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S 263. m PROJEC

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CONTENTS SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND SITE VICINITY SITE PLANS 4 - 5 6 - 7 PROFILES 8 - 22 BORE LOGS

2 3

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _DARE

PROJECT DESCRIPTION NC HWY 12 OVER PEA ISLAND BREACH

SITE DESCRIPTION BRIDGE ON NC 12 OVER PEA ISLAND BREACH AT -L- STA. 3170+75

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2500AB	1	22

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

Soll AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT RECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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 STRADARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED 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 THEREATURES, 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATION AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENSIAND ON OF FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

ES: 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 REDUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAVES 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.

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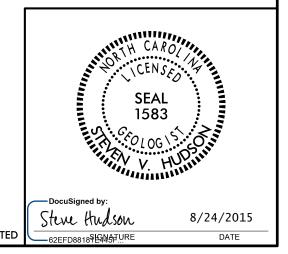
INVESTIGATED BY <u>CATLIN</u> ET AL.

DRAWN BY <u>STEVEN</u> HUDSON, LG

CHECKED BY _____CATLIN

SUBMITTED BY _______ STEVEN HUDSON

DATE AUGUST 2015



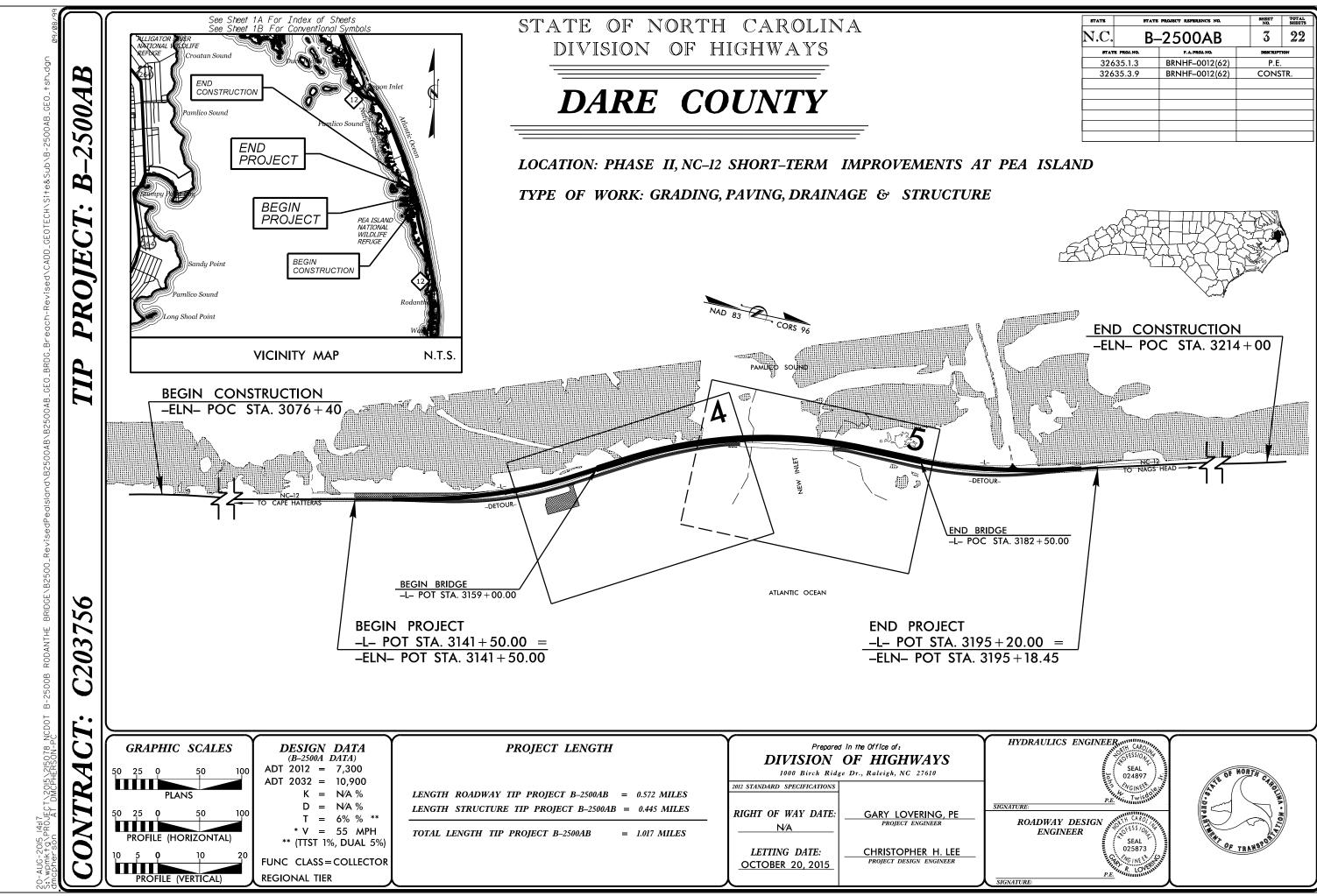
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

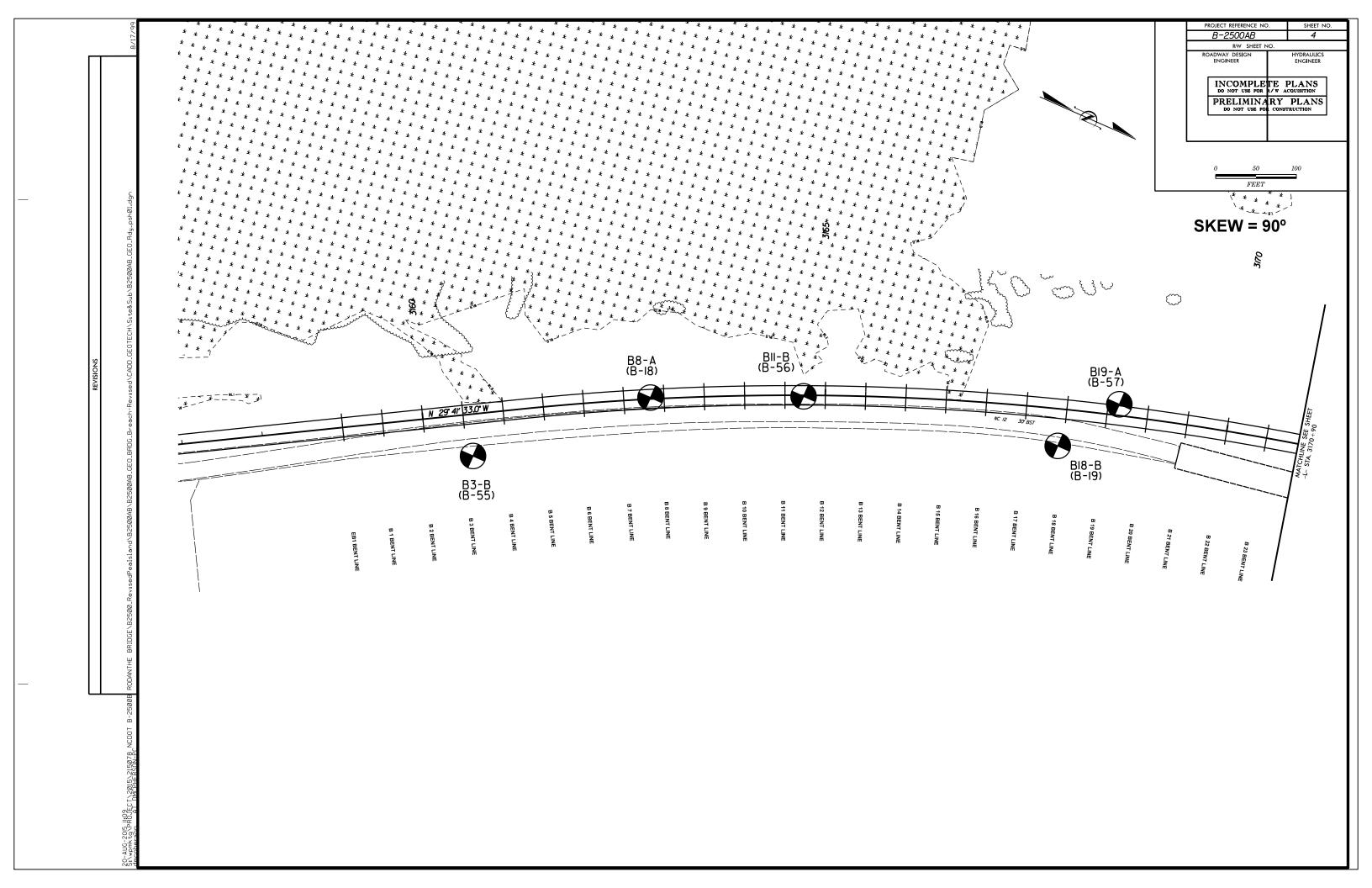
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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>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, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED V//// NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CEMERAI CRAMIII AR MATERIAI S SILT-CLAY MATERIAI S	MINERALOGICAL COMPOSITION	SEVERAL INF	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.	CRYSTALLINE ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, 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	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON CONSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7 0000000000	COMPRESSIBILITY	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL COCCOCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
% PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX *40 30 MX 50 MX 51 MN GRANULAR CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 3/ 3 5% TRACE 1 10% LITTLE ORGANIC MATTER 3 -5% 5 -12% LITTLE 10 -20%	HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	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, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 11 MN HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	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 AND ORGANIC SOILS	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 SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE STITY OR CLAYEY STITY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	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 BATING	<u> </u>	(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	O-MM→ 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 \leq 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
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SING SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
OLIGENCE LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	8	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT CAUGER BORING CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
	INFERRED SOIL BOUNDARY	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	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	Ý I	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	TIST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 T0 15 1 T0 2 (COHESIVE) VERY STIFF 15 T0 30 2 T0 4	ALLUVIAL SOIL BOUNDARY A PIEZOMETER - 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		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	UNCLASSIFIED EXCAVATION - 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
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UCED IN THE TOD O FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	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 CL CLAY MOD MODERATELY γ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION 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.	
- 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	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 AS A PERCENTAGE.
	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.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: SURVEY CONDUCTED WITH TRIMBLE 5800 GPS AND TSC2
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL SHRINKAGE LIMIT	X CME-45 CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REOUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	COORDINATE SYSTEM = NORTH CAROLINA STATE 1983 PROJECT DATUM = NORTH AMERICAN DATUM 1983 (CONUS)
PLASTICITY	CME-55	INDURATION	COORDINATE SYSTEM = NORTH CAROLINA STATE 1983 PROJECT DATUM = NORTH AMERICAN DATUM 1983 (CONUS) ZONE = NORTH CAROLINA 3200 GEOID MODEL = GEOIDO3 (CONUS) ALL UNITS = US FEET
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	ALL UNITS = US FEET
PLASTICITY_INDEX_(PI) DRY_STRENGTH NON_PLASTIC 0-5 VERY_LOW	CME-550 HARD FACED FINGER BITS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST	GENILE BLUW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		CRAINS ARE DISCIPLET TO SERADATE WITH STEEL PROPE.	
		INDURATED OFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

