780 S Ö REFERENCE

> S 4

### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO.	<b>DESCRIPTION</b>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-6	CROSS SECTION(S)
7-10	BORE AND CORE LOG(S)
II-I2	CORE PHOTOS

### **STRUCTURE** SUBSURFACE INVESTIGATION

OUNT	Y _ <b>D</b> .	AV	IDSON	•							
ROJEC	CT D	ES	CRIPTIO	N _	BRI	DGE	N	<b>)</b> . 17	<b>OVER</b>		
			CREE							R	1396
AND	SR	13	23								
ITE D	ESCF	RIPT	ION								

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
V.C.	B-5780	1	12

#### **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 1999 707-6550. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

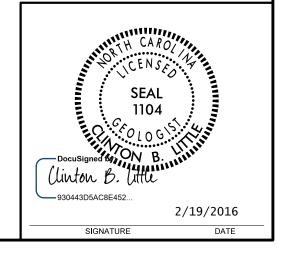
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND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

THE 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION 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 INVESTIGATIONS 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 FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- IES;
  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.
  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.

J.K. STICKNEY
C.L. SMITH
M.R. MOORE
IF REVERIV
INVESTIGATED BY J.E. BEVERLY SEB
DRAWN BY J.E. BEVERLY
CHECKED BY C.B. LITTLE
SUBMITTED BY C.B. LITTLE

