DATE 03/05/24	SURFACE WATER DEPTH N/A	
ELEV DRIVE DEPTH BLOW CO (ft) (ft) (ft) 0.5ft 0.5ft			SOIL AND ROCK DESCRIPTION	CORE SIZE NQ		TOTAL RUN 10.5 ft			
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G	ELEV. (ft) DEPTH	(ft) ELEV	(ft) RAIE	RUN REC.SAMP.STRA REC.(ft)(ft)NO.(ft)%%%	TA L RQD O (ft) G ELEV. (ft)	DESCRIPTION AND REMARKS	
				(it)	(II) (Min/ft)		G ELEV. (ft)		DEPTH
730			728.8 GROUND SURFACE	.0 718.2 718.2 10.6 717.7 A 11.1	0.5	(0.5) (0.0) (4.7) (718.2	Begin Coring @ 10.6 ft CRYSTALLINE ROCK	1
	7	: · · · · M	RESIDUAL - 726.4 Stiff, Olive Brown, Fine to Coarse Sandy	715 +	5.0 0:54/0.5	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.8) 718.2 33% Slight to Moderate Red, METAD	e Weathering, Hard to Moderately Hard, Gray ar DIORITE with Close to Very Close Fracture Space	nd Pale ng
725 725.5 - 3.3 3 2	. <i>j</i>	· · · · ·	CLAY (A-6), Saprolitic	712.7 - 16.1	9:27 6:03	(4.2) (1.8) 84% 36%		(GSI: 45 - 55)	1
	$\left \begin{array}{c}\bullet\\\bullet\\\bullet\end{array}\right \left \begin{array}{c}\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\$	<u>· · · · · ·</u> SS-1 43%	 Yellowish Brown, Silty CLAY (A-7-6), Saprolitic 	+	5.0 1:25	(4.1) (0.0) 82% 0% (3.3) (94%	0.0) Moderate to Moder	rately Severe Weathering, Medium Hard, Light E ETADIORITE with Close to Very Close Spacing	rownish
720 720.5 8.3			- '		5.0 1:25 1:25 1:25 1:25 1:30 1:45 1:59	02 // 0 // 34 //	0.0) 712.7 Moderate to Moder Gray, ME 0.0) 709.2 0.0) 707.7 Severe Weathering	(GSI: 30 - 40)	1
	50/0.3	· · · 100/0.8		3 707.7 21.1	1:55		0.0) 500 Severe Weathering	WEATHERED ROCK g, Soft to Very Soft, Light Brownish Gray, METAL	
718.2 10.6		· · · 60/0.0	- <u>718.2</u> WEATHERED ROCK 10 - Light Brownish Gray, METADIORITE CRYSTALLINE ROCK				Boring Termir	with Very Close Spacing nated at Elevation 707.7 ft in WEATHERED ROC	
715		· · · · ·	Gray and Pale Red, METADIORITE					METADIORITE	
			- - 712.7 16					NOTE: Topsoil (0.1 Foot)	
710			- Light Brownish Gray, METADIORITE					,	
		· · · · ·	709.2 19						
			- 707.7 Light Brownish Gray, METADIORITE Boring Terminated at Elevation 707.7 ft in						
			WEATHERED ROCK: METADIORITE						
			NOTE: Topsoil (0.1 Foot)						
			- Topson (0.11 00t)						
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GEOTECHNICAL BORING REPORT CORE LOG

ROCK CORE PHOTOGRAPHS

BR-0152 (67152.1.1)