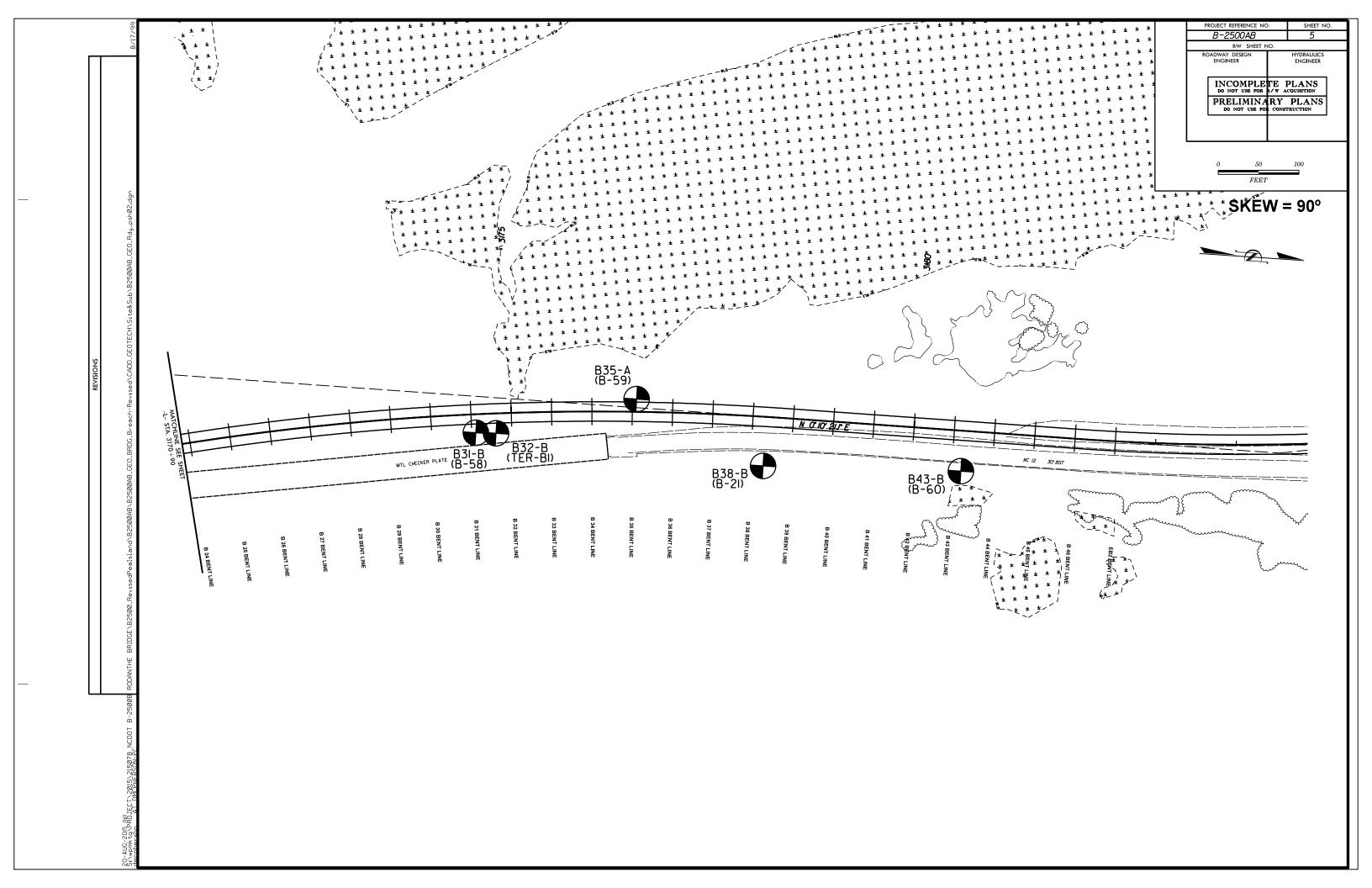
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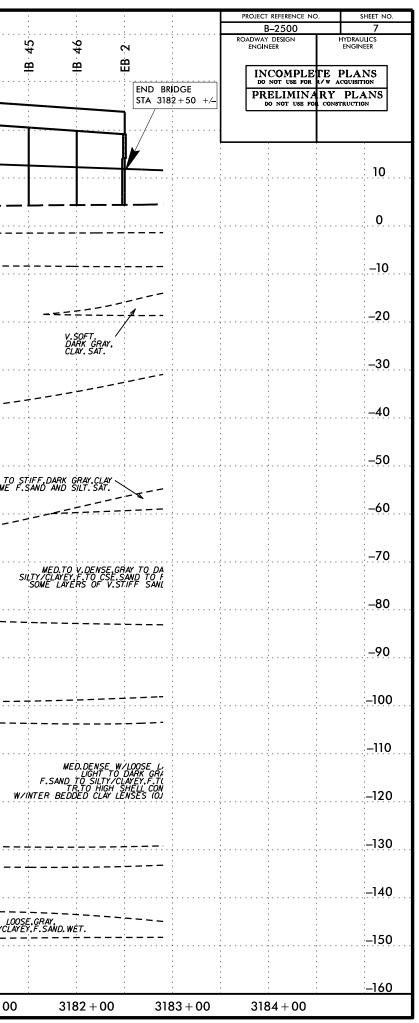