PERSONNEL



DATE \_\_FEBRUARY 2016

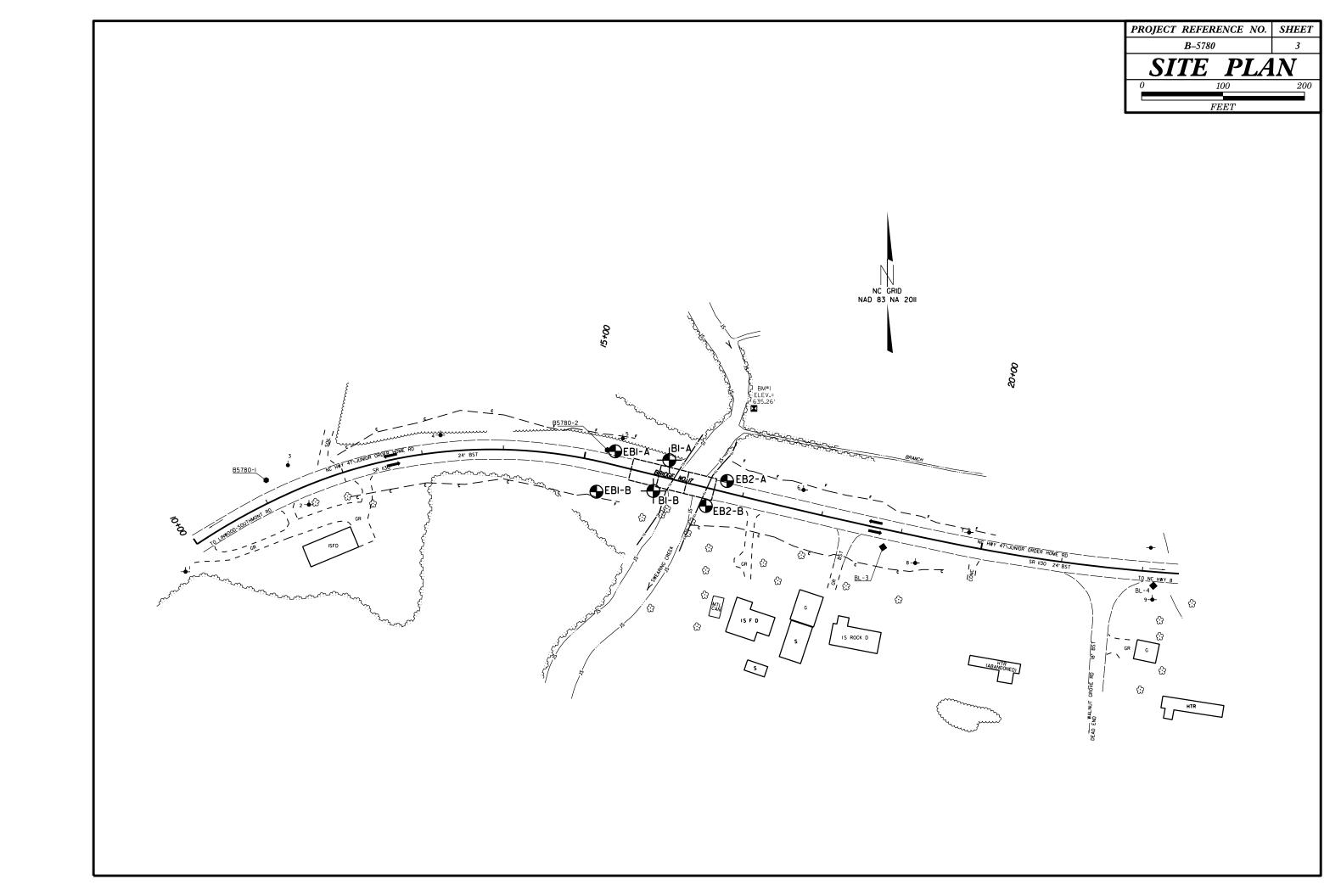
PROJECT REFERENCE NO. SHEET NO. 2

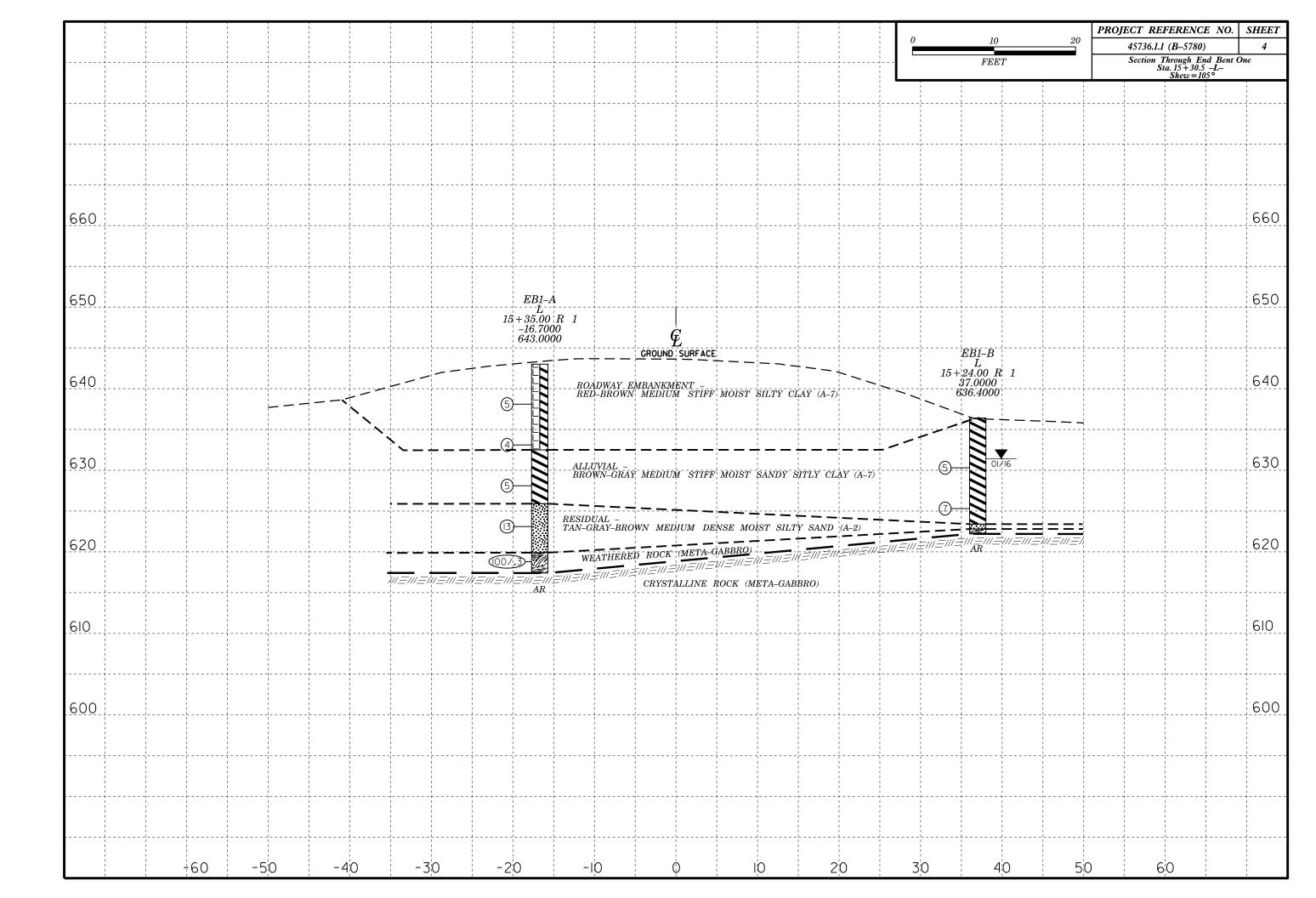
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

