# **D**: **B**-4772

# OJECT: 38544.1.1

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

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#### STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38544.1.1 (B-4772) F.A. PROJ. BRZ-1525(9)

COUNTY \_\_IOHNSTON

PROJECT DESCRIPTION BRIDGE NO. 326 ON -L- (SR 1525)

OVER MILL BRANCH CREEK AT STA. 14+78

N.C. 38544.1.1 (B-4772) 1 10

#### 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 SOL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS. NOR THE FIELD BORING LOGS, ROCK CORES, OR SOL TEST DATA ARE 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 BOREHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INMERENT IN THE STANDARD TEST METHOD. THE OBSCRIVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATION. 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 THAS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR DENINON 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 SATISFY HYBELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS 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.

PERSONNE

J. L. PEDRO

H. R. CONLEY

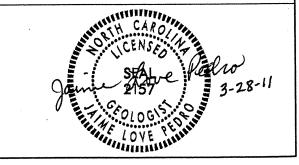
J. R. MATULA

INVESTIGATED BY J. L. PEDRO

CHECKED BY N. T. ROBERSON

SUBMITTED BY J. L. PEDRO

DATE MARCH 2011



#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

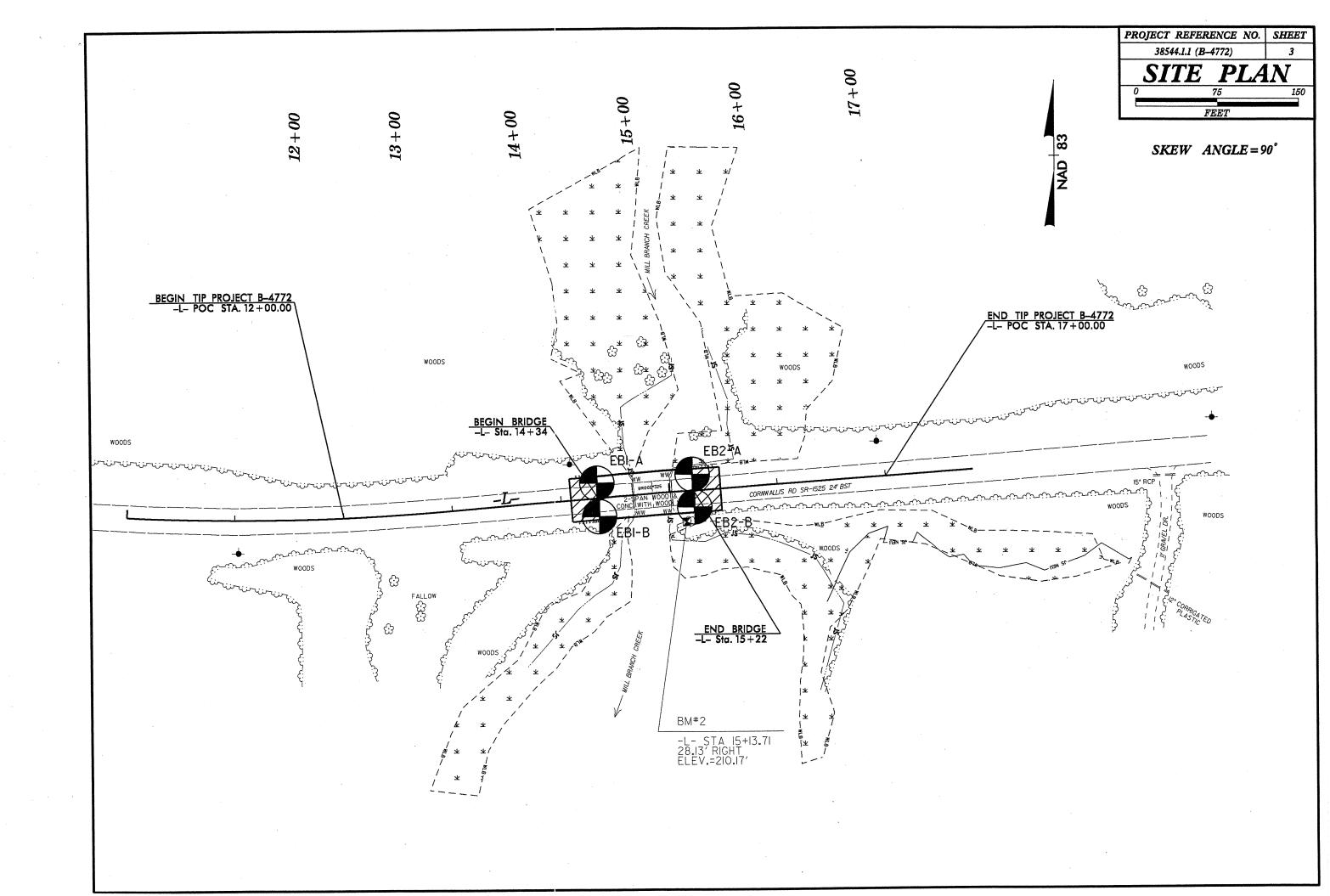
#### DIVISION OF HIGHWAYS

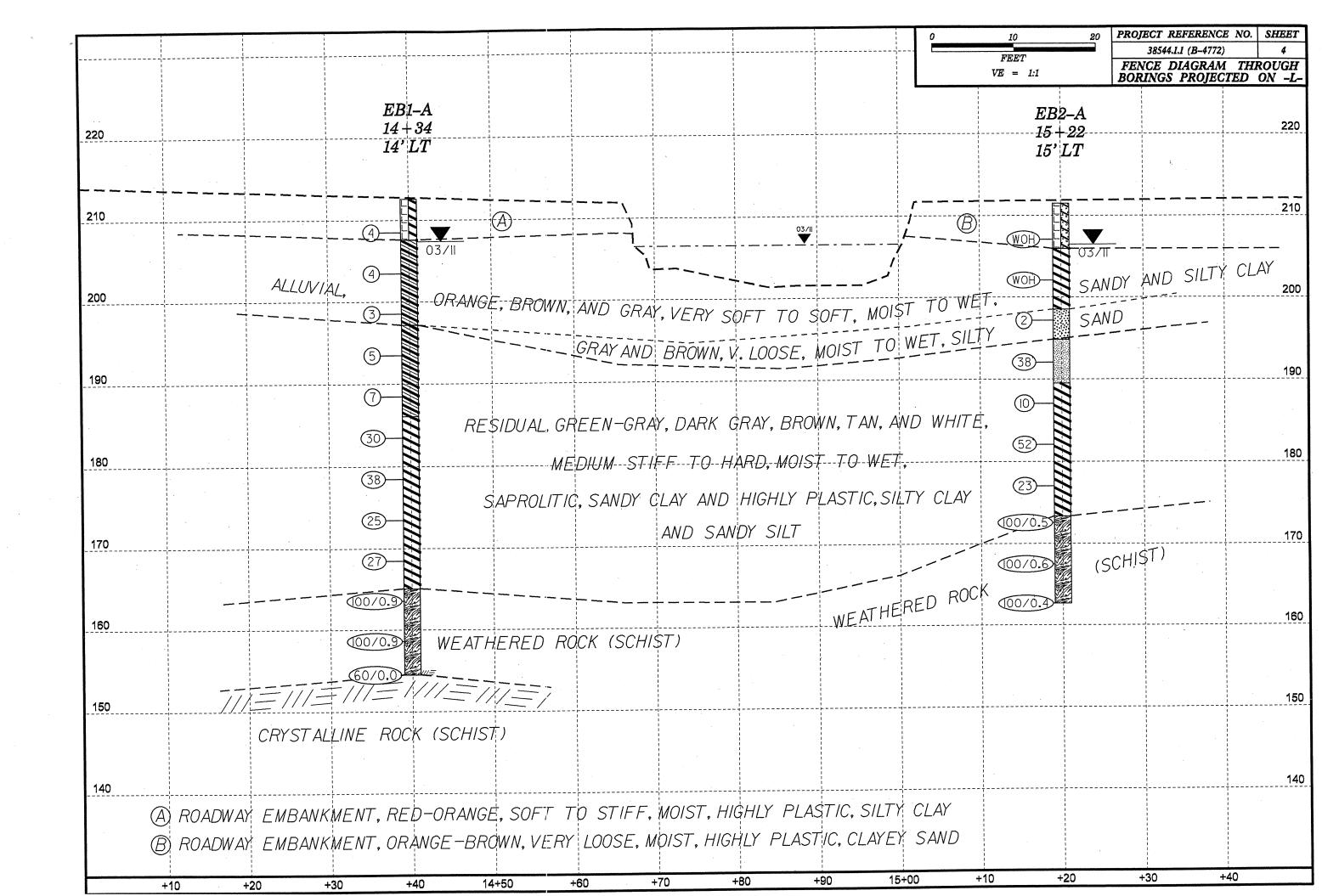
GEOTECHNICAL ENGINEERING UNIT

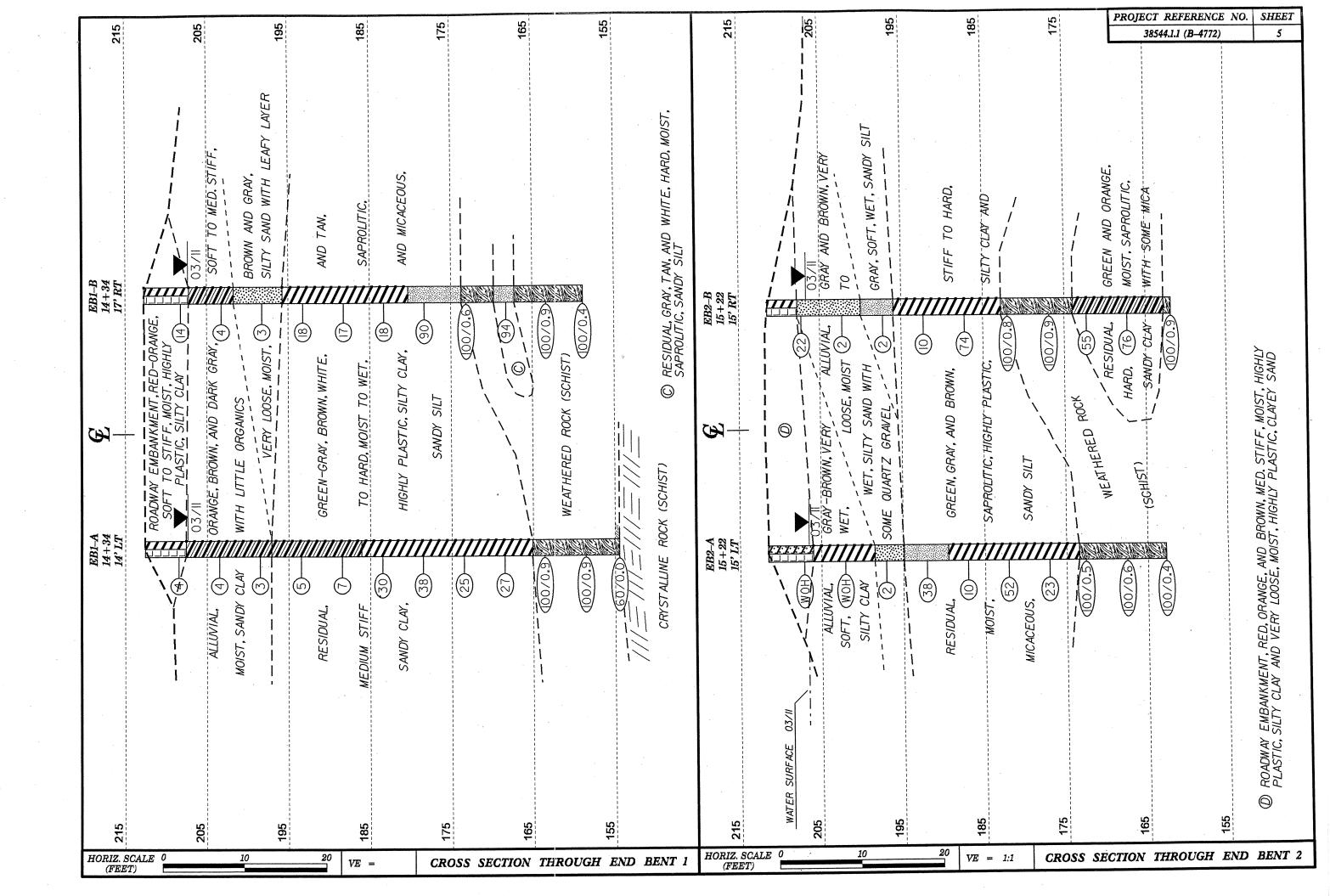
#### SUBSURFACE INVESTIGATION

	SOIL AND ROCK	LEGEND TERMS	SYMBOLS.	AND ABBREVI	IATIONS	
	GRADATION	DECENTE, TEXTES,			DESCRIPTION	TERMS AND DEFINITIONS
SOIL DESCRIPTION  SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR VEATHERED EARTH MATERIALS THAT CAN BE PERCETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 108 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AGSHTO 1206, ASTM D-1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOSITURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTILLE SIZES FROM F UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME PODRLY GRADED GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE S  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS.	SIZES. (ALSU	ROCK LINE INDICATE SPT REFUSAL IS PEI IN NON-COASTAL PLA OF WEATHERED BOCK	OASTAL PLAIN MATERIAL THA 5 THE LEVEL AT WHICH NON- IETRATION BY A SPLIT SPOON IN MATERIAL, THE TRANSITI	NT IF TESTED, WOLLD YIELD SPT REFUSAL. AN INFERRED CORSTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. I SAMPLER EDUAL TO OR LESS THAN &1 FOOT PER 60 BLOWS. ON BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	ALLUVIUM (ALLUV.) - SDILS THAT HAVE BEEN TRANSPORTED BY WATER.  ADUIFER - 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 A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
AS MINERALDGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:  VERY STEF, GRASSICY CLA. MOST WITH WITERBEDGED FIRE SAND LATERS, MISHAP PLASTIC. 4-7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED ROCK (WR)	NON-COASTAL F BLOWS PER FOO	PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 DT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION  GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL OGICAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		CRYSTALLINE ROCK (CR)	FINE TO COARS WOULD YIELD S GNEISS, GABBRO	E GRAIN IGNEOUS AND METAMORPHIC ROCK THAT PT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, , SCHIST, ETC.	AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.  CALCAREOUS (CALCA) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. (\$\leq 35\% PASSING *200) (> 35\% PASSING *200)  GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY		NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY R	E GRAIN METAMORPHIC AND NON-COASTAL PLAIN OCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-5 A-2-7 A-7-5 A-3 A-6, A-7 CLASS. SYMBOL 888888888888888888888888888888888888	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS MODERATELY COMPRESSIBLE LIQUID LIMIT EDUAL HIGHLY COMPRESSIBLE LIQUID LIMIT GREAT	THAN 31 _ TO 31-50 [ER THAN 50	CDASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN	LITE, SLATE, SANDSTONE, ETC.  SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, 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.
Z PASSING GRANII OR SILT- MUCK,	PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY		icr)		ATHERING	<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
* 10 58 HX * 40 38 MX 58 HX 51 HN * 200 35 MX 55 HX 18 MX 35 MX 35 MX 35 MX 35 MX 36 MN	ORGANIC MATERIAL         SOILS         SOILS         OTHER           TRACE OF ORGANIC MATTER         2 - 3%         3 - 5%         TRACE           LITTLE ORGANIC MATTER         3 - 5%         5 - 12%         LITTLE	1 - 10%	HAMMER	IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUID LIMIT 48 HX 41 MN 48 HX 41 HN 48 HX 41 HN 48 HX 41 HN 48 HX 41 HN 50 ILS WITH PLASTIC INDEX 5 MX NP 18 HX 13 MX 11 HN 11 HN 11 HN 11 HN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME HIGHLY ORGANIC >10% >20% HIGHLY	20 - 352	(V SLI.) CRYSTAL	NERALLY FRESH, JOINTS STAI S ON A BROKEN SPECIMEN FA YSTALLINE NATURE.	NED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, ACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	<u>OIP DIRECTION OIP AZIMUTHI - T</u> HE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX 0 0 0 0 1 MX 8 MX 12 MX 16 MX NO MX MODERATE ORGANIC SULLS TYPES STONE FRACS. FINE SILTY DR CLAYEY SILTY CLAYEY ORGANIC	GROUND WA'TER  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLII		(SLIL) 1 INCH.	OPEN JOINTS MAY CONTAIN C	NED AND DISCOLORATION EXTENDS INTO ROCK UP TO LAY. IN GRANITOID ROCKS SOME DCCASIONAL FELDSPAR D. 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 BRAYEL AND SAND GRAVEL AND SAND SOILS SOILS MATTER MATERIALS SAND SAND FAIR TO	STATIC WATER LEVEL AFTER 24 HOURS  VPW. PERCHED WATER, SATURATED ZONE, OR WATER BEARING ST	1	MODERATE SIGNIFIC	ANT PORTIONS OF ROCK SHOW	V DISCOLORATION AND WEATHERING EFFECTS. IN RE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS ND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS A   EXCELLENT TO GOOD   FAIR TO POOR   POOR   POOR   UNSUITABE	- OM- Spring or seep		WITH FF	EGH ROCK. K EXCEPT QUARTZ DISCOLORE	D OR STAINED. IN GRANITDID ROCKS, ALL 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