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20	BEGIN BRIDGE STA 3159+00 +/-																				20		LIMINAR NOT USE FOLC	Y PLAN CONSTRUCTION
10				B3-B (B-55) 52 RT	,			B8-A (B-18) 2 LT				B11-B (B-56) 1 RT					B18 (B-	8-B 19) _{RT}	[319-A B-57)			~	
0		• • • • • • • • •	® ® 	0000	GRAY TO BROW	VN.F.TO CSL					(LOOSE TO AND GRAY,F CSE.SAND.M	HED.DENSE.TA SAND AND S. OI.TO WET.(R	N. BROWN. ILTY, F. TO DADWAY EMB.	,		▼ 	4 LT		O LOOSE.BRO TO SILTY.F. TLE CSE.SAM		
-10			@	— — — — — -	IED.DENSE.GRA SILTY.F.TO	AY.TAN.AND CSE.SAND. J.C.P.J	BROWN, SAT.	9			:			```\			20 25					ERY LOOSE TH W TO GRAY.F		
-20 -30			· (3	— — — — — — — — — — — — — — — — — — —	LOOSE, DARK L	BROWN, SILT ORG.ODOR.	ŚAT. (7				2 		MED.DENSE, SILTY STRONG (DARK BROWN F.TO CSE.SA DRG.ODOR.SAT	 TO BROWN. YD. (U.C.P.) 	0 0		 @		V.LC ORG	OSE.BROWN.F WOOD FRAGS		
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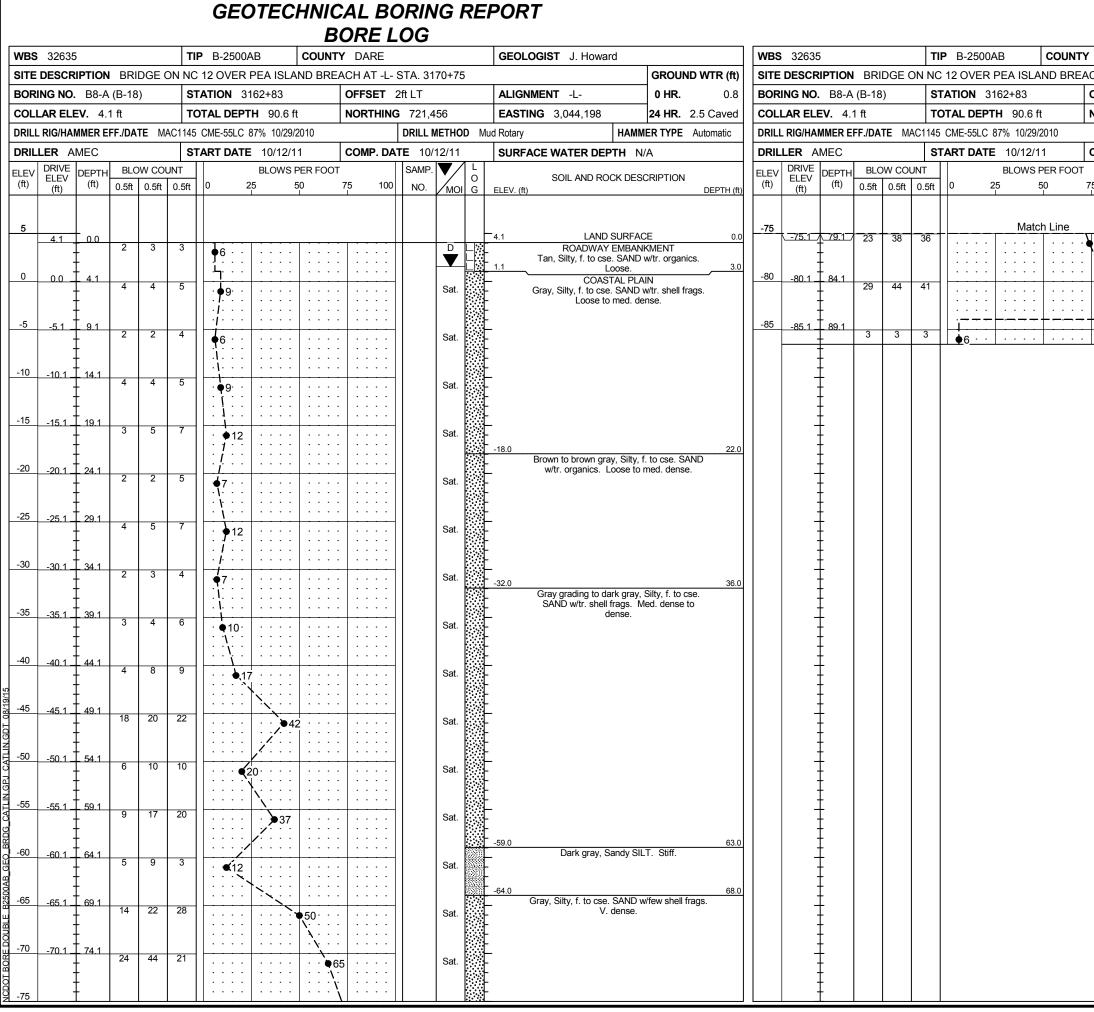
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		CAL BORING REI BORE LOG	PORT								21507	78 Corporate Lice	220 Old Dair Wilmington, N ensure No. for Enginee	NC 28405 R_250		SHEET
WBS 32635	TIP B-2500AB COUN	ITY DARE	GEOLOGIST Tom Stetler	WBS	32635	5		TIF	P B-2500AB	COUNT	Y DARE			GEOLOGIST Tom Stetl	er	
SITE DESCRIPTION BRIDGE ON		1	GROUND WTR (ft)	SITE	DESCR	IPTION	BRIDGE		12 OVER PEA ISLAN		-		70+75		GROUN	ND WTR (ft)
BORING NO. B3-B (B-55)	STATION 3160+57	OFFSET 52ft RT	ALIGNMENT -L- 0 HR. 5.4	BOR	ING NO.	B3-B	(B-55)	ST	TATION 3160+57		OFFSET :			ALIGNMENT -L-	0 HR.	5.4
COLLAR ELEV. 4.2 ft	TOTAL DEPTH 155.4 ft	NORTHING 721,284	EASTING 3,044,353 24 HR. 4.2		LAR ELI		-	_	DTAL DEPTH 155.4 ft	t	NORTHING	, <u>,</u>		EASTING 3,044,353	24 HR.	4.2
DRILL RIG/HAMMER EFF./DATE CAT1		DRILL METHOD MU	, , , , , , , , , , , , , , , , , , , ,				FF./DATE (CME-45B 92% 11/16/2011						HAMMER TYPE	Automatic
	START DATE 01/31/12	COMP. DATE 02/01/12	SURFACE WATER DEPTH N/A		LER C				ART DATE 01/31/12		COMP. DA		01/12	SURFACE WATER DEPT	"H N/A	
ELEV DRIVE DEPTH BLOW COUN (ft) (ft) 0.5ft 0.5ft 0		75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV (ft)	ELEV (ft)	DEPTH (ft)	BLOW CO	_	BLOWS PE 0 25 50		75 100	SAMP. NO.	MOI		K DESCRIPTION	
5 4.2 0.0			-4.2 LAND SURFACE 0.0	-75			-10 - 15		Match	Line			Sat.	Gray, Silty, f. SAND v	utr. shall frags. Do	
	5		2.7 ROADWAY EMBANKMENT 1.5 Light brown, f. SAND w/tr. shell frags. Geotextile fabric at base of sample. Loose.		-	+ + +			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				e. (continued)	CISC
	4		COASTAL PLAIN Light grayish brown, f. SAND w/tr. to no shell frags. and cse. sand. Poorly graded. Loose	-80	-79.7	83.9	6 8	9	· · · · · · · · · · · · · · · · · · ·	· · · · ·	· · · · ·		Sat.			
-5 -4.7 8.9			grading to med. dense.	-85	-84.7	88.9				· · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			Gray, Silty, f. SAND Silty/Clayey, f. SAND	w/tr. clay grading D. Loose to v. loo	87.0 g to ose.
	5 9	· · · · ·	-			F	2 2	2	4 4	· · · · ·	· · · · · · · · · · · · · · · · · · ·		Sat.			
<u>-10</u> <u>-9.7</u> <u>13.9</u> <u>4</u> 5	7	· · · · ·	-	-90	-89.7	93.9	1 2	1	• · · · · · · · · · · · · · · · · · · ·	· · · · ·			Sat.			
		· · · · ·								· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			-93.8		98.0
	6 11		-	-95	-94.7	98.9	3 5	6	•11.	· · · · ·	· · · · ·		Sat. 000		ell frags. Well grac dense.	//little ded.
<u>-20</u> <u>-19.7</u> <u>23.9</u> <u>4</u> 5	7	· · · · · · · · · · · · · · · · · · ·	-18.3 22.5 Dark brown, Silty, f. SAND. Strong organic odor. Med. dense.	-100	-99.7	103.9	35 47	42		· · · · · ·				-98.8		103.0 s. V.
	' . •12				-	ł	35 47	42		· · · · · · · · · · · · · · · · · · ·			Sat.		nse.	
<u>-25</u> <u>-24.7</u> <u>28.9</u> <u>3</u> 7	6 · · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	Brown to light brown, f. SAND w/tr. silt. Poorly graded. Strong "odor" at top of	-105	-104.7	108.9	4 8	13	· · · · · · · · · · · · · · · · · · ·	· · · ·	· · · · ·		Sat.	Gray, Silty, f. SAND.	Poorly graded. Model of dense.	108.5 Vled.
-30 -29.7 - 33.9			interval. Med. dense.	-110	- -109.7	113.9				· · · · ·	· · · · · · · · · · · · · · · · · · ·					
	8	· · · · ·	-	-110			5 8	10	· · · • 18 · · · · ·	· · · · ·	1 1		W			
-35 -34.7 - 38.9 5 7	7	· · · · · · · · · · · · · · · · · · ·	_	-115	- <u>-114.7</u>	118.9	9 15	21	• • • • • • • • • • • • • • • • • • • •	· · · · ·			w			
		· · · · · ·				Ŧ				· · · · ·	· · · · · · · · · · · · · · · · · · ·			-117.8 Gray, Silty to Silty/Cla frags. and shells. C	yey, f. SAND w/tr.	122.0 shell
<u>-40</u> <u>-39.7</u> <u>43.9</u> <u>4</u> 4	7		-	-120	-119.7	123.9	2 5	10		· · · · ·			w	frags. and shells. C w/depth. Med.	lay content increas dense to loose.	ses
44.7 48.9 40 - 44.7 48.9	15	· · · · · · · · · · · · · · · · · · ·	-43.8 48.0 Grayish brown, Silty, f. SAND. Poorty	-125	-124.7	128.9	5 4	8		· · · · ·						
	¹⁵ b 21 b b		graded. Med. to v. dense.			ł	5 4		· .∳12 · ·	· · · · ·			W	N- 		
-50 <u>-49.7 53.9</u> 14 23 3		· · · · · ·	-	-130	-129.7	133.9	4 3	5					w			
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-55 -54.7 58.9 5 - 10 15 -	15 @ 30		-	-135	-134.7	- 138.9 - -	2 4	5	· • 9	· · · · ·	· · · · · · · · · · · · · · · · · · ·		w	2 4 -		
	18	· · · · · · · · · · · · · · · · · · ·	-58.8 63.0 Dark gray, f. Sandy SILT. Low plast. Poorly	-140	-139.7	143.9	3 3	5		· · · · ·	· · · · ·		10/			
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	30 · · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	Gray, Silty, cse. to f. SAND w/shell frags. Well graded. Dense. <u>-66.8</u> Driller noted "hard" layering at top of interval. <u>71.0</u>	-145	-144.7	148.9	14 13	21		· · · · ·	· · · · ·		w	Gray, Silty, cse. to f. shell content. D	SAND w/little to mense to v. dense.	nod.
-70 -69.7 73.9	$\left \begin{array}{c c c c c c c c c c c c c c c c c c c$		Gray, Silty, f. SAND w/tr. shell frags. Dense to med. dense.	-150	-149.7	153.9					· · · · · · · · · · · · · · · · · · ·					
				-150	<u>_</u>		12 21	51			•72 <u></u>	-	w	Boring Terminated at	t Elevation -151.2	155.4 ft in
-75 -74.7 78.9						<u> </u>								- Silty, cse. to f. SA	IND. Coastal Plair	n