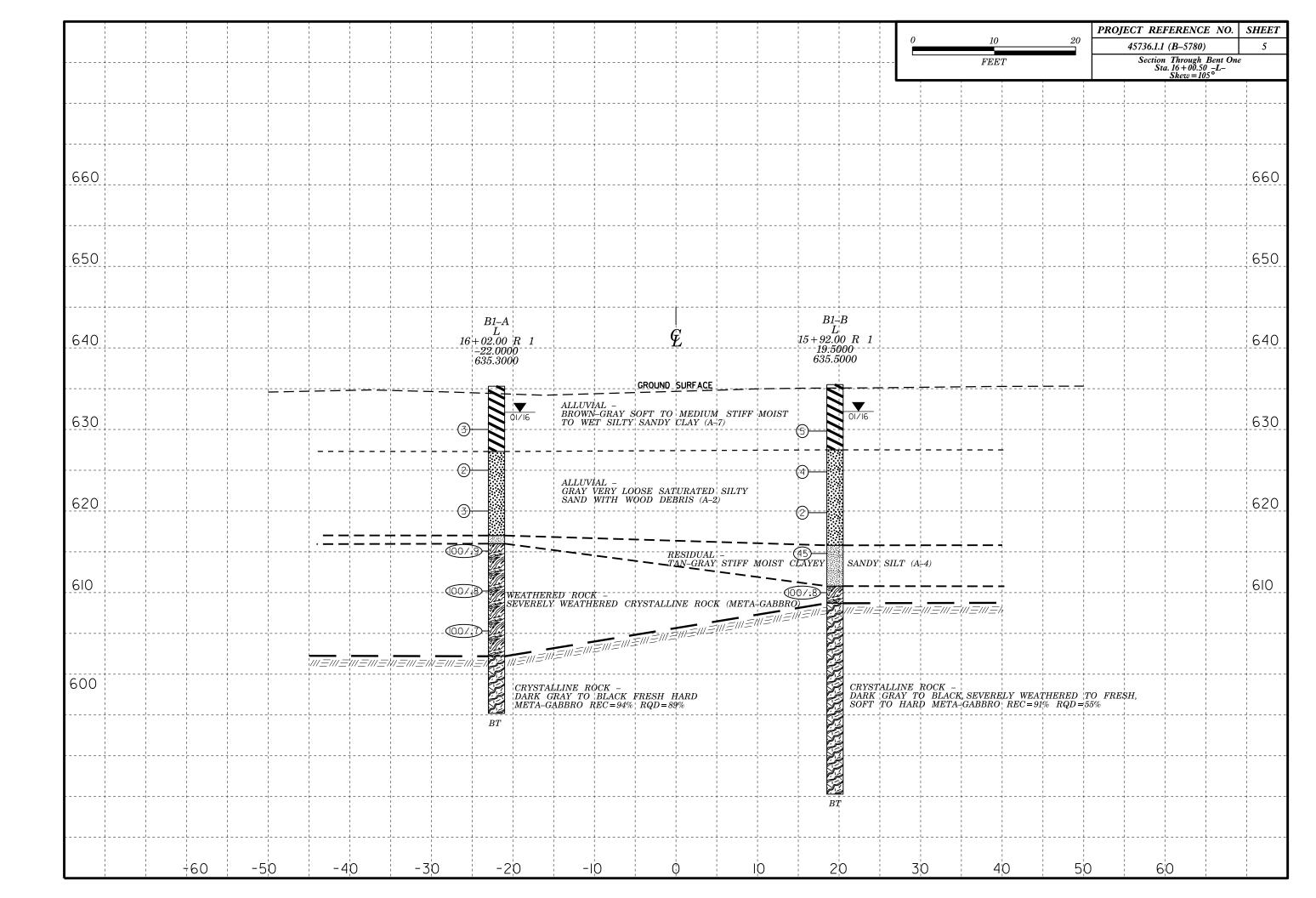
### SUBSURFACE INVESTIGATION

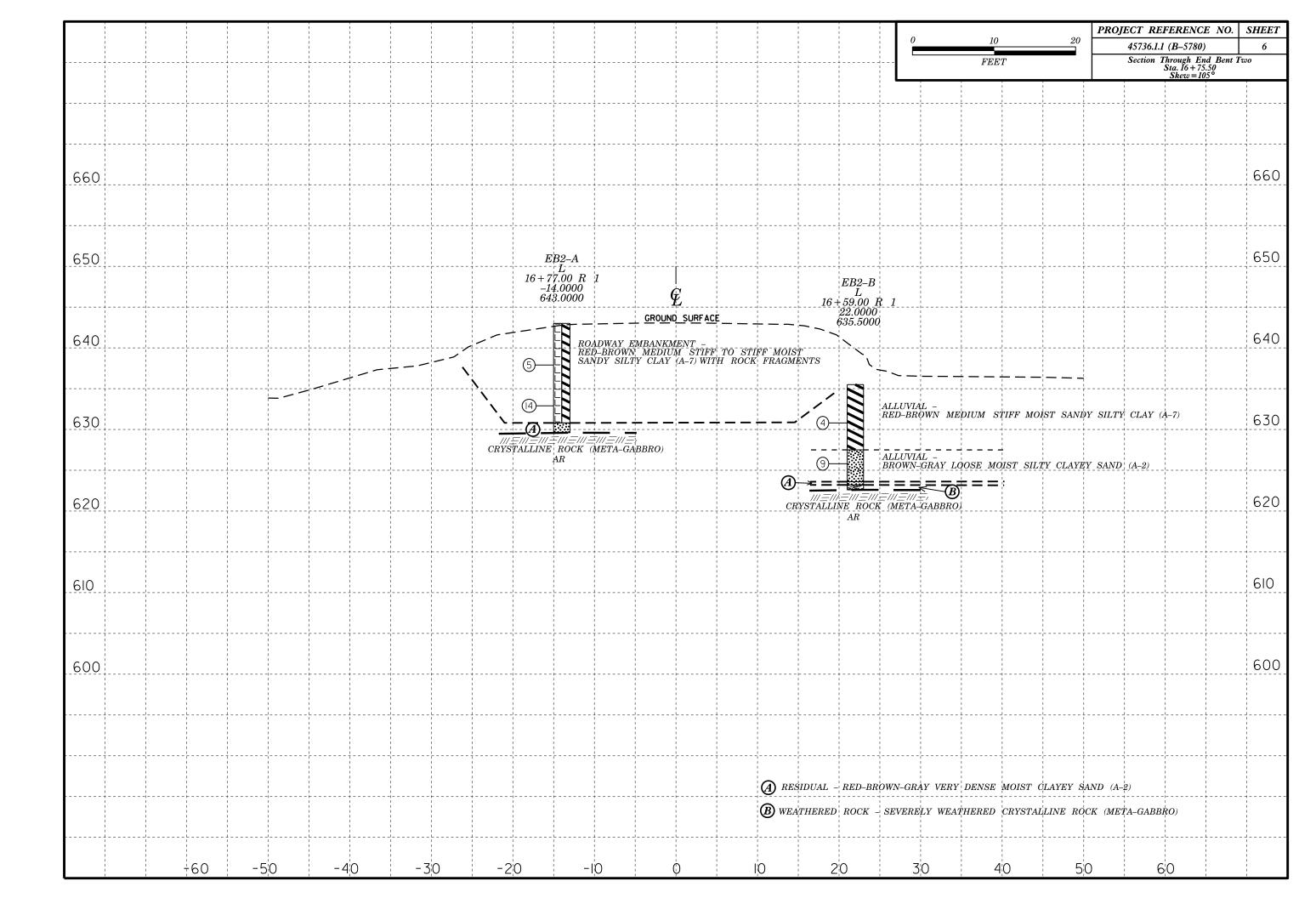
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - 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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CEMERAL CRAMIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	EINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, CNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COOCHOOCH STATE OF THE S	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD TELLD SPT REFOSAL IF TESTED.  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT- SILT- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	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
*40 38 MX 58 MX 51 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL MATERIAL	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 41 MN LITTLE OR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOLIS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELOSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN DATING		(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS  RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VEDY LODGE / /	- CDT	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
CENHULAD LOOSE 4 TO 10	SOIL SYMBOL  OPT ONT TEST BORING  SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	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
MATERIAL DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	— INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  MONITORING WELL  TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL         STIFF         8 TO 15         1 TO 2           (COHESIVE)         VERY STIFF         15 TO 30         2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTREET TON -	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBRE VIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_a$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO   SD SAND, SANDY   SS - SPLIT SPOON   F - FINE   SL SILT, SILTY   ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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.
LL _ LIQUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULID; REDUIRES DRYING TO	FRAGS FRAGMENTS $\omega$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BM #I= RR SPIKE IN WEST SIDE OF 12"ELM EAST OF
(PI) PL _ PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	SWEARING CREEK BANK
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 635.26 FEET
SL T SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:    X CME-45C	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CH CONTINUOUS FLICHT AUGED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	SOIL STRATIGRAPHY IS THROUGH THE BORINGS.
	CME-55	THINLY LAMINATED < 0.008 FEET  INDURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
<u>Plasticity index (PI)</u> <u>Dry strength</u> Non Plastic 0-5 very low	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST Y CASING Y W/ ADVANCER HAND TOOLS:	GENILE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER,	
COLOR	TRICONE	THOUBATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
		OMPHILL DINEMAS MONOSS UNMINS.	UATE: 8-15-14