CONSISTENCY OR DENSENESS  RANGE OF STANDARD   RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS		(MOD, SEV.) AND CAN	BE EXCAVATED WITH A GEOL	IOW KADLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH LOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE (N-VALUE) COMPRESSIVE STRENGTH (TONS/F12 )	ROADWAY EMBANKMENT (RE)  WITH SOIL DESCRIPTION  OF SPT DNT TEST BORING  WITH SOIL CYMPOL  AUGIR BORING	W/ CORE	SEVERE ALL ROI	ED, WOULD YIELD SPT REFUSA IK EXCEPT QUARTZ DISCOLORE NGTH TO STRONG SOIL. IN GF	ED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED RANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY	ARTIFICIAL FILL (AF) OTHER	REF SPT REFUSAL	VERY SEVERE ALL ROOM  OF SEVEN THE MAN	S IS EFFECTIVELY REDUCED	100 BPF ED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT TO SOIL STATUS, WITH DNLY FRAGMENTS OF STRONG ROCK	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  MOTILED (MOT.)- IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS MOTTLING IN SDILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT         <2         <0.25           GENERALLY         SDFT         2 TO 4         0.25 TO 0.50	INFERRED SOIL BOUNDARY  MONITORING WELL  PIE:/OMETER INSTALLATION	South	REMAINI VESTIGE	NG. SAPROLITE IS AN EXAMPL S OF THE DRIGINAL ROCK FA	E OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR BRIC REMAIN. <u>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</u>	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	SLOPE INDICATOR INSTALLATION		SCATTER		C NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - 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
HARD >38 >4  TEXTURE OR GRAIN SIZE	25/825 DIP & DIP DIRECTION OF ROCK STRUCTURES CONE PENETROMETER	TEST	0.4440		K HARDNESS  R SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SOUNDING ROD  ADDRESSALATIONS	·	SEVER	AL HARD BLOWS OF THE GEDL		PARENT ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	AR - AUGER REFUSAL: MED MEDIUM BT - BORING TERMINATED MICA MICACEDUS	VST - VANE SHEAR TEST WEAL - WEATHERED	MODERATELY CAN B	FACH HAND SPECIMEN.  E SCRATCHED BY KNIFE OR P	ICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE COLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  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   SIZE IN, 12 3	CL CLAY MOD MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE COARSE ORG ORGANIC	7- UNIT WEIGHT 7- DRY UNIT WEIGHT	BY MO MEDIUM CAN B	DERATE BLOWS. E GRODVED OR GOUGED <b>0.0</b> 5 1	INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (GPT) - 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
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC SD SAND, SANDY	SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON	POINT	OF A GEOLOGIST'S PICK.	S TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE  Y BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	A 2 INCH DUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY ISRECJ TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY	F - FINE SL SILT, SILTY FOSS FOSSILIFEROUS SLI SLIGHTLY	ST - SHELBY TUBE RS - ROCK	FROM PIECE	CHIPS TO SEVERAL INCHES IN CAN BE BROKEN BY FINGER	N SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN PRESSURE.	OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROO) - A MEASURE OF ROCK QUALITY DESCRIBED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS FRAGMENTS # - MOISTURE CONFENT HI HIGHLY V - VERY	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO	VERY CAN B SOFT OR MO FINGEI	re in Thickness can be bro	E EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH DKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY 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.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID, REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  (P1)   PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PRO		FRACTL TERM	RE SPACING  SPACING	BEDDING  TERM THICKNESS	BENCH MARK: BM#2, Railroad Spike in Base of 15' Birch tree
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT DR NEAR OPTIMUM MOISTUR		AMMER TYPE:  AUTOMATIC MANUAL	VERY WIDE WIDE MODERATELY CLOS	MORE THAN 10 FEET 3 TO 10 FEET	VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET	at -L- Sta, 15+13.71, 28.13' Rt ELEVATION: 210.17 FT.
SL SHRINKAGE LIMIT  REQUIRES ADDITIONAL WATER TO - DRY - (D) ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FLIGHT AUGER C	ORE SIZE:	CLOSE VERY CLOSE	0.16 TO 1 FEET LESS THAN 0.16 FEET	VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	NOTES:
PLASTICITY			END SEDIMENTARY DO		IDURATION ENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW	X TUNGCARBIDE INSERTS		FRIABLE	RUBBI	NG WITH FINGER FREES NUMEROUS GRAINS:	
LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM		HAND TOOLS: POST HOLE DIGGER		V INDUBATED GRAINS	E BLOW BY HAMMER DISINTEGRATES SAMPLE. S CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:	
HIGH PLASTICITY 26 OR MORE HIGH  COLOR	TRICONE TUVGCARB.	HAND AUGER	INDURATED	BREAK GRAIN	S EASILY WHEN HIT WITH HAMMER. S ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT	SOUNDING ROD  VANE SHEAR TEST		TNDURATED SHARF	CULT TO BREAK WITH HAMMER. P HAMMER BLOWS REDUIRED TO BREAK SAMPLE; LE BREAKS ACROSS GRAINS.	
			<u> </u>	SAMPL	LE DREHKS HURUSS UNHING.	. DEVISED 09/23/09