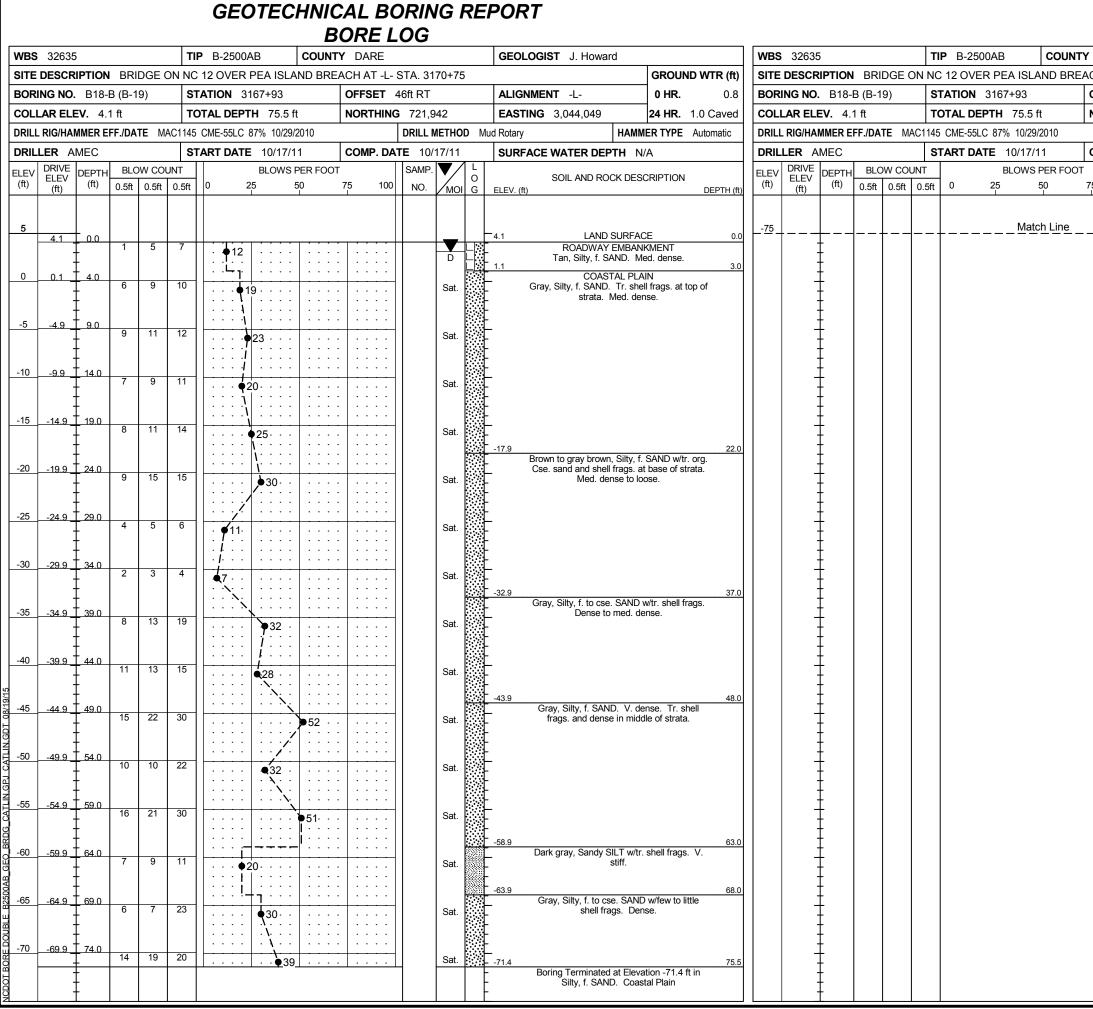


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Y DARE				ervices C-0585		B-	-250	0AB		9
				GEO	LOGIS	ST_J.H	loward	ł		
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OFFSET 2	ft LT			ALIG	SNMEN	NT -L-			0 HR.	0.8
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COMP. DAT	E 10/1	2/11		SUR	FACE	WATER	R DEP	FH N/.	A	
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•74 · · · · · · · · · · · · ·		Sat.			Gray	, Silty, f. tı V.	o cse. S dense.	SAND w/ (continu	few shell fra led)	igs
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							12 OVE			AND BR				3170+	-75					GROUND WT	` '					E ON	-	2 OVER PEA IS		-		70+75			GROUN	ND WTR (ft)
		NO. B		· ·)		ATION				-	FFSET	-				GNMEN			_					6 (B-56)		-	TION 3164+73		OFFSET	-			IGNMENT -L-	0 HR.	N/A
		ELEV.										ORTHIN	-	-				3,044,12		24 HR.			R ELE					AL DEPTH 160		NORTHIN				ASTING 3,044,120	24 HR.	4.8
				./DATE	= CA		CME-45B 9									Mud Rota	•			MER TYPE Autom					F./DATE	CAI1		ME-45B 92% 11/16/2					D Mud Ro			Automatic
ELEV	DRI			BLOW	V COL					PER FO		OMP. DA		P.		506			DEPTH				R CA		BLOW (COUN		RT DATE 01/20	/ 12 /S PER FOO	COMP. DA	SAMP.	51/12	su 1-1	IRFACE WATER DEPTI		
(ft)	ELE (fl	EV UEr	''' 	0.5ft			0	25		50	75	100		17	0 101 G			SOIL AND	D ROCK DE	SCRIPTION DEF	TH (ft)		RIVE LEV (ft)	E	0.5ft 0.5			0 25	50	75 100		мо	O G	SOIL AND ROCK	DESCRIPTION	
5		<u> </u>														4.6		L	AND SURF	ACE	0.0 -75				-10 - 10		~	M	atch Line							
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-20	<u>-19</u>	0.4 <u>+ 2</u> 4 +	.0	8	14	18			• • • •			· · · ·		Sa	at.	-	Dark		oorly grade	. Strong organic d. Dense.	-100)	99.4 + +	04.0	12 2	2 ;	31		<u> </u>	· · · · · ·		w	F	(NOTE: No sample collected	eturn from sam	ple
		Ŧ									.	· · · · ·				23.4					28.0		Ŧ										Ē	00100100		
-25	-24	.4 - 29	9.0	6	9	11		•/						Sa	000				, f. SAND w	/tr. silt. Poorly	-105	5 -1	104.4	09.0	5 1	5	15					W	E			
		ŧ			Ĩ			●20 '. .	· · ·	· · ·					al.			grad	ueu. meu. c				ŧ						· · · · ·	 		VV	_			
	-29	.4 - 34	10					· · ·	· · ·	.	· · · ·			000	28.4		irk brown. S	Silty, cse, to	f. SAND w/little	33.0	1	109.4 +	14 0					· · · · ·	· · · · · ·			_			
-30		+		3	4	4				<u> </u>			1	Sa	at. 000	0 0 0 - 31.9	white	te, well rou		ite gravels. Well	-110	,	+		5 8	3	11	•19				w	_			
		‡							· · · · · ·			· · · · · · · ·						rayish brov		SAND. Mod. to	00.0		‡					····	· · · · ·							
-35	-34	. <u>4 + 39</u> +	9.0	2	3	3	• 6	· ·		· · ·		· · · ·		Sa	at.			ροοι	ny graded.	LOUSE.	-115	5 -1	114.4 +	19.0	3 6	3	13	··· · ···· →19		· · · · ·		w	-			
		ŧ														-							ŧ										-			
-40	-39	.4 + 44	I.0	2		6		. .	· · ·			· · · · ·		_							-120	, -1	119.4	24.0	5 8		10	· · · · · · · ·	· · · · ·	· · · · ·						
		Ŧ		-	-	U	•8					 		Sa	at.	Ē							Ŧ			Í	·•			· · · · ·		W				
19/15	_14										.	· · · · ·				-43.4	6	avish bro	wn Silty f	SAND. Poorly	48.0		124.4	29 0						· · · · · ·						
-45 0		·		13	21	20		<u>-</u> -	•4	1		· · · ·		Sa	at.	3- 3-	9	gradeo	d. Med. to v	. dense.	-125				3 5	5	8	13				w				
N.GD		‡						: :	./ [ŧ					· : : : : : : : : : : : : : : : : : : :	· · · · ·	· · · · · ·			-			
	-49	0.4 <u>+ 5</u> 4	I.0	12	13	15		· .	/ 29	· · ·		 		Sa	at.						-130) -1	129.4 +	34.0	4 5	5	5	· · · · · · · · · · · · · · · · · · ·				w	-			
PI C		‡						· •	<u>~</u> 0 \		.	· · · · · · · ·											‡							· · · · · ·						
0. N 1 -55	-54	.4 + 59	9.0					· ·			.	 									_135	5 -1	134.4	39.0					· · · · · · · ·	· · · · · ·			-			
A P	1	‡		15	25	28		. .		53	.		11	Sa	at.						- 130	-	+		5 5	`	6	. • 11			11	W	-			
BRDG		, ‡						:] /	.		.	· · · · ·				-57.9	Dark	gravish br	own. f. San	dy SILT w/tr. silty	62.5		, †					······································	· · · · ·				-			
a 	-59	0.4 <u>+ 6</u> 4 +	1.0	3	3	5	•8			+ • • •		· · · ·		Sa	at. 🎆	Ë.	Lan	clay. L	Low plast. N	Ned. stiff.	-140)1	139.4 +	44.0	7 6	5	9	15 · · ·	· · · · ·	· · · · ·			-			
AB_G		Ŧ						:+-	~~`			· · · · ·				- - 63.4					68.0		Ŧ							· · · · · ·			- - - - 142	.4 Gray, Silty, f. SAND w	little chall frage	147.0
-65	-64	.4 - 69	9.0	18	36	45				<u> </u>						0_ 0_	Gray,		. to f. SAND Vell graded.	w/abundant shell	<u>-1</u> 45	5 -1	144.4	49.0	14 1	6	18			· · · · ·			· · · · · · · · · · · · · · · · · · ·	clay to tr. clay. Sand	size increases v	
SLE E		Ŧ				10		: []				•81 · · · ·		Sa		0		5	•	frags. V. dense.	71.0		Ŧ			Ĩ	·• [+ . <u></u> .			W	146 148	.4 depth. Dense Driller noted increased		151.0 Ittinas
DOUE	-60	1.4 - 74										· · · ·			0000		(Drille	er noted ha	ard ~2ft hard 78ft)	l layer from 76ft to		_1	149.4	54.0									-148	.4	onen nago. III cu	153.0
-70 80		··+"		8	28	32	· · ·	. .		6	0			Sa	at.	.			rony		-150				27 3	0 ;	31			1		w				
DOT B		‡					· · · ·	: :	· · ·	<i>i</i>	.	 			0 0 0 0 0 0 0 0 0	73.4					78.0		‡					· · · · · · · ·	· · · · `							
0 75	-74	.4 + 79	9.0				• • •	· ·		/	.					:					-155	5 -1	154.4 +	59.0					· · · ·	· `\ `			-			

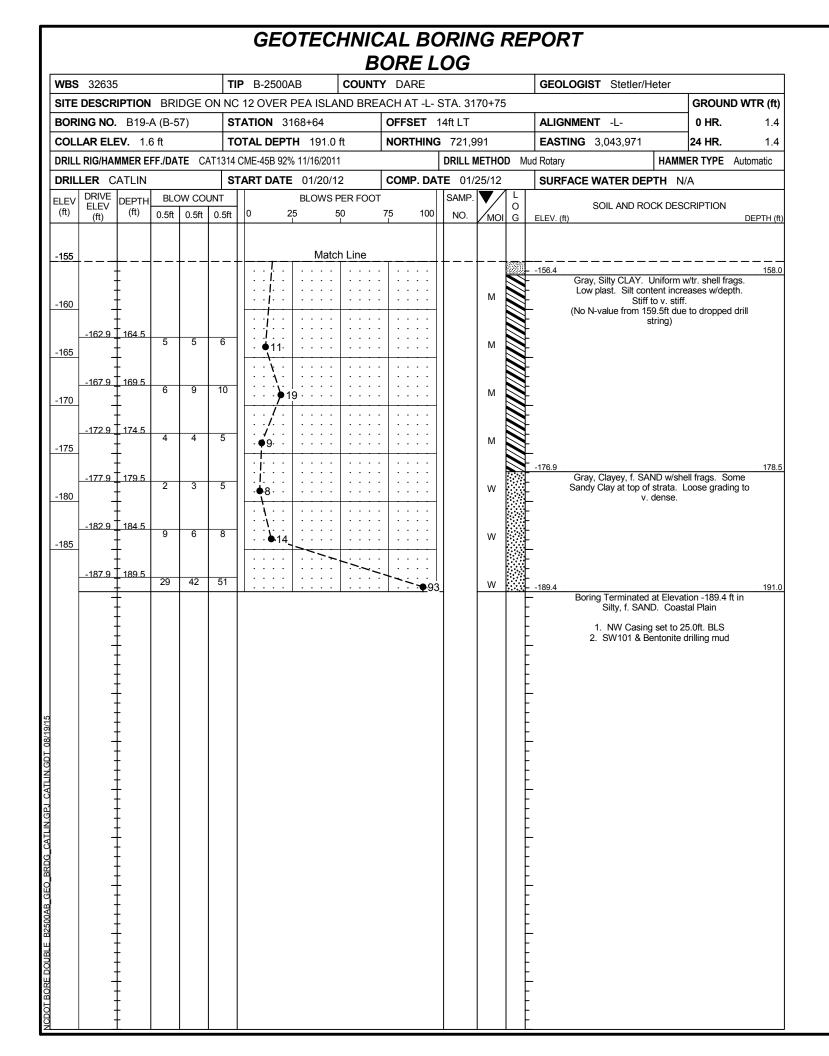
GEOTECHNICAL BORING REPORT BORE LOG COUNTY DARE WBS 32635 **TIP** B-2500AB GEOLOGIST Tom Stetler SITE DESCRIPTION BRIDGE ON NC 12 OVER PEA ISLAND BREACH AT -L- STA. 3170+75 GROUND WTR (ft) **STATION** 3164+73 OFFSET 1ft RT ALIGNMENT -L-**BORING NO.** B11-B (B-56) 0 HR. N/A COLLAR ELEV. 4.6 ft TOTAL DEPTH 160.5 ft **NORTHING** 721,629 EASTING 3,044,120 24 HR. 4.8 DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 92% 11/16/2011 DRILL METHOD Mud Rotary HAMMER TYPE Automatic DRILLER CATLIN **START DATE** 01/26/12 **COMP. DATE** 01/31/12 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft SAMP. BLOWS PER FOOT SOIL AND ROCK DESCRIPTION 0 (ft) 0.5ft 0.5ft 0.5ft MOI G 50 75 25 100 NO. 0 ELEV. (ft) DEPTH (ft Match Line -155 -15 + 41 - 51 + 92 -----T 160.5 Boring Terminated at Elevation -155.9 ft in Silty, f. SAND. Coastal Plain NW Casing set to 30.0ft. BLS SW101 & Bentonite drilling mud