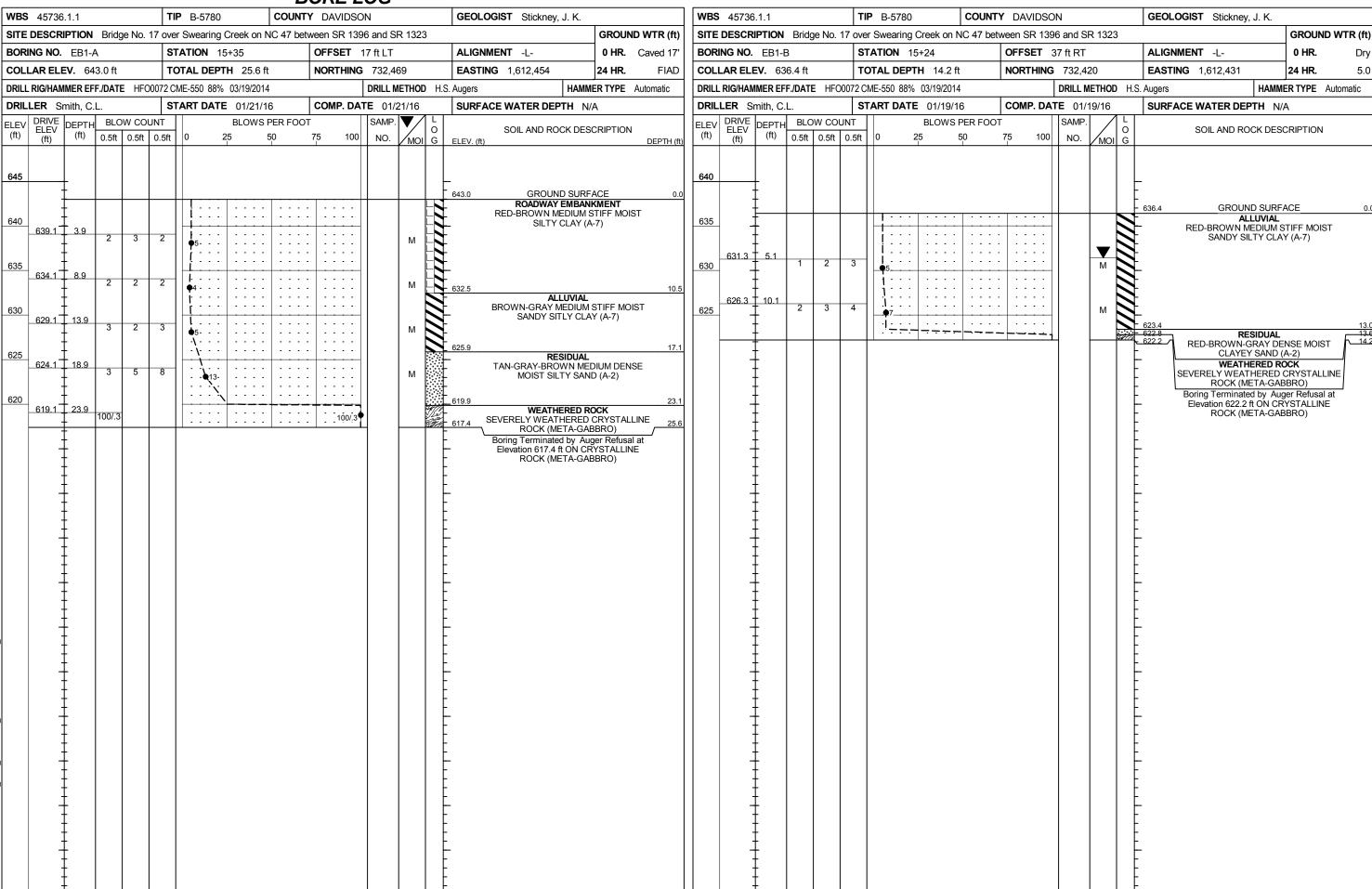








### GEOTECHNICAL BORING REPORT BORE LOG



## GEOTECHNICAL BORING REPORT

SHEET 8

												.OG	! 				
	45736						B-5780		COUNT						GEOLOGIST Stickney, J. K.	т-	
				dge No			er Swearing	_	n NC 47		-			1323		-	ID WTR (ft)
		. B1-A					ATION 16					22 ft L			ALIGNMENT -L-	0 HR.	3.1
		EV. 60			l		OTAL DEPTH			NOF	R) HING	732			<b>EASTING</b> 1,612,520	24 HR.	3.2
				AIE H			CME-550 88%			CO.	4D DA	1			<del></del>		Automatic
	DRIVE	Smith, C	T	ow co		51 <i>7</i>	ART DATE		ER FOOT	L	VIP. DA	SAMI	/20/16	11	SURFACE WATER DEPTH N	/A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft	<del></del>		-	0 25		50	75	100	NO.	1.7	0 I G	SOIL AND ROCK DES	CRIPTION	DEPTH (ft)
				1	ļ	1			1								
640		1													_		
		Ī												E	_		
005		‡													635.3 GROUND SURF	ACF	0.0
635	-	‡			<u> </u>	†	1							7	BROWN-GRAY SOFT MO		
	004.0	‡											lacksquare	S	SILTY SANDY CLA	Y (A-7)	<b></b> .
630	_631.0 -	4.3	1	† 1	2		<b>∮</b> 3 · · · ·			1:			М		_		
		‡					::::								627.3		8.0
625	626.0	9.3	1	1-1-	1 1	_									ALLUVIAL GRAY VERY LOOSE SATI	JRATED SI	
020	-	‡	ļ '	'	'		1						Sat.		SAND WITH WOOD DI		
	004.0	‡					1										
620	621.0	14.3	1	2	1		3			<u> </u>			Sat.		_		
		‡					: : : :								_617.0		_18,3
615	616.0	19.3	39	61/.4	-			·÷:::::-	:		· · ·				616.0 RESIDUAL TAN-GRAY STIFF MOIST (	AVEV CA	19.3
0.10	-	‡		017.7							100/.9	<u> </u>			SILT (A-4)		
	611.0	† 24.3													WEATHERED R SEVERELY WEATHERED	CRYSTALL	INE
610		+ 29.0	51	49/.3						1	100/.8 <sup>4</sup>	<b>,</b>			ROCK (META-GA	BBRO)	
		‡															
<b>60</b> 5	606.0	29.3	32	20	80/.2	,											
	-	‡									100/.7 <sup>-1</sup>				-		
		‡													602.2 CRYSTALLINE F	OCK	33.1
600	-	Ŧ													DARK GRAY TO BLACK META-GABBRO REC=94		
		Ŧ															
		<u> </u>				1									595.2		40.1
	,	‡													Boring Terminated at Eleva CRYSTALLINE ROCK (ME	tion 595.2 t TA-GABB	ft IN RO)
		Ⅎ															
	-	<u> </u>													-		
		‡															
		1													_		
		ŧ															
		‡												<u> </u>			
	-	‡													-		
		<u> </u>												1 E			
	-	‡													_		
		‡												1			
		‡															
	-	<u> </u>													-		
		‡												E			
	_	<u> </u>												E	_		
		‡												[			
		‡												[			
		Γ	l		<u></u>	L						1		1			