PROJECT REFERENCE NO. 38544.I.I (B-4772)







38544.1.1			TIP	B-4772	C	OUNTY	/ JOHNST	ON			GEOLOGIST Pedro, J. L.		┥ }	<b>S</b> 385					B-4772			JOHNST			GEOL	OGIST Pedro			
DESCRIPTION	BRID	OGE NO	D. 326	ON -L- (SR	1525) OVI	ER MIL	L BRANCH	CREE	<			GROUND WTR (ft)	`				DGE N		ON -L- (SR									GROUNI	) WI
ING NO. EB1-				TION 14+			OFFSET				ALIGNMENT -L-	0 HR. 4.5	BOR	RING N	<b>O.</b> EB1	1-B			ATION 14+			OFFSET				MENT -L-		0 HR.	
LAR ELEV. 21	12.6 ft		TO	TAL DEPTH	58.1 ft		NORTHING	<b>3</b> 664,0	)44		<b>EASTING</b> 2,127,058	<b>24 HR.</b> 5.2			LEV. 2				TAL DEPTH		i.	NORTHING	·			ING 2,127,06	<del></del>	24 HR.	
L RIG/HAMMER E	FF/DAT	re RFC	00074 C	ME-55 00% (	00/00/2011	L		DRILL I	METHO	H.S	S. Augers HAN	IMER TYPÉ Automatic	DRIL	L RIG/H	AMMER	EFF/DAT	TE RF	O0074 C	CME-55 00% C	0/00/2011			<u> </u>		H.S. Augers			R TYPE	Autor
LER Conley,				ART DATE		I	COMP. DA	TE 03/	14/11		SURFACE WATER DEPTH	N/A	DRII		Conley,			STA	ART DATE	03/15/11		COMP. DA		<del></del>	SURF	ACE WATER D	DEPTH N/	<u>م</u>	
DRIVE DEDT		W COU	vT		BLOWS PER	R FOOT		SAMP.	<b>V</b> /	L	SOIL AND ROCK DE	SCRIPTION	ELEV	/ DRIVI	DEPTI	H BLO	W COL		1		ER FOOT	75 100	SAMP.	//0	,	SOIL AND	ROCK DESC	RIPTION	
ELEV (ft)	0.5ft	0.5ft	0.5ft	0 25	50		75 100	NO.	МО	1 - 1	ELEV. (ft)	DEPTH (	t) (ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	5(		75 100	NO.	MOI G	<u> </u>		<del></del>	<del></del>	
			1																			•							
											· -		215	<b>_</b>	4										-				
1											212.6 GROUND SUF		.0		‡				<u> </u>			<del></del>	<b> </b>		212.7		OUND SURFA		
				1 7			T::::			13	ROADWAY EMBA RED-ORANGE, HIGH	ILY PLASTIC,	210		‡										<b>£</b>	RED-ORAN	IGE, HIGHLY SILTY CLAY		ı
209.5 3.1	1	2	2				<del> </del>	SS-6	-M-	H	- SILTY CL/	AY .		209.2	2 7 3.5	2	4	10							<b>\frac{1}{2}</b>	•	SILI I CLAI		
1 ±		-	_	i				1	₩		ALLUVIA		.9		‡				: ;7."						207.2		ALLUVIAL		
204.5 + 8.1				1				]			ORANGE-BROWN TO SANDY CLAY WITH LIT		205	204	2 <sup>+</sup> 8.5				<del>  ',' · ·  </del>			<b></b> -			<del>}</del>	BROV	WN, SANDY (	CLAY	
1 204.5	2	2	2	<b>4</b>				SS-7	М		•				7	2	2	2	<b>•</b> 4			: : : :	SS-11	M	201.7				
1 1													200		‡							: : : :			201.7		ND GRAY, SI AFY LAYER 1		
199.5 <del>1</del> 13.1	1	1	2	H		• • • •		SS-8	- M		<b>-</b>		1 200	199.	2 13.5	1	2	1	1				SS-12	м	F	WITH LEA	AFT LATER I	4.0-14.2	
1	'			1	::::			1 33-0	┨‴		197.1 RESIDUA	15	.5		‡				λ					1 🖺	195.7				
] <u>I</u>				<u> </u>	• • • •						GREEN-GRAY, TAN.	AND WHITE,	195	104	2 <sup>+</sup> 18.5				· \ · · ·						195.7		RESIDUAL	\\\(	
194.5 + 18.1	1	2	3	<b>6</b> 5	::::		.	SS-9	w		SAPROLITIC, SAI	NDY CLAY		133.	1	4	6	12	•18		: : : :			м	*	SAPROLIT	BROWN, AND		
I I				} : : :			:   : : : :				· .		190		‡ .										*		SILTY CLAY		
189.5 - 23.1	4	<u>                                     </u>	4	1			+	1	М		<del>-</del>		190	189	2 🕇 23.5	6	8	9	j.					M	\$				
	4	3	7	.•7			:   : : : :		I M			26			‡				17		::::			"	*				
1045									1		186.1 GREEN, GRAY, BROW	N, AND WHITE,	185	5 404	2 <sup>+</sup> 28.5				-				11		<b>3</b> -				
184.5 + 28.1	6	12	18		<b>3</b> 0				М		SAPROLITIC, HIGH SILTY CL	LY PLASTIC, AY		184	1 20.0	7	8	10	18					м	3				
1 ‡			1		.\						•	er.			· ‡				:::;		::::				180.2				
179.5 33.1					-\-			+	1		- -		180	179.	2 🛨 33.5	1	31	50	1		·		SS-13	. 🛚			WHITE, SAF SANDY SILT	ROLITIC,	
1 ‡	20	17	21	::::	38				M		•				İ	!'	31	"	::::		: : : :	90	33-13	M		· · · · · · · · · · · · · · · · · · ·	ONIND! OIL!		
‡			l	: : : :	/						•		175	5	<u></u>							1 /			L I		4		
174.5 + 38.1	9	11	14		25				м		•			174	$\frac{2+38.5}{1}$	20	75	25//0.1	1::::		: : : :	100/0.6	11		173.7	. WE	ATHERED RO	СК	
‡											•				ł				: : : :		: : : :	1			<b>1</b>	•	(SCHIST)		
169.5 43.1							<u> </u>	┨	_		<u>.</u> 		170		2 43.5	5	10					1/	<del> </del>	1 23	169.7		RESIDUAL	· · · · · · · · · · · · · · · · · · ·	
‡	5	6	21		27			SS-10	M		•				ł	20	42	52	1::::			•	4	M	167.2	GRAY, TAN, A	AND WHITE, SANDY SILT	SAPROLIT	IC,
‡				::::			:		-		165.1	47	<u>7.5</u> 165	5	Ŧ								<b>  </b>				ATHERED RO (SCHIST)	CK	
164.5 + 48.1	36	64/0.4	l				100/0				165.1 WEATHERED (SCHIST	ROCK		164	2 T 48.5	5 28	72/0.4				1::::	- 100/0.9	•				(30/1101)		
1 ‡							.	11			• '				Ŧ														
159.5 + 53.1				• • • •				41			<u>-</u>		160	159	$_{2}$ $+_{53.5}$	5					<b></b>	1	1		158.8				
1	38	62/0.4			1	: :	. 100/0.9	• <b>•</b>			- - -				7	100/0.4	1					100/0.4			E	Boring Termin	ated at Eleva ERED ROCK	tion 158.8 f (SCHIST)	t IN
‡		<b> </b> .					1				- -				Ŧ										E				
154.5 + 58.1	60/0.0			<u> </u>			60/0.0	<del>,</del>	-	5377	- Donng reminated		3.1		Ŧ										Ł				
‡											Penetration Test Refusal ft ON CRYSTALLINE I				‡										E				
‡												• •			‡						•				_				
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BS 38544.1.1	TIP B-4772 COUN	ITY JOHNSTON	GEOLOGIST Pedro, J. L.		WBS 38544.1.1	<u> </u>	TY JOHNSTON	GEOLOGIST Pedro, J. L.	T
TE DESCRIPTION BRIDGE NO	. 326 ON -L- (SR 1525) OVER N	MILL BRANCH CREEK	GROL	IND WTR (ft)	SITE DESCRIPTION BRIDGE NO		T		GROUND WTR
ORING NO. EB2-A	STATION 15+22	OFFSET 15 ft LT	ALIGNMENT -L- 0 HR.	. 4.0	BORING NO. EB2-B	STATION 15+22	OFFSET 15 ft RT	ALIGNMENT -L-	0 HR. 6
OLLAR ELEV. 211.5 ft	TOTAL DEPTH 48.8 ft	NORTHING 664,051	<b>EASTING</b> 2,127,145 <b>24 HR</b>	. 5.0	COLLAR ELEV. 211.5 ft	TOTAL DEPTH 49.6 ft	NORTHING 664,021	<b>EASTING</b> 2,127,147	24 HR. 4
RILL RIG/HAMMER EFF./DATE RFO	0074 CME-55 00% 00/00/2011	DRILL METHOD	S. Augers HAMMER TYPI	E Automatic	DRILL RIG/HAMMER EFF./DATE RFOO	0074 CME-55 00% 00/00/2011	DRILL METHOD	<del></del>	AMMER TYPE Automati
RILLER Conley, H. R.	START DATE 03/14/11	COMP. DATE 03/14/11	SURFACE WATER DEPTH N/A		DRILLER Conley, H. R.	START DATE 03/16/11	COMP. DATE 03/16/11	SURFACE WATER DEPTH	N/A
DRIVE DEDTIL BLOW COUN	T BLOWS PER FOO	OT SAMP. L	SOIL AND ROCK DESCRIPTIO	N	ELEV DRIVE DEPTH BLOW COUNT		11 1 / 10	SOIL AND ROCK	DESCRIPTION
t) ELEV (ft) 0.5ft 0.5ft 0	.5ft 0 25 50	75 100 NO. MOI G		DEPTH (ft)	(ft) (ft) (ft) 0.5ft 0.5ft 0	.5ft 0 25 50	75 100 NO. MOI G		
15		.	<u>.</u>		215			-	
			- -					ODOLIND C	LIDEAGE
<u> </u>			- 211.5 GROUND SURFACE - ROADWAY EMBANKMENT	0.0	210	<del>                                      </del>		- 211.5 GROUND S - ROADWAY EM	BANKMENT
10			ORANGE-BROWN, HIGHLY PLAS	STIC,	210			RED-ORANGE, HIC SILTY O	
208.1 T 3.4 WOH WOH W	лон	SS-1 W/	206.0 ALLIMAL		1 4 10	12 22	SS-14 M/	207.8 ALLUV	/IAL
05				5.5	205	/ .	<u> </u>	BROWN, SIL WITH SOME QUART	Z GRAVEL, MICA,
203 1 + 84			GRAY-BROWN, SILTY CLAY	•	203.3 + 8.2 WOH 1	$\frac{1}{1} y' \cdots   \cdots   \cdots  $	: ::::     <sub>w</sub>	AND TRACE W	OOD DEBRIS
WOH WOH V	VOH	SS-2 W	_		1 1 1 1 1			200.0	
<u>∞</u>   ‡			 - 198.5	13.0	198.3 T 13.2		<del>.    </del>	GRAY, SAN	IDY SILT
198.1 13.4 1 1		SS-3 W	- GRAY-BROWN, SILTY SAND - WITH SOME GRAVEL	)	198.3 1.3.2 WOH WOH	2 2	SS-15 W	196.0	
95			_	16.6	195			RESID	
193.1 18.4			RESIDUAL DARK GRAY, MICACEOUS,		193.3 + 18.2   3   4	6   :\\	: ::::     <sub>M</sub>	GREEN AND BROV HIGHLY PLASTIC	C, SILTY CLAY
193.1 10.4 10 16	22 38.	SS-4 M	SANDY SILT			0 10	: ::::	WITH ABUNE	DANT MICA
90			—189.5	22.0	190		<del>-  </del>	<u>+</u>	•
188.1 23.4 4 4		SS-5 M	- GREEN, GRAY, AND BROWN - SAPROLITIC, HIGHLY PLASTI		188.3 7 23.2 22 32	42	74 M	<u> </u>	
	10	:: ::::   <del>33-0</del>	SILTY CLAY		185			<u>L </u>	
85	1		<b>-</b>		102 2 7 20 2	200		182.8	
183.1 28.4 9 17	35 52.	:: ::::   M	<u>-</u>		163.3 + 28.2   22   44   56	6/0.3	100/0.8	WEATHER! (SCHI	
180 🛨	/		-		180 🕇			(John 1)	0.,
178.1 33.4		:: ::::	- -		178.3 † 33.2	0/0.4		<b>4</b>	
9 11	12 23	M			175		100/0.9	182.8 WEATHERI (SCHI	
175		<del>    </del>		38.1	173.3 + 38.2			174.0 RESID	UAL
173.1		100/0.5	WEATHERED ROCK (SCHIST)		18 21	34 •55		GREEN AND ORAN SANDY CLAY WI	GE, SAPROLITIC,
170					170 ‡			DANS! OBA! W	TH COME MICH
168.1 43.4					168.3 + 43.2 50 40	36	`\[	\$	
85 15/0.1		100/0.6 P	<u>.</u>		1 1 1 1 1			<b>\$</b>	•
165					165 I I I I I I I I I I I I I I I I I I I			<b></b>	
163.1		100/0.4	162.7 Boring Terminated at Elevation 162	48.8 2.7 ft IN	163.3 + 48.2   13   25   7	5/0.4	100/0.9	161.9 WEATHER	ED ROCK
			WEATHERED ROCK (SCHIS	T)			100/0.9	Boring Terminated at	Flevation 161 9 ft IN
			F					- WEATHERED R	OCK (SCHIST)
			F					-	
			-		+ $+$ $+$ $+$ $+$ $+$			<u> </u>	
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1 T   1			L		11 + 1 1			F '	