~	CATLIN Engineers and Scientists	PROJECT REFERENCE NO.	SHEET
215078 Corporate L	220 Old Dairy Road Wilmington, NC 28405 Licensure No. for Engineering Services C-0585	B-2500AB	11

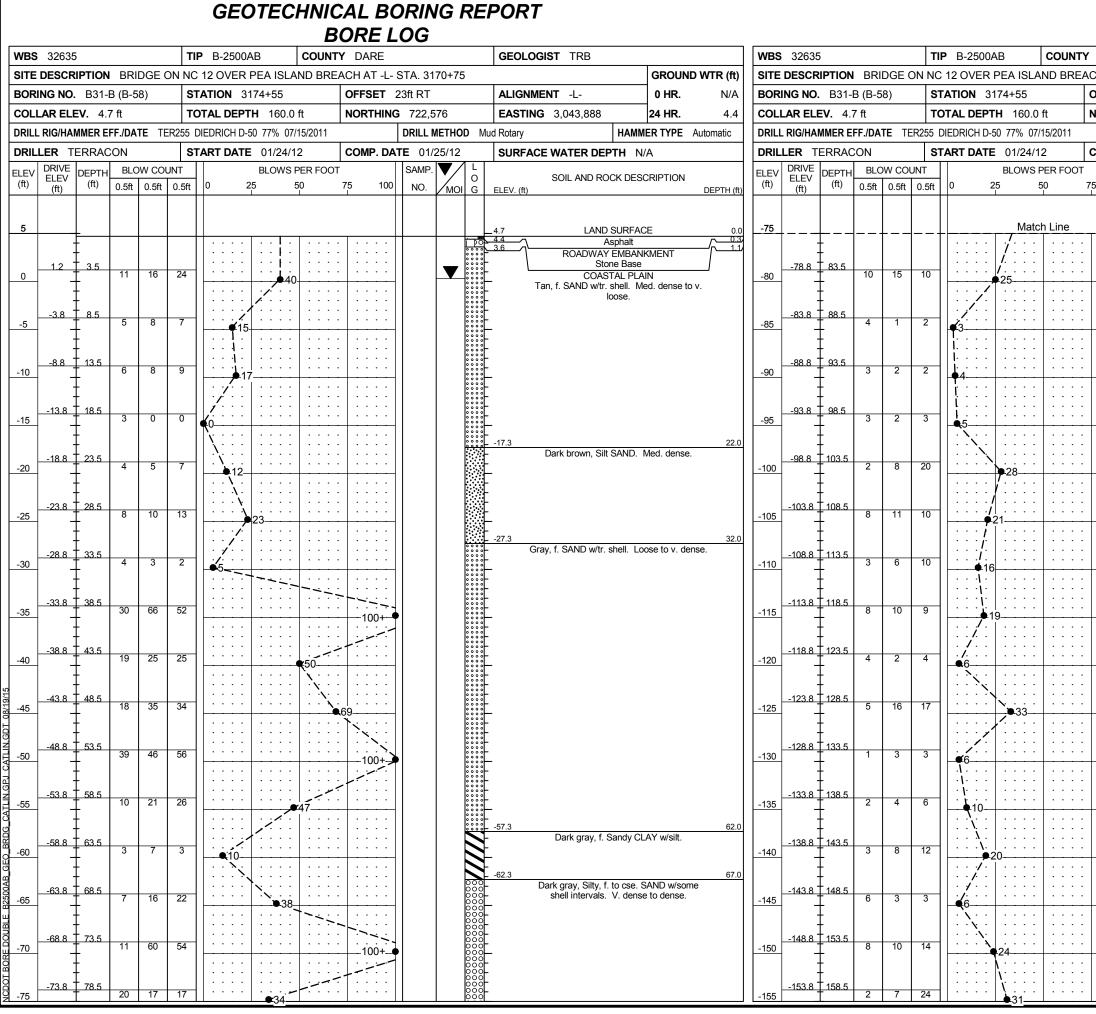


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DAR	E				GEO	L OGIST J	. Howard			
CH AT	-L- S	STA. 31	70+75						GROUND	WTR (ft)
OFFSE	T 4	6ft RT			ALIG	NMENT -l			0 HR.	0.8
NORTH	IING	721,9	42		EAS	FING 3,04	4,049		24 HR. 1	.0 Caved
		DRILL N	IETHO	D M	ud Rotary			HAMM	ER TYPE	Automatic
COMP.	DAT		17/11		SUR	ACE WAT	ER DEPT	H N/.	A	
75	100	SAMP.		L O		SOIL	AND ROC	K DESC	RIPTION	
75	100	NO.	/моі	G						
						1) Borir	ig advance	ed w/3"	Roller Cone	
					-	2) (Casing set	to 29.0	π. ΒΕδ	
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WB	S 3263	35			ТІ	P B-250	00AB			Y DAF				C	GEOLOGIST Stetler/Heter		WB	S 3263	5			TIP	B-2500AB	COUNT	TY DARE			GEO	LOGIST Stetler/	Heter	
SIT	E DESC	RIPTION	N BRI	IDGE (: 12 OVE	R PE	A ISLA	ND BRE	ACH AT	T -L- S	TA. 31	70+75	I		GROUND WTR (ff		E DESCR	RIPTION	BRID	DGE O	N NC	12 OVER PEA ISL	AND BRE	EACH AT -L-	- STA. 31	70+75	5		G	ROUND WTR
BOF	ring no	O. B19	-A (B-5	57)	S	TATION	3168 ⁻	3+64		OFFS	ET 14	4ft LT		4	ALIGNMENT -L-	0 HR. 1.4	BOF	ring no	. B19-	A (B-57	7)	STA	ATION 3168+64		OFFSET	14ft LT		ALIG	SNMENT -L-	0	HR.
		LEV. 1.				OTAL DE				NORT		,			EASTING 3,043,971	24 HR. 1.4	_	LAR EL				_	TAL DEPTH 191.		NORTHIN	,			TING 3,043,971		HR.
			-	TE C/		CME-45B 9								D Mud F	,	MER TYPE Automatic	_			FF./DAT	E CA	_	ME-45B 92% 11/16/20		1			D Mud Rotar	,		TYPE Automat
					-		-					-	- -	<u> </u> 8		N/A							ART DATE 01/20				25/12	SUR 1	FACE WATER DE	PTH N/A	
ELE\ (ft)	ELEV (ft)	/ DEPTH (ft)	· – – – – – – – – – – – – – – – – – – –	OW COU 0.5ft		0	25 1		PER FOO ⁻ 50	75	100	SAMP. NO.	/	O G EL	SOIL AND ROCK DES	SCRIPTION DEPTH ((ff)	/ DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	W COU 0.5ft		0 25	50	75 100	SAMP.	мо	O G	SOIL AND R	OCK DESCRIF	PTION
5		_															-75						Mai	tch Line		<u> </u>			Gray, Silty, f. SAN	D. tr. cse. sar	d and shell
		Ī												1.6	B LAND SURFA	VCE C	.0	-77.9	79.5	6	8	10		· · · · ·	· · · · · · · · · · · · · · · · · · ·				frags. Dense to		
0	_	Ŧ					• •				• •			· · · · · ·	COASTAL PL Brown to dark grayish br	own, f. SAND.	-80		ŧ	0	0	10	· · · • • 18 · · ·	. - 	· · · · ·	_	Sat.	_			
	-2.9	+ 45						· · · · · ·		.				~~~~ ~~~~	Uniform. Tr. to little cse. sa shell frags. Loose to r			-82.9	+ 84.5				. /	· · · · ·				-81.4	Gray, Silty, f. S		
-5	-	-	3	3	3	∳6 ·				· · · ·			Sat.				-85		Ī	3	3	2	●5 · · · · ·	· · · · ·	· · · · ·		Sat.		Increase in silt cor in middle of stra		
		Ŧ.				• • •	: [:												ŧ												
-10	-7.9	9.5	5	6	7		 3 .	· · · · · ·	· · · ·	 			Sat.				-90	-87.9	89.5	2	1	2		. .	· · · · · ·		Sat.	-			
- 10	1	+															-90		ŧ							11					
	-12.9) <u> </u> 14.5 	3	2	4			· · ·		· · · · · · · ·	· ·		Sat.					-92.9	94.5	2	3	4	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · · · · · · · · ·			Sat.				
-15	-	Ŧ						· · · ·									-95		Ŧ				▼ ′ · · · · · · · · · · · · · · · · · · ·	· · · · ·				-96.4			
	-17.9	9 19.5	2	2	2		· ·	· · · · · ·						•••• •••• ••••	٩	20	5	-97.9	99.5	5	6	4	· · · · · · · ·						Gray, Silty, cse. content. Well	to f. SAND w/ graded. Med.	high shell dense.
-20	_	‡				4	· ·		· · ·	· · ·			Sat.	-18	Droum f CAND w/little we	od frags. and tr. 22	400		‡		0		• • 10• • • •	· · · ·	· · · · ·		Sat.	0000			
	-22.9	+					: :	· · · · · ·						• • • • •	odor noted. Lo	oose.		-102.9	+ 104.5					· · · · · · · ·				<u>000</u> -101.9	Gray, f. SAND. Tr	. cse. shell fra	as. w/some
-25	-	1	4	6	7	·	 3 .	· · ·		· · ·			Sat.	• • • • • • • • • • • • • • • • • • •	Brown, f. SAND. "Oyster present. Med. d		-105		E	14	21	17	· · · · · · · · · · · · · · · · · · ·	 8	· · · · ·		Sat.		interlayered silty	/clayey f. sand se to loose.	l at base.
		Ŧ					: :							<u>-26</u>	Olive brown, f. to cse. SANE	28 D w/high amounts			£									* * * * * * * * * * * * * * * * * * *			
20	-27.9	29.5	2	2	2	 ∳4	· ·	· · ·	· · ·	 	· ·		Sat.	000	of sub-angular gravel and q pebbles. Well grade	uartz grains. Tr.	110		109.5	4	4	4	••••••••••••••••••••••••••••••••••••••		· · · · · ·		Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0			
-30	_	+							<u> </u>					000 000 000 -3'	1.4	33	<u>-110</u>		ŧ									-110.9	Gray, Silty, f. SA		1 Drlavorod
	-32.9) + 34.5	3	3	3			· · · · · ·			· ·		Sat.	• • • • • -	Brown, f. SAND w/tr. cse. Loose.	sand. Uniform.		-112.9	114.5	5	5	7	$\begin{vmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{vmatrix}$	· · · · ·			Sat.		clayey, f. sand. w/depth. Tr. shel	Clav content i	ncreases
-35	_	Ŧ				•6	· ·	· · ·		· · · ·			Sal.	-3	5.4 Gravish brown, f. SAND. Ti	37	<u>-115</u>		ŧ		-		· • 12 · · ·	· · · · ·	· · · · · ·		Sal.				e to 1003e.
	-37.9	39.5			10			· · · · · · ·							top grading to no shells.			-117.9													
-40	_	+	3	8	19		· •	27					Sat.				-120		Ļ	2	3	3	•6 • • • • •				Sat.				
ы	-42.9	+ + + + 44.5					: :			· · ·	· ·			· · · · · ·				_122.0	- 124.5				: ` \. : : : : :	. .							
<u>-45</u>		+ ++.0 +	16	29	31			· · ·	• 60	· · · ·			Sat.				-125		+	3	7	8	· · • • 15 · · ·	· · · ·	· · · · · ·		Sat.				
		Ŧ					· ·			 	· ·								Ŧ					· · · · ·	· · · · ·	1					
CATLIN.GDT	-47.9	9 <u>T</u> 49.5 T	8	29	32		· ·	• • •	. í. . ∳61		· ·		Sat.						<u>129.5</u>	5	6	10	· · • • 16 · · ·		· · · · · · · · · · · · · · · · · · ·		w				
-50 CAT	-	+							1								-130		ŧ									-131 9			4
CATLIN.GPJ	-52.9) = 54.5	16	23	21		· ·	· · · ·		· · · ·	· ·		Sat.	· · · · · · · · · · · · · · · · · · ·					134.5	3	2	4		 			w	-131.9	Gray, Silty to Cl	ayey, f. SAND	. Loose.
ALLA ALLA	-	+					• •	· ·••4	+4 · · · · · · ·	· · ·			Jal.	····	5.4	58	-135		ŧ		-		•6 • • • • •	· · · ·							
	-57.9	59.5						·/· ·	· · · ·	 				<u>····⊢</u> -56	Grayish brown, Silty, f. SAN cse. sand at bottom. Unifor	ND w/tr. shell and		-137.9	139.5					· · · · ·	· · · · · · · · · · · · · · · · · · ·			-136.9	Gray, Sandy to (
GEO BRDG 09- 0		‡	8	16	16		• 9	32 ·	· · ·				Sat.		grading at bottom. Dense	to med. dense.	-140		ŧ	9	6	10	• • • 16 • • •	• • • •			W	-140.4		ell frags. V. sti	1
BGE	00.0	+					: / :	· · · · · ·	· · · ·	. .	· ·							140.0	+					. .					Gray, Silty, f. SA SAND. Tr. shell	ND grading to frags. Dense	Clayey, f. grading to
E B2500AB () 64.5	4	9	10		./ 19	· · · · · ·	· · · ·	. .			Sat.				-145		144.5 -	7	12	19	· · · · ·) 31.	· · · · ·	· · · · · ·		w			loose.	- 0
<u>а</u> ш	1	Ŧ						· · · ·	<u> </u>							68			ŧ							1		-			
TRE DOUBLE	-67.9) <u>† 69.5</u> I	9	19	23					· · · · · · · ·	· ·		Sat.		Gray, Silty, f. SAND. tr. cse frags. Dense to me	e. sand and shell d. dense.			149.5	4	3	6		· · · · ·			w				
다70 범이	-	Ŧ						· # 42 · / ·	2 · · ·								-150		Ŧ				·••9···								
OT B(-72.9	74.5	5	15	17		· ·							-				-152.9		6	7							-151.9	Gray, f. Sandy to	Clayey SILT.	Low plast.
Q -75		+	5	15	17		· 9	•32 ·			•••		Sat.	-			-155		<u>+</u>	0	1	0	· · • 15 · · ·				W	-		Stiff.	