Replacement of Bridge No. 76 on SR 1436 (Pinebrook School Road) over I-40

EB1-B BOX 1: 10.6 - 21.1 FEET







		BORE LOG						
WBS 67152.1.1		TY DAVIE	GEOLOGIST M. Foster	WBS 67152.1.1			ITY DAVIE	GEOLOGIST M. Foster
· · · ·	ent of Bridge No. 67 on SR 1436 (F	, , , , , , , , , , , , , , , , , , , ,			· ·	nt of Bridge No. 67 on SR 1436 (P	,	
BORING NO. B1-A	STATION 19+81	OFFSET 20 ft LT	ALIGNMENT -L- 0 HR. N/A	BORING NO. B1-A		STATION 19+81	OFFSET 20 ft LT	ALIGNMENT -L- 0 HR. N/
COLLAR ELEV. 711.7 ft	TOTAL DEPTH 35.5 ft	NORTHING 810,735	EASTING 1,551,805 24 HR. FIAD	COLLAR ELEV. 7		TOTAL DEPTH 35.5 ft	NORTHING 810,735	EASTING 1,551,805 24 HR. FIAI
DRILL RIG/HAMMER EFF./DATE TRI		DRILL METHOD Mu	· · · · · · · · · · · · · · · · · · ·			055 CME-55 83% 05/09/2022		Mud Rotary and Core HAMMER TYPE Automatic
DRILLER R. Toothman	START DATE 03/13/24	COMP. DATE 03/14/24	SURFACE WATER DEPTH N/A	DRILLER R. Toot	hman	START DATE 03/13/24	COMP. DATE 03/14/24	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW CO (ft) (ft) (ft) 0.5ft 0.5ft			SOIL AND ROCK DESCRIPTION		DUN DRILL	TOTAL RUN 24.9 ft		
		75 100 NO. MOI G	ELEV. (ft) DEPTH (ft)	ELEV RUN DEPTH (ft) (ft) (ft)	H RUN RATE (ft) (Min/ft)	REC. RQD SAWP. REC. RQE		DESCRIPTION AND REMARKS
745				701.1			G ELEV. (ft)	DEPTH Begin Coring @ 10.6 ft
715			-	701.1 10.6	1 1	(3.3) (0.0) 67% 0% (8.8) (1.0 85% 10%)) 701.1	CRYSTALLINE ROCK 10
			711.7 GROUND SURFACE 0.0	‡	1:55/0.9 1:34 1:25 1:17 5.0 2:05	9 87% 0% 85% 10%		derately Severe Weathering, Moderately Hard to Medium Greenish Black, METADIORITE with Close to Very Close
710 710.3 1.4 13 7	9		. ROADWAY EMBANKMENT _709.8 Asphalt (0.0 - 1.1 Feet)	<u>696.2 15.5</u> 695	1:25 1:17 5.0 2:05	(5.0) (1.0)		Fracture Spacing (GSI: 35 - 45)
707.7 4.0	$\left \begin{array}{c} \bullet \\ \bullet $		ABC Stone (1.1 - 1.9 Feet)		1:42		Hard, Gray and C	
		· · 100/0.4	Gray, METADIORITE	691.2 + 20.5	1:42 1:43 1:50 1:40 1:35			
703.8 7.9		· · · · · · · · · · · · · · · · · · ·		690	5.0 1:30 2:08	(4.8) (3.5) 96% 70% (4.3) (3.5 96% 78%		erate Weathering, Hard to Moderately Hard, Gray and METADIORITE with Moderately Close to Close Fracture
701 1 10 6		· · · · ·]	701.1 10.6	‡	2:02	96% 78%	6 Greenish Gray,	METADIORITE with Moderately Close to Close Fracture Spacing (GSI: 55 - 65) 29
700 - 60/0.0		· · · 60/0.0	CRYSTALLINE ROCK Gray and Greenish Black, METADIORITE	<u>686.2 25.5</u> 685	5.0 1:30 2:08 2:02 1:45 2:13 5.0 1:40	(4.5) (2.2)	686.2 Moderate to Moderate to Mod	derately Severe Weathering. Moderately Hard to Medium
					2:05	90% 44% 100% 21%	683.3	TADIORITE with Close to Very Close Fracture Spacing (GSI: 35 - 45)2
695				681.2 30.5	0.0 1.10 2:05 2:06 1:57 2:19 5.0 2:01	(6.3) (5.0 89% 70%)) Slight to Mode Greenish Grav, M	rate Weathering, Hard to Moderately Hard, Gray and METADIORITE with Close to Very Close Fracture Spacing
			_	680	5.0 2:01 1:29 1:52	(4.7) (3.4) 94% 68%	Greenish Gray, N	(GSI: 55 - 65)
			. 690.7 21.0	I I I	1:41			
			Gray and Greenish Gray, METADIORITE	676.2 + 35.5	1:52		676.2 Boring Term	inated at Elevation 676.2 ft in CRYSTALLINE ROCK:
				III			E	METADIORITE
685		· · · · · · RS-1	686.2 25.5 Gray, METADIORITE					
			683.3 28.4 Gray and Greenish Gray, METADIORITE					
			-					
			676.2 35.5	‡				
			Boring Terminated at Elevation 676.2 ft in CRYSTALLINE ROCK: METADIORITE	‡				
			-					
			-	 				
				III			I E	
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GEOTECHNICAL BORING REPORT CORE LOG