SHEET 8 38544.1.1 (B-4772)

EB1-A SOIL TEST RESULTS AASHTO % BY WEIGHT % PASSING (SIEVES) DEPTH SAMPLE CLASS. L.L. P.I. C.SAND F.SAND SILT CLAY 10 40 200 MOISTURE ORGANIC STATION OFFSET INTERVAL NO. A-7-5(31) 69 38 5.7 14.7 18.4 61.2 90 88 75 3.1-4.6 14+34 SS-6 14 LT A-6(4) 36 13 19.8 36.5 15.1 28.6 96 87 49 SS-7 14 LT 14+34 8.1-9.6 100 97 57 49.8 23.3 20.4 A-6(5) 39 11 6.5 7.7 13.1-14.6 SS-8 14 LT 14+34 A-4(4) 37 8 11.6 36.5 35.5 16.3 92 87 59 18.1-19.6 SS-9 14 LT 14+34 A-7-6(23) 58 34 11.8 20.4 31.0 36.7 97 91 70 SS-10 14 LT 14+34 43.1-44.6

<i>EB1-B</i>															
			S	OIL T	TE	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-11	17 RT	14+34	8.5-10.0	A-6(9)	40	15	10.8	29.6	18.8	40.8	98	92	66	-	•
SS-12	17 RT	14+34	13.5-15.0	A-2-4(0)	30	NP	28.2	56.3	7.3	8.2	96	87	21	-	•
SS-13	17 LT	14+34	33.5-35.0	A-4(2)	38	5	7.8	44.9	33.1	14.3	100	99	57	-	-

EB2-A															
	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY W	/EIGHT		% PAS	SING (S	IEVES)	%.	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	15 LT	15+22	3.4-4.9	A-2-7(4)	58	35	56.3	10.0	1.0	32.7	87	48	31	-	-
SS-2	15 LT	15+22	8.4-9.9	A-7-6(2)	43	18	32.4	23.5	11.4	32.7	79	62	38	-	-
SS-3	15 LT	15+22	13.4-14.9	A-2-4(0)	24	NP	43.5	45.5	2.9	8.2	92	69	13	-	-
SS-4	15 LT	15+22	18.4-19.9	A-4(0)	27	NP	13.5	56.9	21.4	8.2	100	97	40	-	-
SS-5	15 LT	15+22	23.4-24.9	A-7-6(39)	71	47	7.6	15.9	25.5	51.0	99	95	79	. =	-

EB2-B		-	S	OIL 7	TE.	$\overline{ST}$	RE	SUL	TS				7		
SAMPLE			DEPTH	AASHTO			İ	% BY W	/EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-14	15 RT	15+22	3.7-4.7	A-2-4(0)	16	NP	39.4	42.4	8.0	10.2	77	61	18	, <b>-</b>	•
SS-15	15 RT	15+22	13.2-14.7	A-4(0)	30	NP	14.5	39.2	13.7	32.7	98	92	54	-	-
SS-16	15 RT	15+22	38.2-39.7	A-6(3)	34	12	3.5	58.2	30.2	8.2	100	99	51	•	-



#### FIELD SCOUR REPORT

WBS:38	544.1.1 TIP:	B-4772	cc	OUNTY: Johnsto	on		
DESCRIPTION(1): Bridge	No. 326 on -L- (SR	1525) over Mi	ll Branch C	reek			
		EXISTING	BRIDG	E			-
Information from:	Field Inspection _ Other (explain) _	<u>X</u> M	icrofilm	(reel	_ pos:	_)	
Bridge No.: 326 Foundation Type: Timber		Total Bents:		ts in Channel:	3 Bents in	Floodplain:	0
EVIDENCE OF SCOUL Abutments or End Be	₹(2)	ible - submerg	ed				
Interior Bents: None							
Channel Bed: None							
Channel Bank: None							
EXISTING SCOUR PR	OTECTION						
Extent(4): 40' W	x 5' H	· .					
Effectiveness(5): Effec	tive				-		
Obstructions(6): None							

#### **INSTRUCTIONS**

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- Describe extent of existing scour protection.
- Describe whether or not the scour protection appears to be working.
- Note obstructions such as dams, fallen trees, debris at bents, etc.
- Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

	<u>DESIGN IN</u>	<u>FORMATION</u>		
Channel Bed Material(7):	Alluvial, gray and brown,	soft, sandy clay		
Channel Bank Material(8):	Alluvial, gray and brown, v	very soft to soft, silty	clay	
Channel Bank Cover(9):	Grass and brush	`		
Floodplain Width(10):	+/- 250			
Floodplain Cover(11):	grass, trees, and brush			
Stream is(12):	Aggrading	Degrading X	Static_	
Channel Migration Tend.(13):	None			
Observations and Other Comm	nents: Mill Branch Creek e	mpties into the head	of a pond on the	downstream side
DESIGN SCOUR ELEVATION	IS(14)	Feet	K Meters_	· · · · · · · · · · · · · · · · · · ·
				÷
Comparison of DSE to Hydrau According to the DSE, the sco		is 200.0'. The histor	rical scour elevatio	ons range from
194.9' to 197.1'.				
SOIL ANALYSIS RESULTS F	ROM CHANNEL BED AN	D BANK MATERIA		
Bed or Bank Sample No.				
Retained #4				
Passed #10				
Passed #40				
Passed #200 See Sheet	t 8,			
Coarse Sand "Soil Test	Results",			
Fine Sand for sample	es:			
Silt SS-7 Clay SS-11				
Clay SS-11				
PI	* ,			
AASHTO				
Station				
Offset				
Depth	1	1	1	1 .

Jaime Love Pedro Reported by:

**Date:** 3/14/2011

## SITE PHOTOGRAPH

Bridge No. 326 on -L- (SR 1525) over Mill Branch Creek



Looking South towards End Bent 2

**CONTENTS** 

5-6

7-10

**DESCRIPTION** 

TITLE SHEET

LEGEND

SITE PLAN PROFILE

BORE LOGS

CROSS SECTIONS

SITE PHOTOGRAPH

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

## **STRUCTURE** SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33772.1.1 (B-4561) F.A. PROJ. **BRZ-1525(5)** COUNTY JOHNSTON PROJECT DESCRIPTION BRIDGE NO. 147 ON SR 1525 (CORNWALLIS ROAD) OVER SWIFT CREEK

STATE STATE PROJECT REFERENCE NO. SHEET TOTAL SHEETS N.C. 33772.1.1 (B-4561)

#### **CAUTION NOTICE**

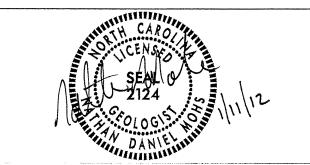
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOCS, ROCK CORES, AND SOIL TEST DATA AVALABLE MAY WE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 NECESSARLY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORENOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACE! TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABLITY NHIERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSITURE CONDITIONS NINCLED 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 DEFARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINON 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 SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS 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. THOSE INDICATED IN THE SUBSURFACE INFORMATION.