\sim	CATLIN Engineers Scientists	PROJECT REFERENCE NO.	SHEET
215078 Corporate	220 Old Dairy Road Wilmington, NC 28405 e Licensure No. for Engineering Services C-0585	B-2500AB	14

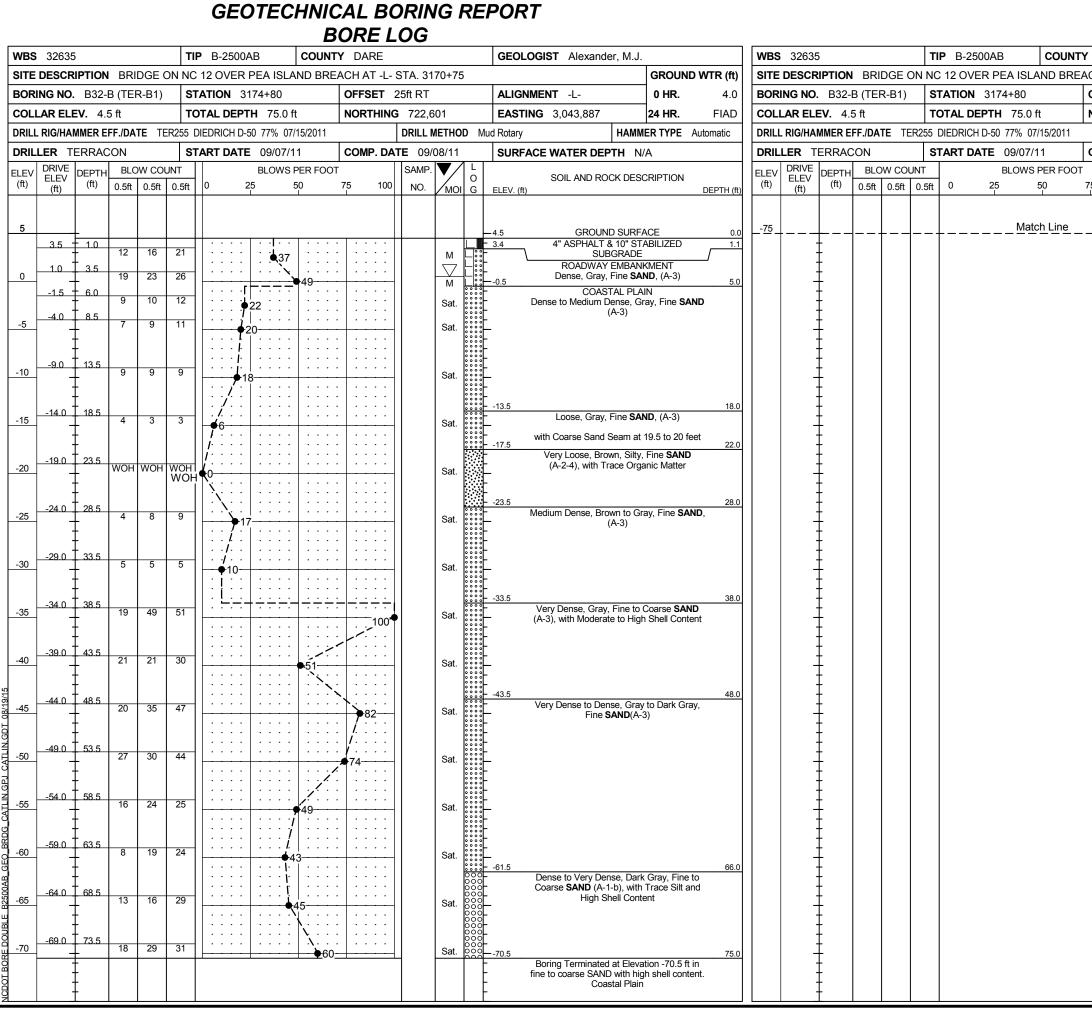


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	21507	₹ (Dairy Ro		PRO				CE NO.	SHEET
			Wilming nsure No. for Er	ton, NC 28 ngineering S	Services C-0585		В	-250	0AB		15
Y DAR	E				GEO	LOGIS	ST TR	RB			
ACH AT	-L- \$	STA. 31	70+75							GROUNE	WTR (ft)
OFFSE	T 2	23ft RT			ALIG	NMEN	NT -L-			0 HR.	N/A
NORTH	IING	722,5	76		EAS	ΓING	3,043,	,888		24 HR.	4.4
		DRILL N	IETHO	D M	ud Rotary	/			HAMM	ER TYPE	Automatic
COMP.	DA		25/12		SUR	FACE	WATE	r dep	TH N/	A	
75	100	SAMP.		L O			SOIL AI	ND ROO	CK DESC	RIPTION	
15	100	NO.	/моі	G							
Τ	.	+		0 <u>00</u> 0	-76.3						- <u> </u>
	:				-	Gray	/, Silty, f	. SAND.	Loose	to med. den	se.
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GEOTECHNICAL BORING REPORT BORE LOG

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									ND RKF	1			10+15)					ID WTR (f
			-	d)			FION 317		6	OFFSE			70		ALIGNMENT -L-			0 HR.	N/.
				TF						NORTH				.	EASTING 3,043,	888		24 HR.	4.
				IE IE			DRICH D-50			1					lud Rotary			MER TYPE	Automatic
	LER T	1				TAF	RT DATE			COMP.				1 L T	SURFACE WATER	R DEI	PTH N	I/A	
EV t)	DRIVE ELEV	DEPTH (ft)	0.5ft	0.5ft	1	- _0		BLOWS P	'ER FOO 0		100	SAMP. NO.		0		ND RC	OCK DES	SCRIPTION	
-7	(ft)	(7	0.51	0.51	0.511	\mathbb{H}^{\bullet}			I			NO.	<u>/мо</u> і	G	ELEV. (ft)				DEPTH
								N 4 - 4 - 1											
55	· <u> </u>	<u></u>			<u> </u>	╞┝╴		Match	1 Line				<u> </u>	•		inated			 ft in _16
		ŧ													- Silty, 1	f. SAN	D. Coa	stal Plain	
		Ł															SA to 5.3	3ft. o 178.5ft.	
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\sim	CATLIN Engineers and Scientists	PROJECT REFERENCE NO.	SHEET
215078 Corporat	220 Old Dairy Road Wilmington, NC 28405 te Licensure No. for Engineering Services C-0585	B-2500AB	16