ROCK CORE PHOTOGRAPHS

BR-0152 (67152.1.1)

Replacement of Bridge No. 76 on SR 1436 (Pinebrook School Road) over I-40

B1-A BOXES 1 & 2: 10.6 - 30.5 FEET





B1-A BOX 3: 30.5 - 35.5 FEET





				_OGIST M. Foster WBS 67152.1.1 TIP BR-0152 COUNTY DAVIE GEOLOGIST M. Foster						
WBS 67152.1.1		TY DAVIE	GEOLOGIST M. Foster	WBS 67152.1.1			GEOLOGIST M. Foster			
SITE DESCRIPTION Replacemen	, · · · · · · · · · · · · · · · · · · ·	,		· · · ·	ent of Bridge No. 67 on SR 1436 (F	· · · · · · · · · · · · · · · · · · ·				
BORING NO. B1-B	STATION 19+96	OFFSET 31 ft RT	ALIGNMENT -L- 0 HR. N/A	BORING NO. B1-B	STATION 19+96	OFFSET 31 ft RT	ALIGNMENT -L- 0 HR. N/A			
COLLAR ELEV. 711.8 ft	TOTAL DEPTH 35.6 ft	NORTHING 810,768	EASTING 1,551,847 24 HR. 5.8	COLLAR ELEV. 711.8 ft	TOTAL DEPTH 35.6 ft	NORTHING 810,768	EASTING 1,551,847 24 HR. 5.8			
DRILL RIG/HAMMER EFF./DATE TRI005	55 CME-55 83% 05/09/2022	DRILL METHOD Mud	Rotary and Core HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE TRIO	055 CME-55 83% 05/09/2022	DRILL METHOD Mu	Id Rotary and Core HAMMER TYPE Automatic			
DRILLER R. Toothman	START DATE 03/12/24	COMP. DATE 03/13/24	SURFACE WATER DEPTH N/A	DRILLER R. Toothman	START DATE 03/12/24	COMP. DATE 03/13/24	SURFACE WATER DEPTH N/A			
ELEV DRIVE DEPTH BLOW COUN			SOIL AND ROCK DESCRIPTION	CORE SIZE NQ	TOTAL RUN 26.6 ft					
(ft) (ft) (ft) 0.5ft 0.5ft 0	0 25 50	75 100 NO. MOI G		ELEV RUN DEPTH RUN DRIL	- IREC. IRQUI SAWE IREC. IRQ		DESCRIPTION AND REMARKS			
				(ft) (ft) (ft) (ft) (Min/f	(ft) (ft) NO. (ft) (ft)	G ELEV. (ft)	DEPTH (ft)			
715				702.8			Begin Coring @ 9.0 ft			
				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	(1.1) (1.1) (1.1) (10.5) (8.3) $(91%)$ $72%$	8) 702.8 6 Slight to Mode	CRYSTALLINE ROCK 9.0 Prate Weathering, Hard to Moderately Hard, Gray, with Moderately Close to Close Fracture Spacing			
			711.8 GROUND SURFACE 0.0 ROADWAY EMBANKMENT	700 5.0 2:07/0 700 2:00 2:00 696.2 15.6 2:39 695 5.0 2:13	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	METADIORITE	with Moderately Close to Close Fracture Spacing (GSI: 55 - 65)			
710 710.4 1.4 13 5	7		710.0 Asphalt (0.0 - 1.0 Foot) 1.8							
707.8 4.0	+		<u>708.3</u> <u>ABC Stone (1.0-1.8 Feet)</u> <u>3.5</u> Stiff, Olive Brown and Gray, Silty CLAY (A-7)	696.2 15.6 2.39 695	(4.8) (3.6) 96% 72%					
					96% 72%					
704.1 7.7			Olive Gray and Gray, METADIORITE	691.2 20.6 2:50 691.2 50 2:50 2:25 2:35 2:35 2:35 2:35 2:35 2:35 2:35	RS-2	METADIORITE 691.2	20.6			
702.8 - 9.0 100/0.4			702.8 9.0 CRYSTALLINE ROCK	690 5.0 2:09 - 2:33 - 2:07	(5.0) (2.1) 100% 42% (13.1) (4.8 97% 36%	3) Slight to Moderate V 6 Black and Greenish	Veathering, Moderately Hard to Medium Hard, Greenish Gray, METAGABBRO with Moderately Close to Close			
700			Gray, METADIORITE	T 2:16			Fracture Spacing (GSI: 45 - 55)			
				686.2 25.6 2:22 685			· · · · ·			
				5.0 2.20 2.43 2.53 2.53 2.37	(4.7) (1.6) 94% 32%	(ME	TADIORITE Encountered Throughout)			
695				681.2 30.6 2:33						
		· · · · · · P S 2		680 7 5.0 2:11	(4.9) (2.0)					
		· · · · · · RS-2	691.2 20.6 Greenish Black and Greenish Gray,	2:14		677.7	34.1			
			METAGABBRO	676.2 35.6 2:06	(1.5) (0.9) 676.2 Very Slight to S	Slight Weathering, Hard to Moderately Hard, Gray, 35.6 ADIORITE with Close Fracture Spacing			
			(METADIORITE Encountered Throughout)			Boring Termina	ted at Elevation 676.2 ft in CRYSTALLINE ROCK:			
685							METADIORITE			
		· · · · · ·								
			676.2 Gray, WETADIORITE 35.6 Boring Terminated at Elevation 676.2 ft in			F				
			CRYSTALLINE ROCK: METADIORITE							
		F								
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GEOTECHNICAL BORING REPORT CORE LOG