> PERSONNEL N.D. MOHS

TERRACON



**INVENTORY** 

INVESTIGATED BY N.D. MOHS

N.T. ROBERSON

SUBMITTED BY N.D. MOHS

JANUARY 2012

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS. SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

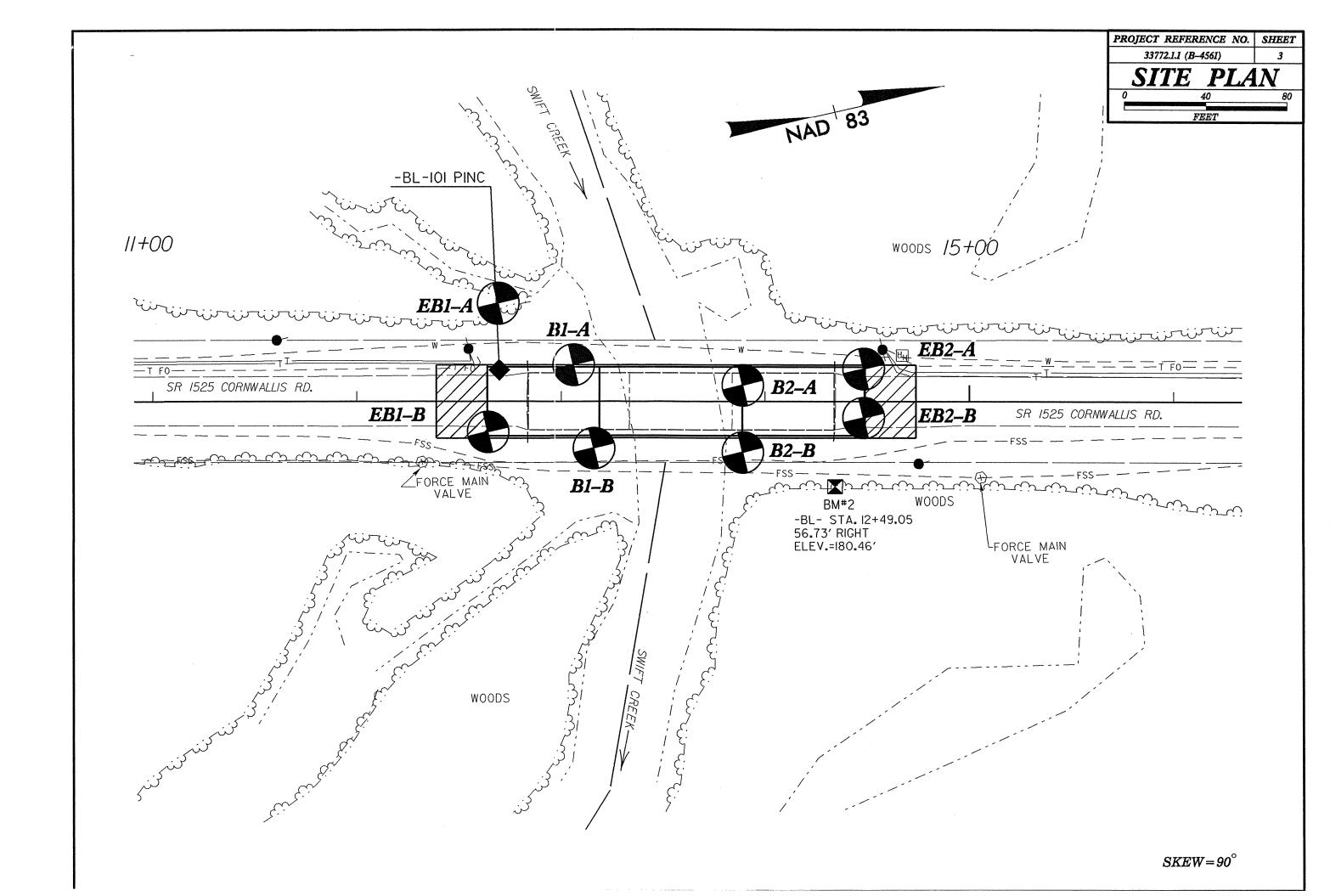
PROJECT REFERENCE NO. 33772.I.I (B-456I) SHEET NO.