### GEOTECHNICAL BORING REPORT

SHEET 8

	45736										RE LOG			
SITE							30	C	OUNT	Υ [	AVIDSON GEOLOGIST Stickney, J. K.			
SITE DESCRIPTION Bridge No. 17 over Swearing Creek on NC 47								k on N	IC 47			GROUND WTR (ft)		
BORING NO. B1-A STATION 16+02						TION	16+02			OF	SET 22 ft LT ALIGNMENT -L- 0 HR.	3.1		
COLL	COLLAR ELEV. 635.3 ft TOTAL DEPTH 40.1 ft					PTH 40	.1 ft		NC	RTHING 732,458 EASTING 1,612,520 24 HR.	3.2			
				TE HFOO	072 CN	1E-550	88% 03/1	9/2014	•	,	DRILL METHOD NW Casing w/ Core HAMMER TYPE Autor	matic		
	LER Si	_	.L.		<u> </u>		TE 01/2	:0/16		CC	MP. DATE 01/20/16 SURFACE WATER DEPTH N/A			
CORE	ESIZE	NW	<del></del>		TOTA	AL RUI	N 7.0 ft	T 676		_				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS ELEV. (ft) DE	EPTH (1		
302.2	602.2	33.1	2.0	1:15/1.0	(1.7)	(1.7)		(6.6)	(6.2)		Begin Coring @ 33.1 ft  602.2 CRYSTALLINE ROCK	33.		
600	600.2	35.1	5.0	1:05/1.0	85%	85%		(6.6) 94%	(6.2) 89%		DARK GRAY TO BLACK FRESH HARD META-GABBRO WITH CLOSE	33.		
	1	-	0.0	1.00/1.0	(4.9) 98%	(4.5) 90%					FRACTURE SPACING R1=15, R2=17, R3=20, R4=20, R5=7 RMR=79 ROCK TYPE E			
	595.2	40.1									595.2	40		
	J35.2	- 40.1									Boring Terminated at Elevation 595.2 ft IN CRYSTALLINE ROCK (META-GABBRO)	40		