ROCK CORE PHOTOGRAPHS

BR-0152 (67152.1.1)

Replacement of Bridge No. 76 on SR 1436 (Pinebrook School Road) over I-40

B1-B BOXES 1 & 2: 10.6 - 30.5 FEET



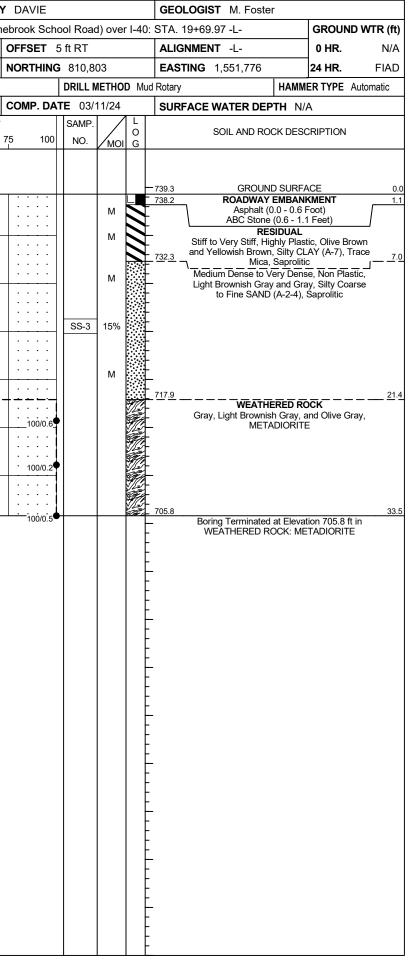
FEET

B1-B BOX 3: 30.5 - 35.5 FEET





		BORELOG	1		1
WBS 67152.1.1		TY DAVIE	GEOLOGIST M. Foster	WBS 67152.1.1	TIP BR-0152 COUNTY
SITE DESCRIPTION Replacemen	nt of Bridge No. 67 on SR 1436 (F	Pinebrook School Road) over I-40	D: STA. 19+69.97 -L- GROUND WTR (ft)	SITE DESCRIPTION Replacemen	nt of Bridge No. 67 on SR 1436 (Pine
BORING NO. EB2-A	STATION 21+28	OFFSET 6 ft LT	ALIGNMENT -L- 0 HR. N/A	BORING NO. EB2-B	STATION 21+29
COLLAR ELEV. 739.9 ft	TOTAL DEPTH 33.3 ft	NORTHING 810,878	EASTING 1,551,766 24 HR. FIAD	COLLAR ELEV. 739.3 ft	TOTAL DEPTH 33.5 ft
DRILL RIG/HAMMER EFF./DATE TRI00	055 CME-55 83% 05/09/2022	DRILL METHOD M	Id Rotary HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE TRI00	55 CME-55 83% 05/09/2022
DRILLER R. Toothman	START DATE 03/08/24	COMP. DATE 03/08/24	SURFACE WATER DEPTH N/A	DRILLER R. Toothman	START DATE 03/11/24
ELEV (ft) DEPTH BLOW COUNT (ft) (ft) DEPTH 0.5ft 0.5ft		0T SAMP. V L 75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft	ELEV COUN (ft) DRIVE ELEV DEPTH BLOW COUN (ft) 0.5ft 0.5ft 0	
740 738.9 1.0 5 8 736.2 3.7 -	0.5tt 0 23 30 7 13 31 12	. . <td>739.9 GROUND SURFACE 0.1 738.8 ROADWAY EMBANKMENT 1.1 Asphalt (0.0 - 0.5 Foot) ABC Stone (0.5 - 1.1 Feet) 1.1 BC Stone (0.5 - 1.1 Feet) RESIDUAL 1.1 Stiff to Very Stiff, Highly Plastic, Olive Brown, CLAY (A-7), Saprolitic 6.6 Very Dense, Non Plastic, Light Brownish Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 6.4 727.9 WEATHERED ROCK 12.9 Light Brownish Gray, METADIORITE 12.9 719.1 RESIDUAL 20.8 719.1 RESIDUAL 20.8 719.1 Light Brownish Gray and Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 20.8 719.1 RESIDUAL 20.8 Clark Brownish Gray and Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 20.8 METADIORITE 20.8 METADIORITE 20.8</td> <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td> <td>0 23 30 7 7 14 11 11 10 11 11 11 15 29 11 28 11 11 19 11 11 19 11 11 10 11 11 10 11 