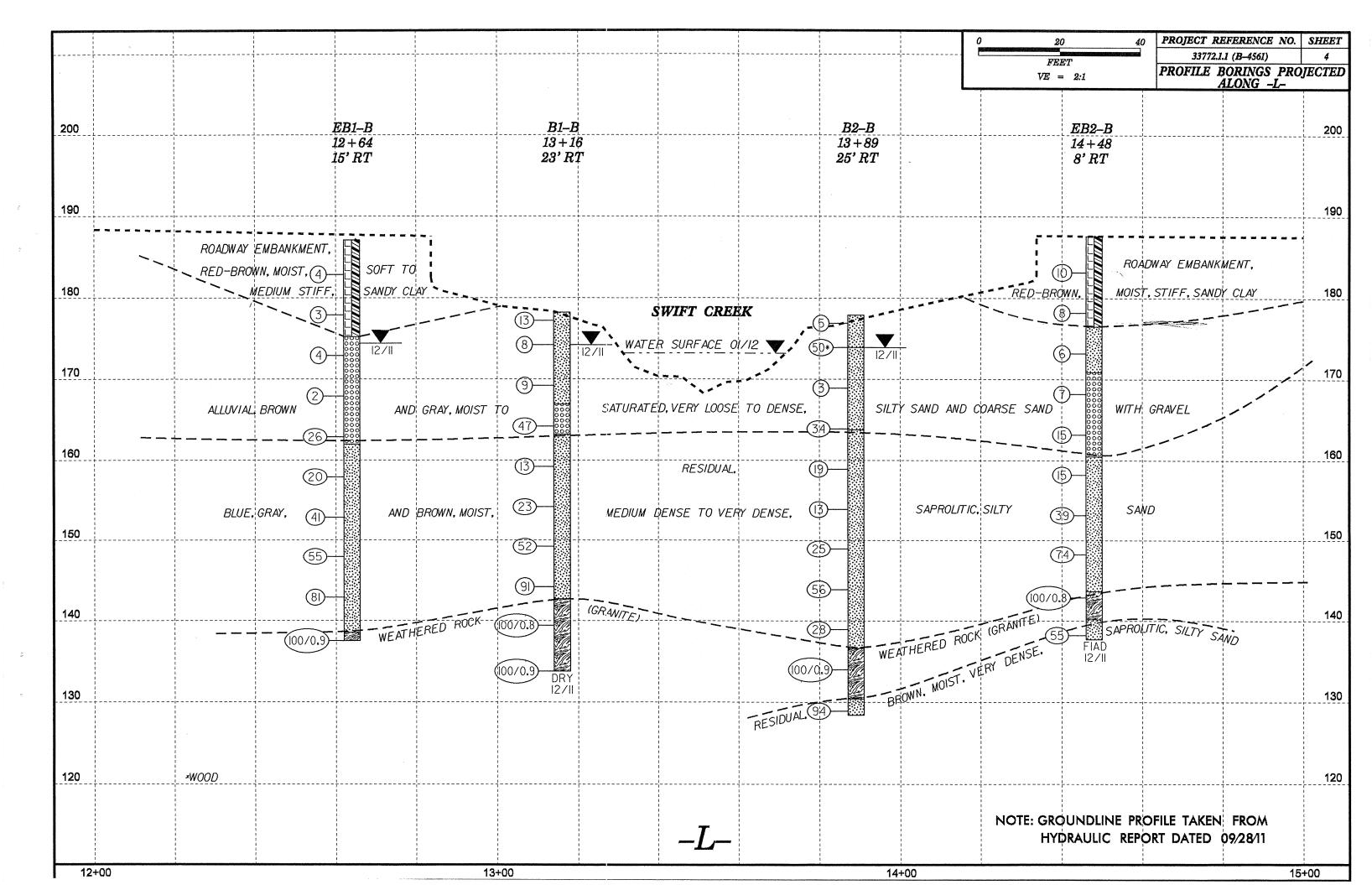
#### DIVISION OF HIGHWAYS

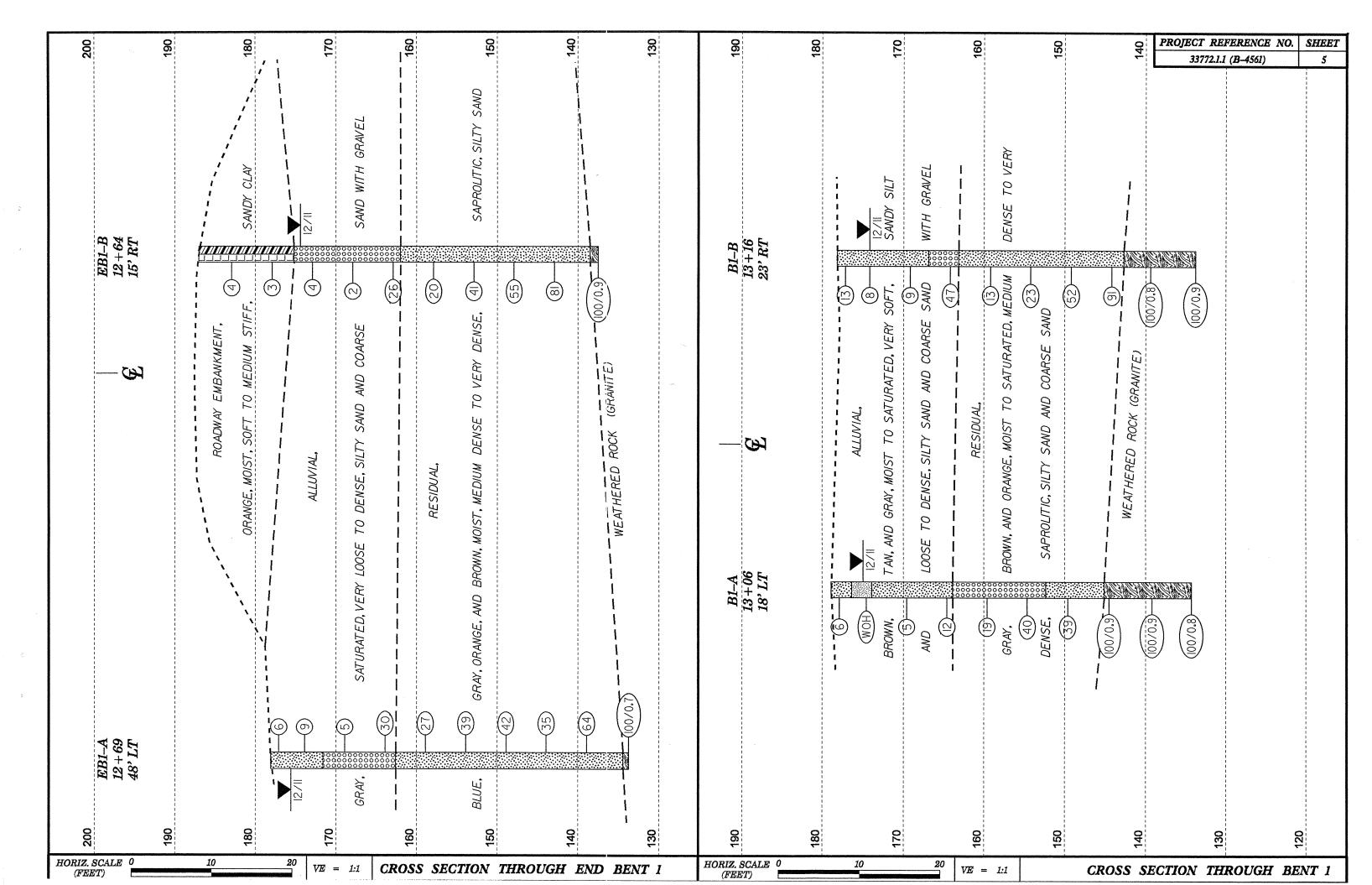
#### GEOTECHNICAL ENGINEERING UNIT

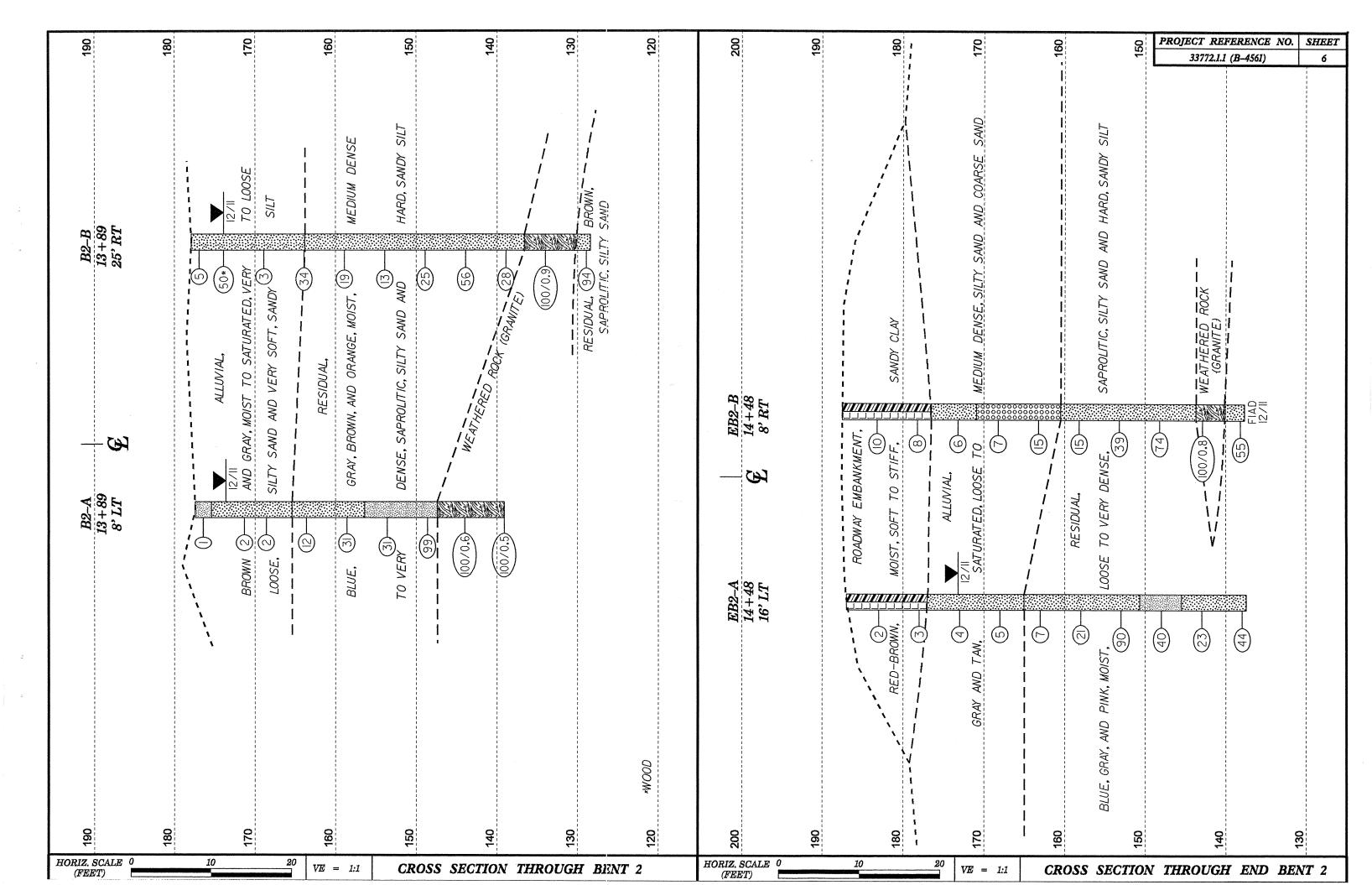
#### SUBSURFACE INVESTIGATION

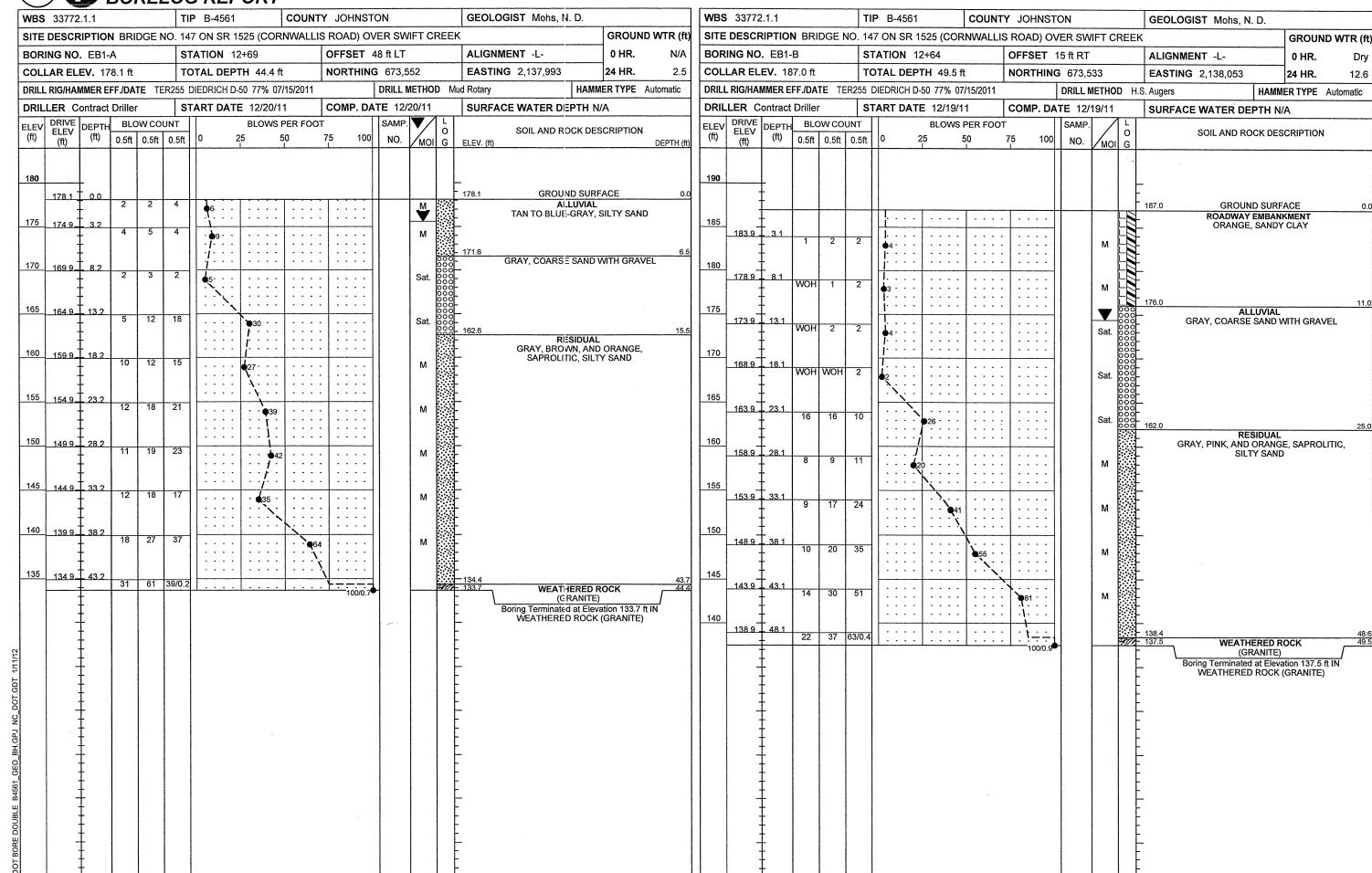
				SOIL AND RO	CK LEGEND, TERM	is, symbols	S, AND ABBREV	IATIONS		
	SOIL DESCRIPTIO	N		GRADATION				DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCON			UNIFORM - INDICATES THAT SO	OOD REPRESENTATION OF PARTICLE SIZES I IL PARTICLES ARE ALL APPROXIMATILLY TH	FROM FINE TO COARSE. E SAME SIZE.(ALSO	ROCK LINE INDICA	ATES THE LEVEL AT WHICH NON-	AT IF TESTED, WOULD YIELD SPT RI COASTAL PLAIN MATERIAL WOULD Y	IELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SDILS THAT HAVE BEEN TRANSPORTED BY WATER.
THAT CAN BE PENETRATED WITH A CON 100 BLOWS PER FOOT ACCORDING TO S			POORLY GRADED) GAP-GRADED - INDICATES A MIX	TURE OF UNIFORM PARTICLES OF TWO DR	MORE SIZES.	SPT REFUSAL IS	PENETRATION BY A SPLIT SPOOM	N SAMPLER EQUAL TO OR LESS THA ON BETWEEN SOIL AND ROCK IS OF	N Ø.1 FOOT PER 60 BLOWS.	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CLASSIFICATION IS BASED ON THE AAS CONSISTENCY, COLOR, TEXTURE, MOISTUR	HTO SYSTEM. BASIC DESCRIPT: E. AASHTO CLASSIFICATION. AN	IONS GENERALLY SHALL INCLUDE: D OTHER PERTINENT FACTORS SUCH		ANGULARITY OF GRAINS		OF WEATHERED RO	OCK. ARE TYPICALLY DIVIDED AS FOL		ILN NEINESENTED DI A ZONE	AMENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGUL	ARITY, STRUCTURE, PLASTICITY	, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNES SUBANGULAR, SUBROUNDED, OR	S OF SOIL GRAINS IS DESIGNATED EY THE	TERMS: ANGULAR,	WEATHERED	BUIGUIA	PLAIN MATERIAL THAT WOULD YIELD	CDT N VALUES \ 100	ARGILLACEDUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
	CLAY, MOIST WITH INTERBEDDED FINE SAND			MINERALOGICAL COMPOSITION	NI .	ROCK (WR)	BLOWS PER FO	OT IF TESTED.		ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
GENERAL GRANULAR MATER	ID AND AASHTO CL	ATEDIAL C		IZ, FELDSPAR, MICA, TALC, KADLIN, ETC. ARE		CRYSTALLINE ROCK (CR)		E GRAIN IGNEOUS AND METAMORPHI PT REFUSAL IF TESTED. ROCK TYP		AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING *	(> 35% PASS	SING *200) ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERE				GNEISS, GABBRO	, SCHIST, ETC. E GRAIN METAMORPHIC AND NON-CO		CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 CLASS. A-1-6 A-1-6 A-2-4 A-	A-2 A-4 A-5	A-6 A-7 A-1, A-2 A-4, A-5 A-7-5 A-3 A-6, A-7	OLTOUTI V. COMPOSCO	COMPRESSIBILITY	4 500 THAN 01	NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY R	OCK THAT WOULD YEILD SPT REFUS		COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL COORDOOC	-2-5 A-2-7	A-7-6	SLIGHTLY COMPRESSI MODERATELY COMPRE	SSIBLE LIQUIC LIMIT	LESS THAN 31 EQUAL TO 31-50	COASTAL PLAIN	CDASTAL PLAIN	LITE, SLATE, SANDSTONE, ETC. SEDIMENTS CEMENTED INTO ROCK.	BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
% PASSING			HIGHLY COMPRESSIBL	PERCENTAGE OF MATERIA	GREATER THAN 50	SEDIMENTARY ROCK (CP)	SPT REFUSAL. I	ROCK TYPE INCLUDES LIMESTONE, SI C.	ANDSTONE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
* 10 58 MX		GRANULAR CLAY MUCK,	ORGANIC MATERIAL	GRANULAR SILT - CLAY	OTHER MATERIAL		WE	ATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
* 40 38 MX 58 MX 51 MN * 200 15 MX 25 MX 18 MX 35 MX 31	5 MX 35 MX 36 MX 36 MN 36 MN	I SUILS I COT O I FERT		SOILS SOILS 2 - 3% 3 - 5% TR	ACE 1 - 10%		FRESH, CRYSTALS BRIGHT, FEW J	TOINTS MAY SHOW SLIGHT STAINING	ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIQUID LIMIT 40 MX 41	1 MN 40 MX 41 MN 40 MX 41 MN	40 MX 41 MN SOILS WITH	LITTLE ORGANIC MATTER MODERATELY ORGANIC	3 - 5% 5 - 12% LIT 5 - 10% 12 - 20% SO	TTLE 10 - 20%	1		NED, SOME JOINTS MAY SHOW THIN	CLAY COATINGS IF OPEN.	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDEX S MX NP 18 MX 16	7 MX 11 MN 11 MN 18 MX 18 MX	11 MN 11 MN LITTLE DR HIGHLY	HIGHLY ORGANIC		SHLY 35% AND ABOVE	(V SL1.) CRYST	TALS ON A BROKEN SPECIMEN FA	CE SHINE BRIGHTLY. ROCK RINGS U	NDER HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0	4 MX 8 MX 12 MX	16 MX No MX MODERATE ORGANIC SOILS		GROUND WATER		i .		NED AND DISCOLORATION EXTENDS I	NTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND GOND GROW	Y OR CLAYEY SILTY EL AND SAND SDILS	CLAYEY DRGANIC SOILS MATTER		VEL IN BORE HOLE IMMEDIATELY AFTER	DRILLING			AY. IN GRANITOID ROCKS SOME OCC CRYSTALLINE ROCKS RING UNDER		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVE	EL HIND SHIND SUILS	301.3	4	ATER LEVEL AFTER 24 HOURS		MODERATE SIGNIE	FICANT PORTIONS OF ROCK SHOW	DISCOLORATION AND WEATHERING	EFFECTS. IN	FLDAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM
AS A EXCELLENT TO G	DOD FAIR T	O POOR FAIR TO POOR UNSUITABLE	PERCHED V	VATER, SATURATED ZONE, OR WATER BEAR	ING STRATA			RE DULL AND DISCOLORED, SOME SH ND SHOWS SIGNIFICANT LOSS OF ST		PARENT MATERIAL.
SUBGRADE  PT OF A=7-5 SUBGROUP 19	S < 11 - 30 + P1 ΩΕ Δ-	7-6 SUBGROUP IS > LL - 30	OM- SPRING OR	SEEP		WITH	FRESH ROCK.			FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
	ISISTENCY OR DEN			MISCELLANEOUS SYMBOLS	3			D OR STAINED. IN GRANITOID ROCKS DW KAOLINIZATION. ROCK SHOWS SE		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
PRIMARY SOIL TYPE COMPACT			ROADWAY EMBANKM	EENT (RE)  PTION  SPT DPT DMT TEST: BORII	TEST BORING	(MOD, SEV.) AND C	CAN BE EXCAVATED WITH A GEOL	DGIST'S PICK. ROCK GIVES "CLUNK"	SOUND WHEN STRUCK.	THE FIELD.
CONST	STENCY (N-VALI		WITH SOIL DESCRI		W/ CORE	1		: D OR STAINED.ROCK FABRIC CLEAR	AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY L			SOIL SYMBOL	AUGER BORING	SPT N-VALUE		RENGTH TO STRONG SOIL. IN GR VT. SOME FRAGMENTS OF STRONG	ANITOID ROCKS ALL FELDSPARS AR	E KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