### GEOTECHNICAL BORING REPORT

SHEET 9

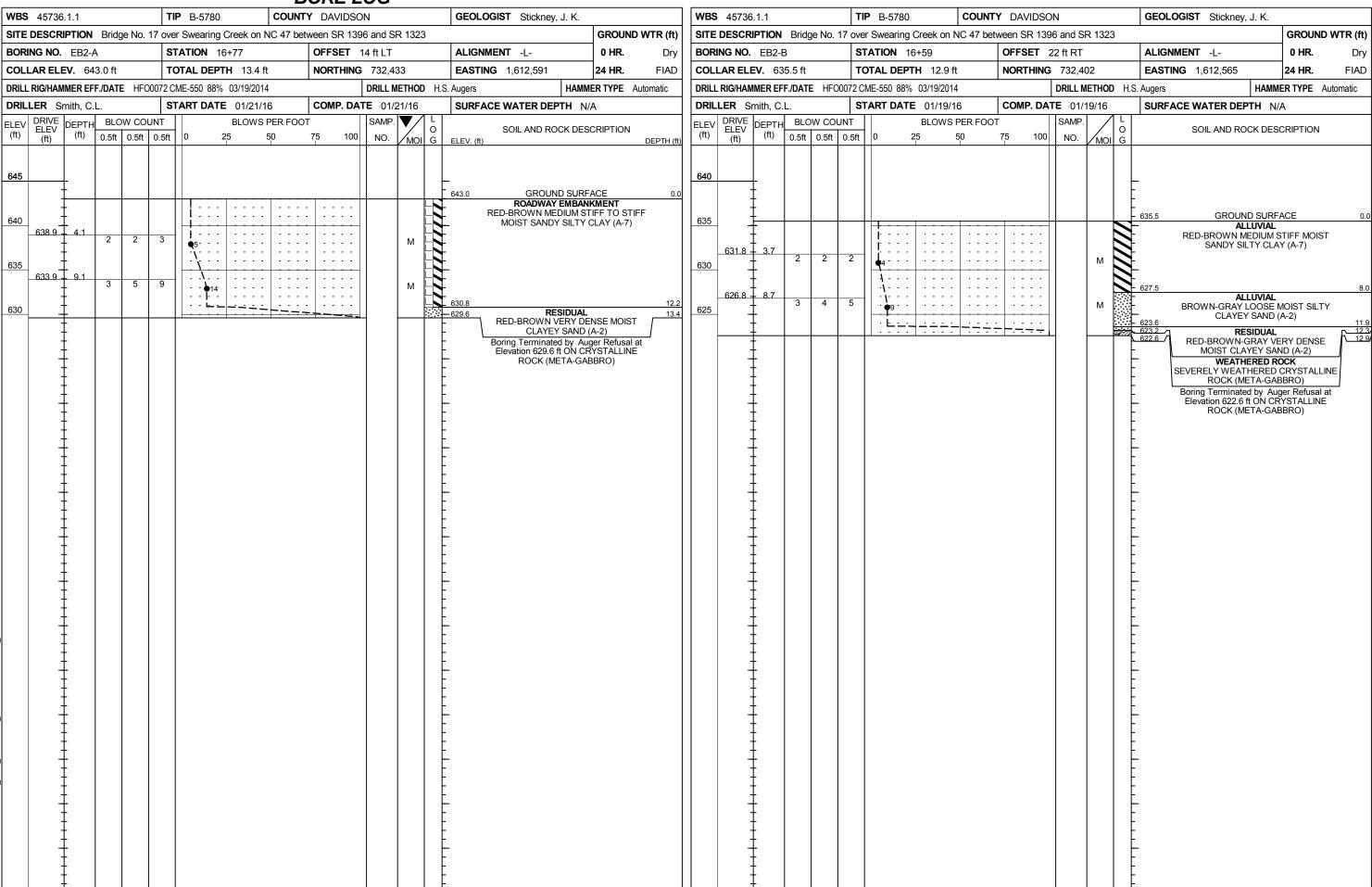
SITE D BORIN COLL						IP B-5780		COGNI	Y DAVIDSO	אוכ			GEOLOGIST Stickney,	J. IX.	
BORIN				ما مستحاسم	. 17.		Crack	NC 47	hotwoon CD	1206 01	-d CD	1222		CBOL	IND WTR (
COLL				age N		ver Swearing		1 NC 47			10 SK	1323	ALIGNMENT -L-	0 HR	
						TATION 154			OFFSET 2						
ייות קונו						OTAL DEPTH			NORTHING			D 100	EASTING 1,612,501	24 HR	
				AIE H	<del></del>	2 CME-550 88%						D NV	,	HAMMER TYPI	Automatic
		mith, C	т	011100		TART DATE			COMP. DA		19/16	111	SURFACE WATER DEPT	TH N/A	
ELEV (ft)	DRIVE ELEV	DEPTH (ft)	0.5ft	OW CC	7		BLOWS F	EK FOOT 60	75 100	SAMP.	//	0		K DESCRIPTIO	
	(ft)		0.510	0.511	0.511			<u> </u>	7,0	NO.	/MOI	G	ELEV. (ft)		DEPTH
640		ŧ							ĺ				_		
		ł										<u> </u>			
635		<u> </u>	_	ļ	ļ					ļ				SURFACE UVIAL	
	-	Ŧ									_		BROWN-GRAY SOF	T TO MEDIUM	
1		†											MOIST TO WET SIL	TY SANDY CLA	Y (A-7)
630	630.8	4.7	0	1	4	5					м		- -		
		‡											627.5		
625	625.8	9.7		<u>_</u>									ALL GRAY VERY LOOSI	<b>UVIAL</b> E SATURATED	SILTY
023	-	‡	1	2	2	<b>†</b> .4					Sat.			D (A-2)	
		‡													
620	620.8	14.7	1	1	1	1	· · · ·				Sat.		<u></u>		
		<u>†</u>													
	615.8	19.7									ļ		615.8		
615	-		12	17	28	1		 			М	Œ	_ RES TAN-BROWN-GR	IDUAL AY STIFF TO H	ARD
		Ŧ										-	MOIST CLAYEY	SANDY SILT (A	-4)
610	610.8	24.7	48	52/.3	-							977	610.8 WFATHE	RED ROCK	
	_	Ŧ	"	OZ.	i				100/.8	'			608.7 SEVERELY WEATH	IERED CRYSTA	LLINE
	•	‡											CRYSTAL	TA-GABBRO) .LINE ROCK	
605	_	‡					· · · ·						DARK GRAY TO I WEATHERED TO FF	BLACK, SEVERI RESH, SOFT TO	ELY HARD
	•	‡											META-GABBRO R	REC=91% RQD=	55%
600		‡													
600	-	‡											<del>-</del>		
		1			Ì										
595		İ											<del>-</del>		
		+													
		Ŧ													
590	-	Ŧ											- -		
		Ŧ													
		Ī					<u> </u>						585.3		
	_	-								7			Boring Terminated a CRYSTALLINE RO	at Elevation 585. CK (META-GAB	3 ft IN BRO)
		‡													,
	-	‡			Ì					Ì			<del>-</del>		
		‡													
į		Ì													
	_	<u> </u>										<u> </u>	<del>-</del>		
		-										<u> </u>			
		Ŧ										F			
	-	Ŧ											<b>-</b>		
		‡													
	-	‡											<del>-</del>		
		‡										\			
		<u>†</u>													