11 11 11 11 128 11 11 19 11 11 19 11 11 10 11 10 11 10 11 11 11 11 11 128 11 119 11 110 11 111 11 111 11 111 11 111 11 111 11 111 11 111 11 112 11 113 11 114 11 115 11 111 11 111 11 111 11 111 11 111 111 1</td>	739.9 GROUND SURFACE 0.1 738.8 ROADWAY EMBANKMENT 1.1 Asphalt (0.0 - 0.5 Foot) ABC Stone (0.5 - 1.1 Feet) 1.1 BC Stone (0.5 - 1.1 Feet) RESIDUAL 1.1 Stiff to Very Stiff, Highly Plastic, Olive Brown, CLAY (A-7), Saprolitic 6.6 Very Dense, Non Plastic, Light Brownish Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 6.4 727.9 WEATHERED ROCK 12.9 Light Brownish Gray, METADIORITE 12.9 719.1 RESIDUAL 20.8 719.1 RESIDUAL 20.8 719.1 Light Brownish Gray and Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 20.8 719.1 RESIDUAL 20.8 Clark Brownish Gray and Gray, Silty Coarse to Fine SAND (A-2-4), Saprolitic 20.8 METADIORITE 20.8 METADIORITE 20.8	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 23 30 7 7 14 11 11 10 11 11 11 15 29 11 28 11 11 19 11 11 19 11 11 10 11 11 10 11 11 11 11 11 128 11 11 19 11 11 19 11 11 10 11 10 11 10 11 11 11 11 11 128 11 119 11 110 11 111 11 111 11 111 11 111 11 111 11 111 11 111 11 112 11 113 11 114 11 115 11 111 11 111 11 111 11 111 11 111 111 1



LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

WBS NO. (TIP NO.): 67152.1.1 (BR-0152) PROJECT ID: 44248 COUNTY: DAVIE DESCRIPTION: REPLACEMENT OF BRIDGE NO. 76 ON SR 1436 (PINEBROOK SCHOOL ROAD) OVER I-40 SITE DESCRIPTION: STA. 19+69.97 -L-

												Atterberg Limits Gradation Results								
Sample No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft)	Natural Moisture Content (%)	AASHTO C (Group Inc		N-Value (blows/ft)	L.L.	P.L.	P.I.	Retained #4 Sieve (%)	Pass #10 Sieve (%)	Pass #40 Sieve (%)	Pass #200 Sieve (%)	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
SS-1	EB1-B	-L-	18+25	26' RT	3.3 - 4.8	42.8	A-7-6	(20)	5	53	25	28	0.6	99.0	89.0	71.8	14.0	18.0	31.2	36.8
SS-2	EB2-A	-L-	21+28	6' LT	8.0 - 9.5	10.1	A-2-4	(0)	64	NP	NP	NP	0.0	99.3	80.6	27.0	36.2	42.0	13.8	8.0
SS-3	EB2-B	-L-	21+29	5' RT	13.0 - 14.5	14.9	A-2-4	(0)	51	NP	NP	NP	0.0	100.0	80.0	28.4	35.7	41.2	15.1	8.0