MATERIAL MEDIUM	DENSE 10 TO	3Ø N/A	ARTIFICIAL FILL		REF- SPT REFUSAL		STED. YIELDS SPT N VALUES > 1			LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) VERY D			THAN ROADWAY EM	MW				D OR STAINED. ROCK FABRIC ELEME TO SOIL STATUS. WITH ONLY FRAGM		MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY S		<0.25	INFERRED SOIL BO	O. D. M. M.	LL	REMAI	NINO, SAPROLITE IS AN EXAMPLE	OF ROCK WEATHERED TO A DEGRE	E SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SOFT SILT-CLAY MEDIUM			INFERRED ROCK LI	NE A PIEZOMETER INSTALLATION		1		RIC REMAIN. IF TESTED, YIELDS S NOT DISCERNIBLE, OR DISCERNIBLE		INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK,
MATERIAL STIF		15 1 TO 2	₹₹₩₩₩ ALLUVIAL SOIL BO	( )	OR	SCATT	ERED CONCENTRATIONS. DUARTZ	MAY BE PRESENT AS DIKES OR STI		ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
HARD			25/025 DIP & DIP DIRECT			ALSO	AN EXAMPLE.	/ UADDNECC		ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AN
T	EXTURE OR GRAIN	SIZE	ROCK STRUCTURES	CONE PENETRON	METER TEST			HARDNESS		EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE		6Ø 2ØØ 27Ø		SOUNDING ROD			ROT BE SCRATCHED BY KNIFE OR ERAL HARD BLOWS OF THE GEOLO	SHARP PICK, BREAKING OF HAND S DGIST'S PICK.	PECIMENS REQUIRES	PARENT ROCK.
OPENING (MM)		0.25 0.075 0.053		ABBREVIATIONS				CK ONLY WITH DIFFICULTY. HARD H	AMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
	GRAVEL COARSE SAND	FINE SILT CLAY	AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST	1	DETACH HAND SPECIMEN.	CK. GOUGES OR GROOVES TO 0.25 I	CHEC DEED CAN DE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
	(GR.) (CSE. SD.)	(F SD.) (SL.) (CL.)	BT - BORING TERMINATED  CL CLAY	MICA MICACEOUS MOD MODERATELY	WEA WEATHERED	HARD EXCA	AVATED BY HARD BLOW OF A GET	OLOGIST'S PICK. HAND SPECIMENS C		SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
GRAIN MM 305 75 SIZE IN. 12 3	2.0	0.25 0.05 0.005	CPT - CONE PENETRATION T CSE COARSE		7 - DRY UNIT WEIGHT	1	MODERATE BLOWS.  RE GROOVED OR COUGED 4.45 TO	NCHES DEEP BY FIRM PRESSURE OF	KNIEE UB DIEK DUINT	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
	TURE - CORRELATIO	ON OF TERMS	DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS	HARD CAN	BE EXCAVATED IN SMALL CHIPS	TO PEICES 1 INCH MAXIMUM SIZE		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
SOIL MOISTURE SCALE	FIELD MOISTURE	GUIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATIO - VOID RATIO	N TEST SAP SAPROLITIC SD SAND, SANDY	S - BULK SS - SPLIT SPOON	1	IT OF A GEOLOGIST'S PICK.  BE GROVED OR GOUGED READILY	BY KNIFE OR PICK. CAN BE EXCAN	ATED IN FRARMENTS	THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)	DESCRIPTION		F - FINE	SL SILT, SILTY	ST - SHELBY TUBE	FROM	M CHIPS TO SEVERAL INCHES IN	SIZE BY MODERATE BLOWS OF A P		STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	FOSS FOSSILIFEROUS FRAC FRACTURED, FRACTUR		RS - ROCK RT - RECOMPACTED TRIAXIAL	1	ES CAN BE BROKEN BY FINGER I BE CARVED WITH KNIFE. CAN BE	PRESSURE. EXCAVATED READILY WITH POINT :	OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY
LL LIQUID LIMIT			FRAGS FRAGMENTS HI HIGHLY	<pre># - MOISTURE CONTENT V - VERY</pre>	CBR - CALIFORNIA BEARING RATIO	SOFT OR M	IORE IN THICKNESS CAN BE BROK	EN BY FINGER PRESSURE. CAN BE		TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO DR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC RANGE <	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	i .	PMENT USED ON SUBJECT I			ERNAIL. URE SPACING	BEDDI	NG	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT		ATTAM OF THIOTH PROBLEMS		ADVANCING TOOLS:	HAMMER TYPE:	TERM	SPACING	TERM	THICKNESS	BENCH MARK: #2 -BL- STATION I2+49.05, 56.73' RT, RR SPIKE IN 20" OAK
OM DPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS:		AUTOMATIC MANUAL	VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED THICKLY BEDDED	> 4 FEET 1.5 - 4 FEET .	DENOTIFIER 2 DE STRION 12 13:00, SOLIS INT, INC. SINC. IN 20 OAK
SL SHRINKAGE LIMIT			MOBILE B	CLAY BITS		WIDE MODERATELY CLO	3 TO 10 FEET OSE 1 TO 3 FEET	THINLY BEDDED VERY THINLY BEDDED	0.16 - 1.5 FEET 0.03 - 0.16 FEET	ELEVATION: 180.46 FT
		REQUIRES ADDITIONAL WATER TO	Вк-51	6° CONTINUOUS FLIGHT AUGER	CORE SIZE:	CLOSE VERY CLOSE	0.16 TO 1 FEET LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	NOTES:
		ATTAIN OPTIMUM MOISTURE		8' HOLLOW AUGERS				THINLY LAMINATED	< 0.008 FEET	4
	PLASTICITY INDEX (BI)	DDV CTDT-10T1	CME-45C	HARD FACED FINGER BITS		FOR SEDIMENTARY RE		JURATIUN VING OF THE MATERIAL BY CEMENT:	NG. HEAT. PRESSURE. ETC.	1
NONPLASTIC	PLASTICITY INDEX (PI) 0-5	DRY STRENGTH VERY LOW	CME-550	TUNGCARBIDE INSERTS	н			WITH FINGER FREES NUMEROUS G		
LOW PLASTICITY MED. PLASTICITY	6-15 16-25	SLIGHT MEDIUM		CASING W/ ADVANCER	HAND TOOLS:	FRIABLE		BLOW BY HAMMER DISINTEGRATES		
HIGH PLASTICITY	26 OR MORE	HIGH	PORTABLE HOIST	TRICONE 2 3/8 STEEL TEETH	POST HOLE DIGGER	MODERATE		CAN BE SEPARATED FROM SAMPLE EASILY WHEN HIT WITH HAMMER.	WITH STEEL PROBE;	
	COLOR		D-50T	TRICONE TUNG,-CARB.	HAND AUGER	THIS IS A TO		ARE DIFFICULT TO SEPARATE WITH	STEEL PRORE-	
		(TAN, RED, YELLOW-BROWN, BLUE-GRAY).		CORE BIT	SOUNDING ROD VANE SHEAR TEST	INDURATE		ARE DIFFICULT TO SEPARATE WITH BLT TO BREAK WITH HAMMER.	SILEL FRUDE;	
MODIFIERS SUCH AS LIGHT, DAR	RK, STREAKED, ETC. ARE USE	D TO DESCRIBE APPEARANCE.	U		VAINE SITEAK (ES)	EXTREMEL		HAMMER BLOWS REQUIRED TO BREAK BREAKS ACROSS GRAINS,	SAMPLE;	
L			L				SAMPLE	DILENS HUNDS GRIPPI		1