## GEOTECHNICAL BORING REPORT

SHEET 9

								- · · · -			RE LOG
	45736					B-578					DAVIDSON GEOLOGIST Stickney, J. K.
SITE	DESCR	IPTION	Brid	ge No. 1	1			k on N	IC 47	·	veen SR 1396 and SR 1323 GROUND WTR (f
	ING NO.						15+92			<del>                                     </del>	FSET 20 ft RT ALIGNMENT -L- 0 HR. 3.
	LAR ELI										<b>EASTING</b> 1,612,501 <b>24 HR.</b> 3.
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014								_		1	DRILL METHOD NW Casing w/ Core HAMMER TYPE Automatic
DRILLER Smith, C.L. START DATE 01/19/16										co	DMP. DATE 01/19/16 SURFACE WATER DEPTH N/A
	E SIZE	T		DRILL			N 23.4 f		RATA	L	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STF REC. (ft) %	RQD (ft) %	O G	DESCRIPTION AND REMARKS  ELEV. (ft) DEPTH
608.7	608.7	26.8	3.4	1:35/1.0	(3.4)	(0.5)		(21.3)	(12.8)		Begin Coring @ 26.8 ft  - 608.7   CRYSTALLINE ROCK 26
	605.3	30.2			100%			91%	55%		DARK GRAY TO BLACK, SEVERELY WEATHERED TO FRESH, SOFT TO HARD META-GABBRO WITH VERY CLOSE TO CLOSE FRACTURE
605	- 000.0	50.2	5.0	NM	(4.0) 80%	(1.6) 32%					SPACING R1=15, R2=20, R3=10, R4=12, R5=7 RMR=64
	-	-			0078	32 /6					ROCK TYPE E
600	600.3	35.2	5.0	2:30/1.0	(4.3)	(1.4)					<del>-</del>
	-	‡	0.0	2.0071.0	86%	28%					<del>-</del> -
595	595.3 <sup>-</sup>	40.2									<del>-</del> %-
393	-	-	5.0	1:45/1.0	(4.6) 92%	(4.5) 90%					<del>-</del> -
	-	‡			3270	0070					<del>-</del>
590	590.3	45.2	5.0	1:31/1.0	(5.0)	(4.8)					<del>-</del>
	-	‡			100%						-
	585.3 <sup>-</sup>	50.2									585.3 50
	-	F									Boring Terminated at Elevation 585.3 ft IN CRYSTALLINE ROCK (META-GABBRO)
	-	Ī									
	_	<u> </u>									_
	-	Ī									
	_	Ĺ						İ			
	-	<u> </u>									
	-	‡									
	-	ŧ									<u>-</u> -
	-	‡						ļ			<u>-</u> -
	_	‡									- -
	-	‡									- -
	-	‡									<b>-</b> -
	-	‡								:	
	-	‡									
	_	-									
	-	Ī									F
	-	Ī									
	-	<u> </u>									
	-	ļ	İ								
	_	<u> </u>		]							-
	-	‡									
	-	‡									<u>-</u>
	-	‡									<u></u>
	-	‡									
	-	‡									
	-	‡		l				l			<u>.</u>
	_	‡									<u>-</u>
		+	L	L	L	į .			L		<u> </u>

### GEOTECHNICAL BORING REPORT BORE LOG



### 45736.1.1 (B-5780) DAVIDSON COUNTY

#### BRIDGE NO. 17 OVER SWEARING CREEK ON NC 47 BETWEEN SR 1369 (LINWOOD SOUTHMONT RD.) AND SR1323 PITTSBURG GLASS ACCESS RD.)

#### **CORE PHOTOS**





## 45736.1.1 (B-5780) DAVIDSON COUNTY BRIDGE NO. 17 OVER SWEARING CREEK ON NC 47 BETWEEN SR 1369 (LINWOOD SOUTHMONT RD.) AND SR1323 PITTSBURG GLASS ACCESS RD.)

CORE PHOTOS