Michelle Stadel, P.E. Michelle Stadel

NCDOT Certification No.: 111-02-1203

LABORATORY SUMMARY SHEET FOR ROCK SAMPLES

WBS NO. (TIP NO.): 67152.1.1 (BR-0152) PROJECT ID: 44248 COUNTY: DAVIE DESCRIPTION: REPLACEMENT OF BRIDGE NO. 76 ON SR 1436 (PINEBROOK SCHOOL ROAD) OVER I-40 SITE DESCRIPTION: STA. 19+69.97 -L-

Sampl No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft)	Core Run Interval (ft)	Core Run Recovery (%)	Core Run RQD (%)	Core Run GSI	Rock Type	Geologic Map Unit	Sample Height (in)	Sample Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)
RS-1	B1-A	-L-	19+81	20' LT	26.1 - 26.6	25.5 - 30.5	90	44	35 - 45	METADIORITE	PzZm	4.30	1.98	181.4	17,823
RS-2	В1-В	-L-	19+96	31' RT	19.4 - 20.1	15.6 - 20.6	96	72	55 - 65	METADIORITE	PzZm	3.99	1.98	176.3	4,769

Lab testing performed by Froehling & Robertson, Inc.



ASTM D7012 - Method D (Modified)

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

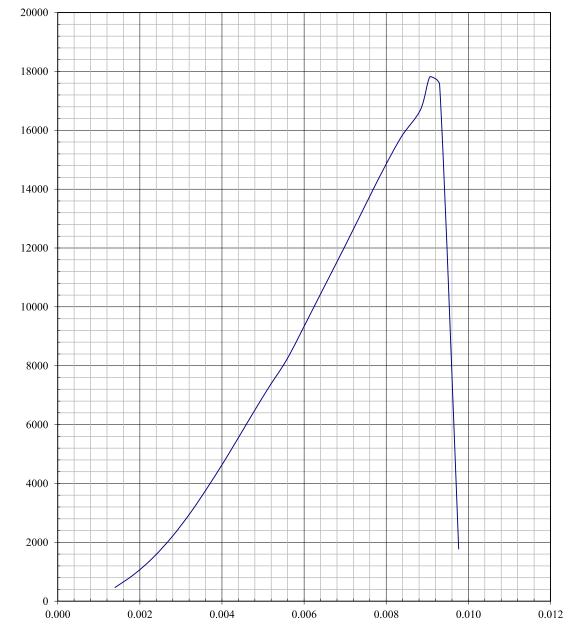
Axial Stress, PSI

Client:		Kleinfelder			Project:		BR-0152 Bridge Investigation		
Submitted By:		:	Dan Kubinski					(24003782.00	2A)
Boring No.:			B1-A			F&R Project No.:		66B-0136	
Sample ID:		RS-1			Testing Date:		3/29/2024		
Depth, ft.:		26.1' - 26.6'			Report Date:		4/2/2024		
								-	
	Reading	Dial Guage	Axial	Total Axial	Axial	Corrected	Axial	Axial	
	No	Deading	Load	Defermention	Stuain	. 1	Ctuaga	Ctuona	