		₹(CATI	LIN	Engineers and Scientists	PROJE	CT REF.	EREN	CE NO.	SHEET
	215078		Wilmingt	I Dairy Re ton, NC 2 igineering	bad		B-250	0AB		17
DAR	E				GEO	LOGIST	Alexande	r, M.J.		
CH AT	-L- S	STA. 31	70+75						GROUND	WTR (ft)
OFFSE	T 2	5ft RT			ALIG	NMENT	-L-		0 HR.	4.0
NORTH					-	FING 3,04	43,887		24 HR.	FIAD
		DRILL		DN	lud Rotary				ER TYPE	Automatic
COMP.	DAT	E 09/0 SAMP.	08/11	L	SUR	ACE WA	FER DEP	TH N/	A	
75	100	NO.	моі	0 G		SOIL	AND ROC	K DESC	RIPTION	
1				0						
					-	1) Advan	ced 3-7/8" t 28.	ricone b 5 feet	it to a depth	of
					-		73.5	5 feet.	between 28.8	
						4) Use	ed water wit	h SW10	th of 30 feet. 1 salt water	
					-	ben	tonite adde	d as dril	ling fluid.	
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BORING NO. B35-A (B-59) COLLAR ELEV. 1.6 ft	TIP B-2500AB COUN DN NC 12 OVER PEA ISLAND BR	BORE LOG										Corporate Licensure N	220 Old Dairy Road /ilmington, NC 28405 Io. for Engineering Services	B-2500A	В	18
BORING NO. B35-A (B-59) COLLAR ELEV. 1.6 ft			GEOLOGIST TRB		WBS 32	2635		TIF	P B-2500AB C	OUNTY	DARE			GEOLOGIST TRB		
COLLAR ELEV. 1.6 ft		EACH AT -L- STA. 3170+75		GROUND WTR (ft)	SITE DES	SCRIPTIC	N BRIDGE	ON NC	12 OVER PEA ISLAND	D BREAC	CH AT -L- :	STA. 3170-	+75		GROUND) WTR (ft)
	STATION 3176+55	OFFSET 16ft LT	ALIGNMENT -L-	0 HR. N/A	BORING	NO. B3	5-A (B-59)	ST	TATION 3176+55	(OFFSET ´	16ft LT		ALIGNMENT -L-	0 HR.	N/A
	TOTAL DEPTH 160.0 ft	NORTHING 722,772	EASTING 3,043,833	24 HR. N/A	COLLAR	ELEV.	.6 ft	тс	DTAL DEPTH 160.0 ft	1	NORTHING	7 22,772	1	EASTING 3,043,833	24 HR.	N/A
	R255 DIEDRICH D-50 77% 07/15/2011	DRILL METHOD	·	MER TYPE Automatic					DIEDRICH D-50 77% 07/15/2			DRILL MET		,	MER TYPE A	Automatic
DRILLER TERRACON	START DATE 01/25/12	COMP. DATE 01/26/12	SURFACE WATER DEPTH N		DRILLER				TART DATE 01/25/12		COMP. DA		12	SURFACE WATER DEPTH	N/A	
ELEV (ft) DRIVE ELEV (ft) DEPTH (ft) BLOW CO 0.5ft 0.5ft 0.5ft		75 400	SOIL AND ROCK DES	SCRIPTION DEPTH (ft)	ELEV (ft) DR EL (f	EV DEPT	H BLOW CO 0.5ft 0.5ft	_	BLOWS PER 0 25 50		75 100	SAMP. NO.	MOI G	SOIL AND ROCK DE	SCRIPTION	
5					-75			+	Match L	Line		++-	-	Gray, Silty, f. SAND w/so		<u> </u>
		· · · · · · · · · · · · · · · · · · ·	LAND SURFA			<u>6.9 78.5</u> 	7 12	17			· · · · ·			Med. dense to v. loose	. (continued)	
-1.9 3.5			Gray to tan, f. SAND. Poo	orly graded. V.	-80	1.9 ⁺ 83.5			· · · · · · · · · ·							
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			o o – o o – o o –		-85	Ŧ			 .	· · · ·	· · · · ·					
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $				-86	<u>6.9 T 88.5</u> T	1 0	0		· · · · ·						
-10					-90	‡			i				-9	90.4		92.0
-11.9 13.5 1 3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		× → • • • • • •		-9	1.9 + 93.5		3	$\left \frac{1}{1} \cdot \cdot \cdot \right \cdot \cdot \cdot \left \cdot \cdot \cdot \cdot \right $	· · · · ·	· · · · ·			Gray, Silty, f. SAND w/high Loose	SHELL conter	nt.
-15			o o ⊢ o o ⊢ o o ⊢		-95	Ī			11 [−]					95 4		97.0
-16.9 18.5	· · · · · · · · · · · · · · · · ·		○ o		-96	<u>5.9 98.5</u>		10		· · · ·				Light gray, f. SAND w/tr. sł	nell. Med. dens	se.
-20	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · · · · · · · · · · · · · · · · · ·	◦ ◦ • ◦ • ◦		-100	ŧ	4 9	10	19	 	· · · ·		0 0 0 0 -			ſ
-21.9 23.5						1.9 <u>1</u> 103.5			· · · · · · · · · ·				<u>****</u> -1	Gray, f. SAND.	Dense.	102.0
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	· · · · ·	°°⊢ °°⊢ °°⊢ -24.4	26.0		+	21 20	23	$\begin{vmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \\ \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{vmatrix} + \begin{vmatrix} \cdot \\ \cdot$	· · · · ·	· · · · · · · · · · · · · · · · · · ·		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			ſ
-25			Dark brown, Silty, f. SANE		-105	Ŧ			· · · · · · · · · · · · · · · · · · ·	· · · · ·			<u> </u>	105.9		107.5
	2 2 2 2 2 2 2 2 2 2		100se.		10	108.5 108.5 1	1 2	3		· · · ·	· · · ·			Gray, Silty, f. SAND w/tr. med. dense		:0
-30 +		· · · · ·	-30.9	32.5	-110	+				· · · ·						
-31.9 33.5 2 2	<u> </u>	· · · · · .	Gray, Silty, f. SAND w/tr. sl med. dense.	hells. Loose to	-11	<u>1.9 ⁺ 113.</u>	5 5 5	8		· · · · · · · ·	· · · · ·					ſ
-35	$\left \begin{array}{c}\bullet5\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot\\\cdot$				-115	Ŧ				· · · · ·						
-36.9 38.5						<u>6.9 118.</u>										ſ
	38	0			100	ŧ	6 8	13	21	· · · · ·	· · · · ·					
-40		· · · · · · · · · · · · · · · · · · ·			-120	+ 1.9 T 123.9							-			
თ <u> </u>	23					+ 20.	10 8	13	$ \begin{vmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \bullet & 21 \cdot & \cdot & \cdot \end{vmatrix} $	· · · · ·	· · · · · · · · · · · · · · · · · · ·					
-45 -46.9 48.5 -60 -51.9 53.5 -56.9 58.5 -56.9 58.5 -56.9 58.5 -60 -61.9 63.5 -61.9 63.5 -61			<u>.</u>		-125	Į.								125.4 Gray, Clayey, f. SAND w/tr	, shell. Loose	127.0
<u>-46.9 48.5</u> 2 16 26	<u>32</u>					6.9 <u> </u> 128.5 	2 3	5		· · · · ·	· · · · ·			med. dense	9.	I
				52.0	-130	‡			- 	· · · ·						
-51.9 53.5 -51.9 53.5 -51.9 5 -5 -6	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Dark gray, Clayey, f. SAND.	. Med. dense to	-13	1.9 <u>†</u> 133.9	5 4 5	4								
					-135	Ī			1 ¹ 1	· · · ·	· · · · ·					
56.9 58.5 10 26		· · · · · · · · · · · · · · · · · · ·			-13	6.9 138.5	5	12			· · · · ·					
	15 · · · · · · · • • • • · · · • • • • •				-140	‡	5 8		20····	· · · · ·	· · · · ·					
			-60.4 Gray, Silty, f. SAND. M	62.0 Med. dense.	-140	+ 1.9 ⁺ 143.9			· · · · · · · · · ·					Gray, Silty, f. SAND. D	ense to loose.	142.0
	14 · · · · · • • • · · · · · · · · · · ·		64.4	20.0		+ +	16 20	20	· · · · · · · • • • • • • • • • • • • •	· · · ·	· · · · · · · · · · · · · · · · · · ·					
			Tan brown, cse. SAND w/sho	ells. Med. dense	-145	Ŧ				· · · · ·						
$\begin{array}{c c} \underline{H} & \underline{-66.9 \ } 68.5 \\ \underline{H} & \underline{42} \ 27 \\ \underline{H} & \underline{42} \ 27 \end{array}$	29				14	. <u>6.9 148.</u> 	5 2 3	8	∕. . . €11.							
					-150	‡										
<u>6</u> <u>-71.9</u> 73.5 16 10	<u> </u>				-15	1.9 153.	5 30 30	26			· · · · ·					
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		00	76.0	-155	‡			F F	●56· · · · · · ·	· · · · ·					

GEOTECHNICAL BORING REPORT BORE LOG

									ORE L	UG						
	32635						B-2500AB		Y DARE				GEOLOGIST TRB			
							12 OVER PEA ISLA	ND BRE			70+75	5	1			ID WTR (f
BORI	NG NO.	B35-	A (B-5	9)	S	TA	ATION 3176+55		OFFSET	16ft LT			ALIGNMENT -L-		0 HR.	N/.
COLL	AR ELE	EV. 1.0	6 ft		Т	01	TAL DEPTH 160.0	ft	NORTHING	5 722,7	72		EASTING 3,043,833		24 HR.	N/.
DRILL	RIG/HAN	MMER E	FF./DA	TE TE	ER255	DI	EDRICH D-50 77% 07/	15/2011		DRILL I	NETHO	D M	ud Rotary	HAMM	ER TYPE	Automatic
DRILL	ER T	ERRAC	ON		S	TA	ART DATE 01/25/1	2	COMP. DA	TE 01/	26/12		SURFACE WATER DE	PTH N/	A	
ELEV (ft)	ELEV	DEPTH (ft)		W CO	1			PER FOOT	7 <u>5</u> 100	SAMP.			SOIL AND RO	OCK DESC	RIPTION	
(14)	(ft)	(11)	0.5ft	0.5ft	0.5ft		0 25 5	50	15 100	NO.	/моі	I G	ELEV. (ft)			DEPTH
155							Matc	h Line		+	<u> </u>		Gray, Silty, f. S/	ND Den	se to loose	<u> </u>
-	-156.9	158.5	13	3	5	$\left \right $							157.3 (CC	ontinued)		15
-		-	10		Ű		• <u>•</u> 8 <u>••</u>		• • • •	-			Boring Terminated	at Elevati	ion -158.4	160 ft in
	-	-											- Silty CLA	. Coasta	Plain	
	-	-											1. NW Ca	asing set to	o 90ft.	
	-	F											-			
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\sim	CATLIN Engineers Scientists	PROJECT REFERENCE NO.	SHEET
215078 Corpora	220 Old Dairy Road Wilmington, NC 28405 te Licensure No. for Engineering Services C-0585	B-2500AB	19