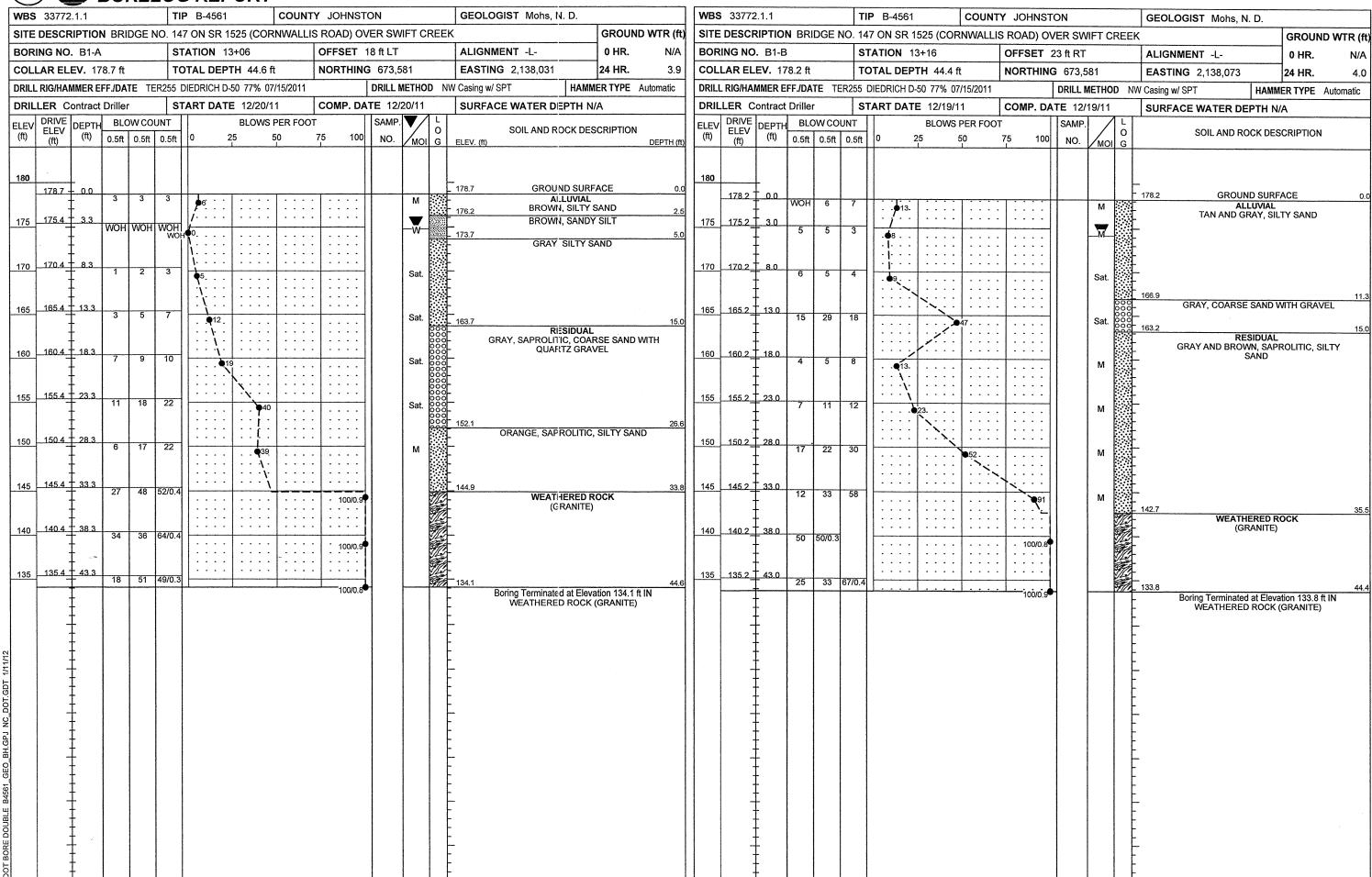




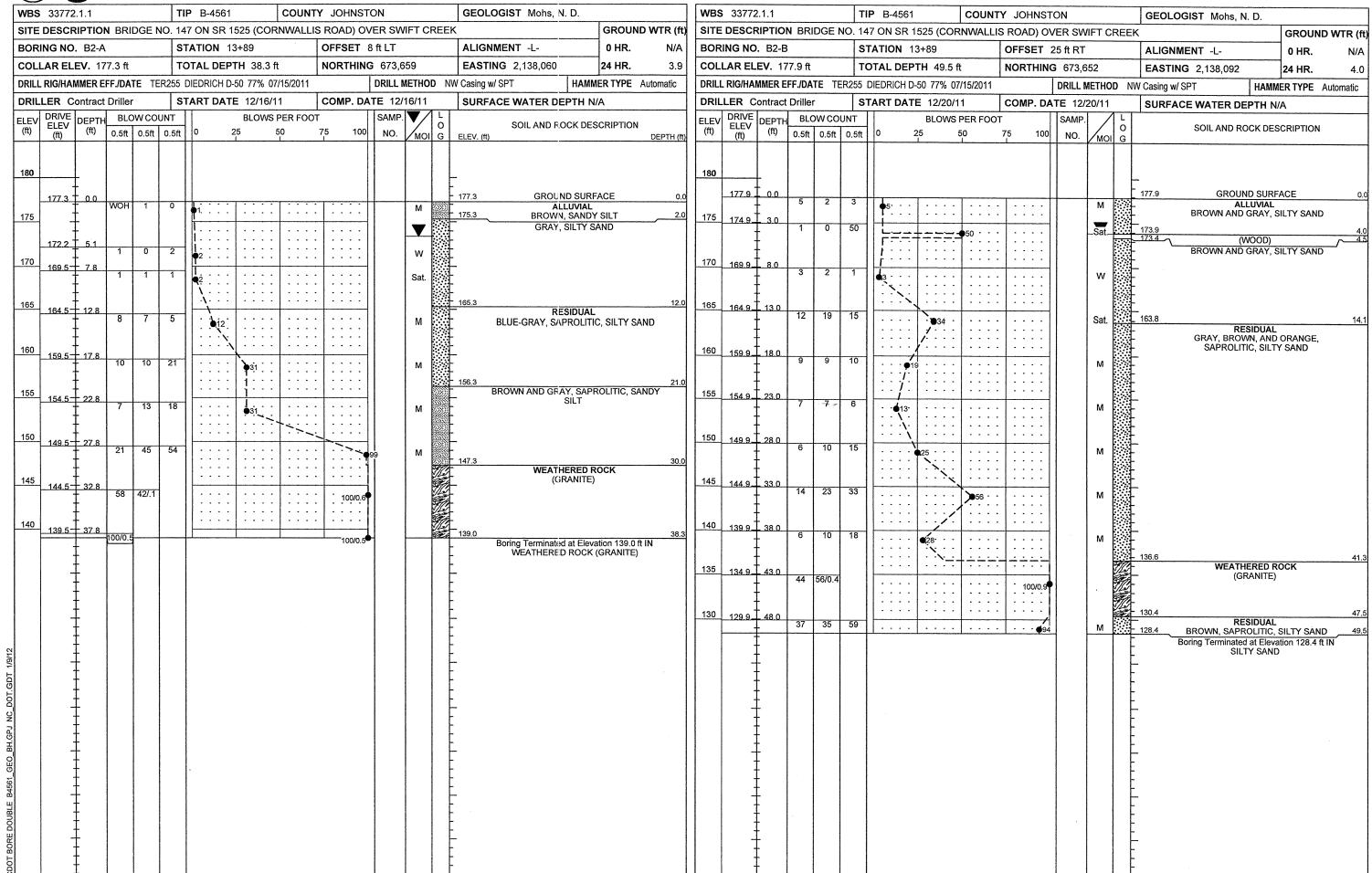


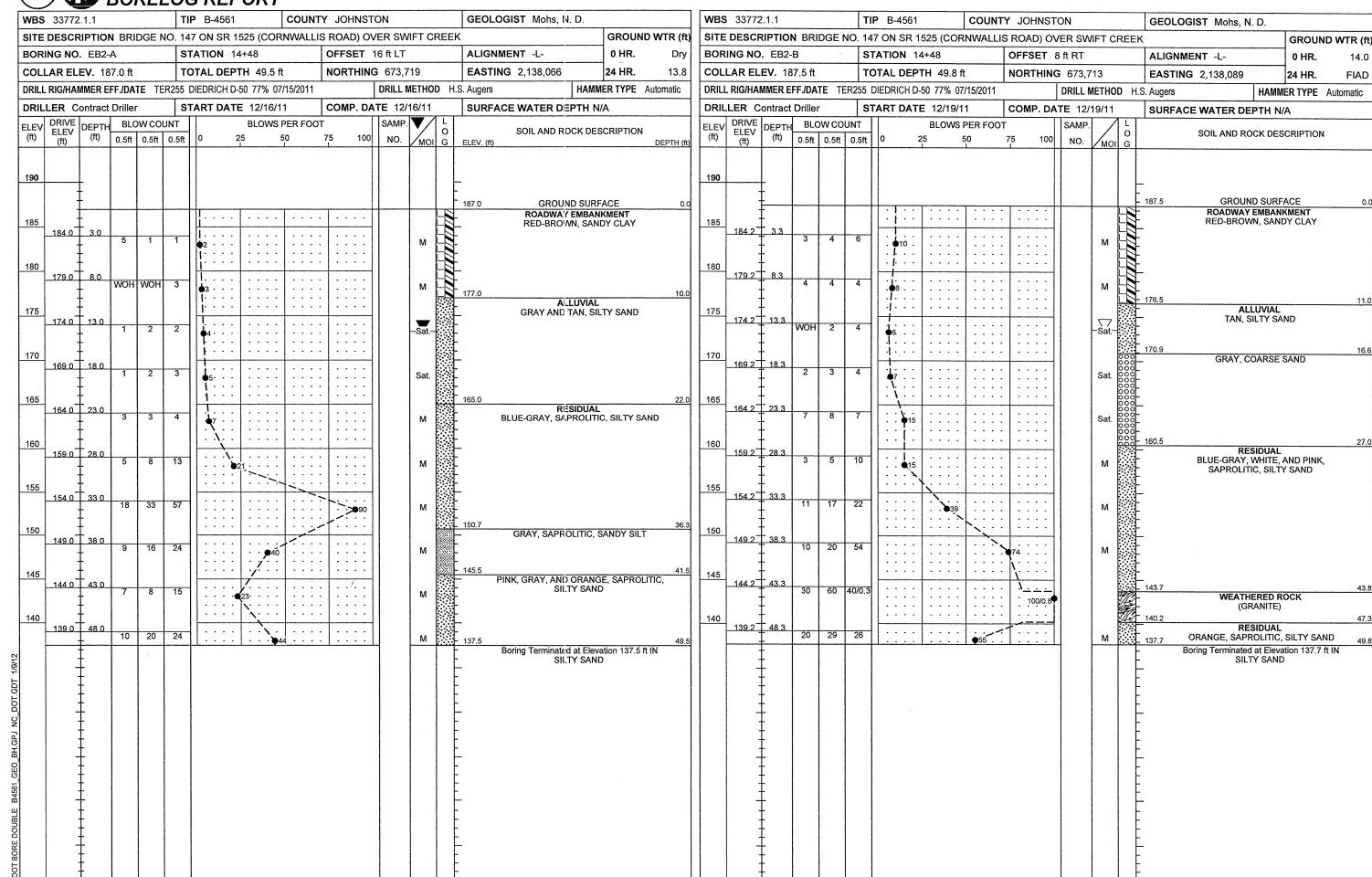






# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT





# SITE PHOTOGRAPH Bridge No. 147 on SR 1525 (Cornwallis Road) over Swift Creek