0							
No.	Reading	Load	Deformation	Strain	Area ¹	Stress	Stress
	(in.)	(lbs)*	(in.)		(in^2)	(psi)	(Kpa)
1	0.006	1433	0.006	0.0014	3.08	465.311	3208.206
2	0.008	2809	0.008	0.0019	3.08	911.827	6286.831
3	0.010	4569	0.010	0.0023	3.08	1483.305	10227.033
4	0.012	6771	0.012	0.0028	3.08	2198.018	15154.804
5	0.014	9390	0.014	0.0033	3.08	3048.176	21016.445
6	0.016	12372	0.016	0.0037	3.08	4016.213	27690.823
7	0.018	15568	0.018	0.0042	3.08	5053.929	34845.625
8	0.020	18923	0.020	0.0047	3.08	6143.048	42354.844
9	0.022	22211	0.022	0.0051	3.08	7210.216	49712.706
10	0.024	25302	0.024	0.0056	3.08	8213.734	56631.724
11	0.026	29148	0.026	0.0060	3.08	9462.017	65238.335
12	0.028	33085	0.028	0.0065	3.08	10739.952	74049.390
13	0.030	36990	0.030	0.0070	3.08	12007.579	82789.379
14	0.032	41011	0.032	0.0074	3.08	13312.966	91789.707
15	0.034	44985	0.034	0.0079	3.08	14603.027	100684.364
16	0.036	48614	0.036	0.0084	3.08	15780.792	108804.772
17	0.038	51450	0.038	0.0088	3.08	16701.460	115152.561
18	0.039	54906	0.039	0.0091	3.08	17823.188	122886.605
19	0.040	54037	0.040	0.0093	3.08	17540.900	120940.293
20	0.042	5460	0.042	0.0098	3.08	1772.373	12220.089

Time to Fai	lure	
Time (secs)	200	
Specimen Con	ditions	
Diameter (in.)	1.98	
Height (in.)	4.30	
Area (in ²)	3.08	No.
Unit Wt. (pcf)	181.4	100 100 100
Shear Testing Co	onditions	PARTICULAR DE
Loading Rate (%/min):	0.012 in/min.	off color
Tested by: Jos	hua Davis	1.000 C





Axial Strain

Maximum Load = 17823 psi

* Method D (Modified) provides stress-strain curve only

SHEET 14

Froehling & Robertson, Inc. 310 Hubert Street Raleigh, NC 27603-2302|USA T 919.828.3441 | F 919.828.5751 www.fandr.com



ASTM D7012 - Method D (Modified)

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

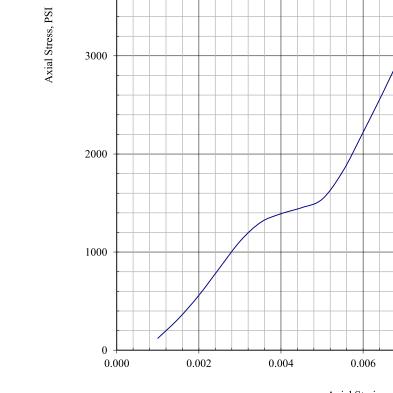
6000

5000

4000

Client: Submitted By:		Kleinfelder Dan Kubinski			Project:		BR-0152 Bridge Investigation (24003782.002A)		
Boring No.:			B1-B			F&R Project No.:		66B-0136	
Sample ID:			RS-2			Testing Date:		3/29/2024	
Depth, ft.:			19.4' - 20.1'			Report Date:		4/2/2024	
	Reading	Dial Guage	Axial	Total Axial	Axial	Corrected	Axial	Axial	
	No.	Reading	Load	Deformation	Strain	Area ¹	Stress	Stress	
		(in)	(lbc)*	(in)		(1,2)	(nei)	(Kn_2)	

INO.	Reading	Luau	Deformation	Suam	Area	Suess	Suess
	(in.)	(lbs)*	(in.)		(in ²)	(psi)	(Kpa)
1	0.004	375	0.004	0.0010	3.08	121.814	839.878
2	0.006	987	0.006	0.0015	3.08	320.396	2209.050
3	0.008	1726	0.008	0.0020	3.08	560.416	3863.933
4	0.010	2580	0.010	0.0025	3.08	837.434	5773.909
5	0.012	3424	0.012	0.0030	3.08	1111.619	7664.344
6	0.014	4015	0.014	0.0035	3.08	1303.370	8986.426
7	0.016	4287	0.016	0.0040	3.08	1391.713	9595.530
8	0.018	4476	0.018	0.0045	3.08	1453.094	10018.734
9	0.020	4747	0.020	0.0050	3.08	1540.920	10624.276
10	0.022	5625	0.022	0.0055	3.08	1826.098	12590.505
11	0.024	6867	0.024	0.0060	3.08	2229.219	15369.931
12	0.026	8160	0.026	0.0065	3.08	2649.002	18264.235
13	0.028	9525	0.028	0.0070	3.08	3092.139	21319.555
14	0.030	10883	0.030	0.0075	3.08	3532.761	24357.541
15	0.032	12182	0.032	0.0080	3.08	3954.526	27265.510
16	0.034	13483	0.034	0.0085	3.08	4376.673	30176.111
17	0.036	14159	0.036	0.0090	3.08	4596.259	31690.103
18	0.038	14195	0.038	0.0095	3.08	4607.882	31770.243
19	0.040	14691	0.040	0.0100	3.08	4768.841	32880.013
20	0.042	13410	0.042	0.0105	3.08	4352.994	30012.849



Axial Strain

Time to Failure

Specimen Conditions

Shear Testing Conditions

Loading Rate (%/min): 0.012 in/min.

Time (secs)

Diameter (in.)

Unit Wt. (pcf)

Height (in.)

Area (in²)

Tested by:

235

1.98

3.99

3.08 176.3

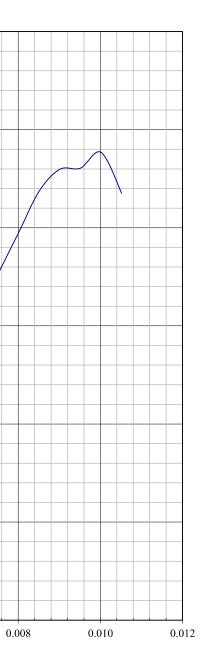
* Method D (Modifed) provides stress-strain curve only

Joshua Davis

Maximum Load = 4769 psi

SHEET 15

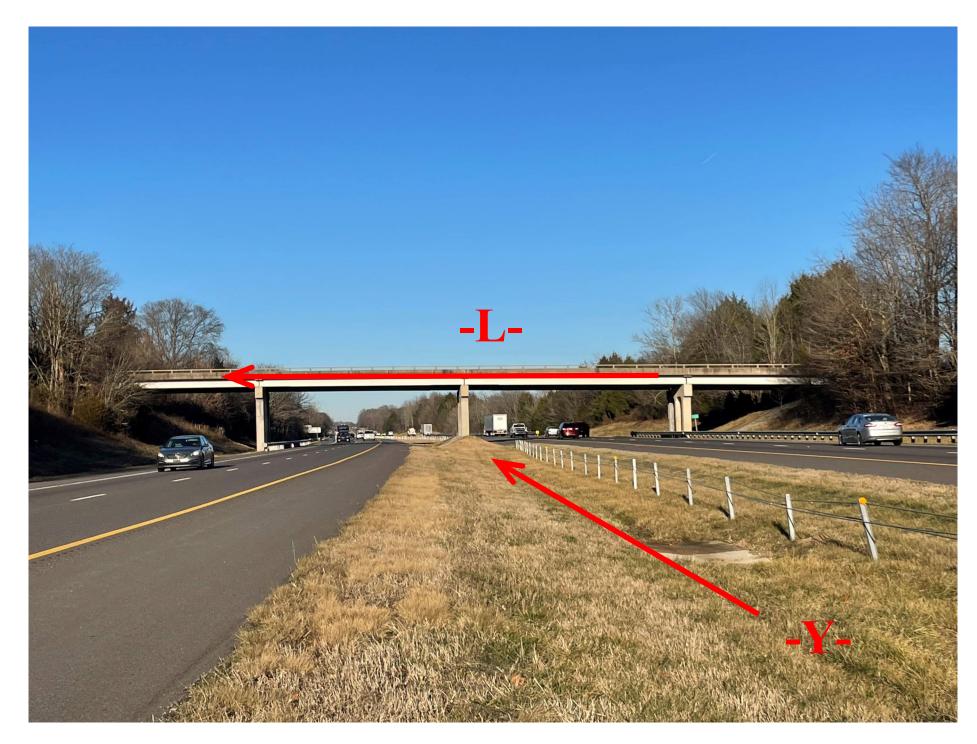
Froehling & Robertson, Inc. 310 Hubert Street Raleigh, NC 27603-2302 | USA T 919.828.3441 | F 919.828.5751 www.fandr.com



SITE PHOTOGRAPH

BR-0152 (67152.1.1)

Replacement of Bridge No. 76 on SR 1436 (Pinebrook School Road) over I-40



Looking East on I-40 (-Y-) towards Bridge No. 76 on Pinebrook School Road (-L-)