GEOTECHNICAL BORING REPORT BORE LOG COUNTY DARE **WBS** 32635 **TIP** B-2500AB GEOLOGIST A. Ezzell SITE DESCRIPTION BRIDGE ON NC 12 OVER PEA ISLAND BREACH AT -L- STA. 3170+75 **GROUND WTR (ft)** OFFSET 61ft RT ALIGNMENT -L-**BORING NO.** B38-B (B-21) **STATION** 3178+16 0 HR. N/A COLLAR ELEV. 2.6 ft TOTAL DEPTH 70.0 ft **NORTHING** 722,934 **EASTING** 3,043,905 24 HR. 2.0 DRILL RIG/HAMMER EFF./DATE TER255 DIEDRICH D-50 77% 07/15/2011 DRILL METHOD Mud Rotary HAMMER TYPE Automatic DRILLER TERRACON **START DATE** 10/05/11 COMP. DATE 10/05/11 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH BLOW COUNT SAMP. BLOWS PER FOOT SOIL AND ROCK DESCRIPTION 0 (ft) (ft) 0.5ft 0.5ft 0.5ft 25 50 75 100 NO. MOI G (ft) ELEV. (ft) DEPTH (ft LAND SURFACE ROADWAY EMBANKMENT . . . ▼ . . . ::-Asphalt Debris · • -0.9 3.5 Lt. brown, f. to cse. SAND. Med. dense. 16 12 15 М **♦**31· -2.4 COASTAL PLAIN Lt. gray to gray, f. to cse. SAND w/tr. shell -5 frags. at approximately 35 ft. BLS. -5.9 Loose/Med. dense. V. dense at base of 4 3 6 Sat. **♦**10+ strata. -10 -10.9 13.5 Δ 6 Sat. ·**•**13 . -15 -15.9 1 18.5 14 8 11 Sat. ¢25∙ -20 -20.9 23.5 6 8 13 Sat. -25 -25.9 1 28.5 Sat. 16 -30 -30.9 1 33.5 . 1. 8 11 6 Sat. 19 -35 -35.9 38.5 3 3 3 Sat. 6 -39.4 42. . . -40 Gray, f. SAND. Lt. gray w/cse. at top. V. -40.9 43.5 · · · · dense 22 32 9 Sat. €54 -45 -45.9 48.5 . . . 22 33 39 Sat. **●**72 -50 -50.9 53.5 22 31 30 Sat. **●**61· 57.0 -55 Gray, f. SAND. V. dense to dense. -55.9 1 58.5 | 21 33 34 Sat. . . . 67 -60 -60.9 1 63.5 20 30 18 . . . Sat. **4**8 · · · · · · 67.0 . . -64 4 . . -65 Gray, f. to cse. SAND w/high shell content. -65.9 68.5 V. dense 23 26 27 Sat. •53 -67.4 70.0 Boring Terminated at Elevation -67.4 ft in f. to cse. SAND w/high shell content. Coastal Plain 1) Boring advanced w/2 15/16" Tricone Carbide bit.

	\sim	CATLIN Engineers and Scientists	PROJECT REFERENCE NO.	SHEET
	215078 Corporate	220 Old Dairy Road Wilmington, NC 28405 Licensure No. for Engineering Services C-0585	B-2500AB	20
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							G	EC	DTE	СН		AL E ORE			G R	EPC	DRT											215	5078	220 Old Da Wilmington, censure No. for Engine	ry Road IC 28405	PROJECT REFERE		<i>неет</i> 21
WBS	32635	5				Т	IP B-	2500A	AB	C	OUNT	Y DARE				GE	OLOGIST Tom Stetler		WBS	3263	5			ТІІ	P B-2500	AB	COUNT	TY DARE			GE	OLOGIST Tom Stetler		
SITE	DESCR	RIPTI	ION	BRID	GE C	ON NO	0 12 0	VER	PEA I	SLAND	D BREA	ACH AT -	L- STA	A. 317	0+75			GROUND WTR (ft)	SITE	DESC	RIPTION	BRI	DGE (ON NC	12 OVER	PEA ISL	AND BRE	EACH AT -L	- STA. 3 ⁻	170+75			GROUND WTF	R (ft)
BOR	ING NO.	. B4	43-B ((B-60))	S	ΤΑΤΙΟ	N 31	180+6	2		OFFSET	5 0ft	RT		AL	IGNMENT -L-	0 HR. 3.5	BOR	ING NC	. B43-	B (B-60	0)	ST	TATION 3	3180+62		OFFSET	50ft RT		ALI	GNMENT -L-	0 HR.	3.5
COL	LAR ELE	EV.	4.0 f	ť		T	OTAL	DEPT	FH 16	60.2 ft		NORTHI	NG 7	23,17	9	EA	STING 3,043,895	24 HR. N/A	COL	LAR EL	EV. 4.	0 ft		тс	DTAL DEP	TH 160.	2 ft	NORTHIN	IG 723,	179	EAS	STING 3,043,895	24 HR.	N/A
DRILI	RIG/HAI	MME	R EFF.	./DATE	E CA	T1314	CME-4	5B 92%	% 11/16	/2011					-	Mud Rot	ary HAN	IMER TYPE Automatic					TE CA	AT1314 (CME-45B 92	!% 11/16/20)11		DRILL	METHOD	Mud Rota	ary HAN	IMER TYPE Automa	natic
DRIL	LER C	ATL					TART	DATE	02/2			COMP. I				SU	IRFACE WATER DEPTH	N/A	DRIL						TART DAT			COMP. D		· /	SUF	RFACE WATER DEPTH	N/A	
ELEV (ft)	DRIVE ELEV	DEP (ft		BLOW				2	BLO\ 25	WS PER 50	R FOOT			AMP.	1		SOIL AND ROCK DE		ELEV (ft)	DRIVE ELEV	DEPTH (ft)	' 			0	BLOWS	S PER FOO [®] 50	T 75 100	SAMP			SOIL AND ROCK DE	SCRIPTION	
(14)	(ft)			.511 1	J.5IL	0.511		2	1	50				NO.	MOI	G ELEV	/. (ft)	DEPTH (ft)	(14)	(ft)	(,	0.511	0.5ft	0.511	0	25			NO.	MOI (3			
5																			75							Mat	tch Line							
5	4.0	<u>+ 0.0</u>		2	1	1										4.0	LAND SURF. ROADWAY EMBA		-75	+	+	6	- 14-	-15		•29 .			++	Sat.		Gray, Silty, f. SAND w/no		
1	-	ŧ		-	'	I	₹	· · · ·	· · · ·		· · · · ·	· · · ·	:		ML		Tan, f. SAND w/tr. gravel a				‡							· · · · · ·				Med. dense. (co	unued)	
0	-0.9	‡ 4.9	9				+-	•••	• •		· · · ·	· · ·					loose.		-80	-79.7	<u>+ 83.7</u>	5	5	7		· · · ·	· · · ·	· · · · ·		Sat.				
	-	Ē		3	4	4] .\ 	8		.	· · · · ·		·		Sat.	-1.5	COASTAL P				Ŧ										-82.0	Gray, Silty, f. SAND w/tr. t	o little clav and tr	86.0
-5	-	Ŧ														-4.5	Dark brownish gray, Silty interlayered cse. sand. Lo	oss of circulation8.5	-85	-84.7	+ - 88.7							· · · · ·				shell frags. V.		
	-5.9	9.9		5	4	4		 8							Sat.		Geotextile fabric noted (Brownish gray to gray, f. S	SAND. Tr. cse. at			£	2	1		•2					Sat.				
		±					· ·			.	· · · · ·		.		0 0 0 0 0 0		top. Loose to me	d. dense.			±							· · · · · · · · · · · · · · · · · · ·		2.2	, , , ,			
-10	-9.7	+ ^{13.}		6	7	8	1	• • 15							Sat.				-90	-89.8	<u> </u>	2	2	1	↓					Sat.				
	-	ŧ						1. 1.		· · ·	 	· · · ·	•		000000000000000000000000000000000000000						ŧ				\ \			· · · · · ·		00	-92.0	Gray, Silty to Clayey, cse.		96.0
-15	-14.7	18.	3.7	6	8	10		·[·		· · ·	· · · ·	· · ·	·		Sat.				-95	-94.7	+ <u>98.7</u>	3	4	5	<u>.</u>			· · · · ·		Sat.		graded w/little shell fr	ags. Loose.	
	-	ŧ		Ĭ	Ĩ	10		.•.18	8		 	· · · ·			Sal.	-18.0		22.0			‡	Ŭ			. € .9. ∖			· · · · · ·			0-			
-20	-19.7 ⁻	+ 23	3.7					· 1 · 1		· · ·	 				0 0 0 0 0 0 0 0	-18.0	Brownish gray to grayish		-100	-99 7	+ + 103.7						· · · · · · · · · · · · · · · · · · ·	· · · · · ·			-99.0	Gray, f. SAND w/tr. silt ar	d shell frage V	103.0
-20		‡		6	10	13	1		23 .						Sat.		w/tr. silt. Med.	uense	- 100		+ '	30	39	42					11	Sat.	· · ·	Gray, f. SAND w/tr. slit ar dense.	iu sheli itays. V.	
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-25	-24.7	<u>† 28.</u> †	3.7	6	9	10		· / .•1			· · · ·	· · ·			Sat.				-105	-104.7	<u>† 108.7</u> †	4	4	4			· · · · ·	· · · · ·		Sat.		Gray, Silty to Clayey, cse. shell frags. Well gra	to f. SAND w/little ded. Loose.	
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-30	-29.7	Т 33.	3.7				::			: :	· · · · ·		:		00000				-110	-109.7	T 113.7							· · · · ·				clay. Med. de		
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-35	-34.7	+ ^{38.}	5./	5	6	6		12							Sat.				-115	-114.7	$\frac{118.7}{4}$	2	3	8	•11					w	_			
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-40	-39.7	<u>+ 43.</u>	3.7	12	17	25		••	<u>```</u>	· · ·		· · ·	·		W		Brown gray, Silty, f. SAND shell frags. D	w/tr. cse. and little	-120	-119.7	+ 123.7	4	3	12		<u> </u>	· · · ·			w				
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-45	-44.7	± 48	3.7] ::	••• •••			· · · · ·		:			-43.0	Brownish gray, Silty, f. graded. V. dense	SAND. Poorly	-125	-124.7	+ + 128.7				'i		· · · · · · · ·	· · · · · ·						
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-55	-54.7	± 58.	3.7	14	25	26		• •	· ·	•••					, , , , , , , , , , , , , , , , , , ,	-			-135	-134.7	+ 138.7	5	5	9	·	• • •								
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GEOTECHNICAL BORING REPORT BORE LOG

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215078 Corpora	220 Old Dairy Road Wilmington, NC 28405 te Licensure No. for Engineering Services C-0585	B-2500AB	22

CONTENTS SHEET NO.

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REFERENCE

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DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY DARE

PROJECT DESCRIPTION PHASE II, NC-12 SHORT-TERM IMPROVEMENTS AT PEA ISLAND

SITE DESCRIPTION WALL 1 AT -L- STA. 3153 + 50, 20.75' RT

STATE PROJECT REFERENCE NO. STATE SHEETS N.C **B-2500AB** 1 4

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATIO GEOTECHNICL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED 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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 NUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DETAILS SHOWN ON THE SUBSURFACE PLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO RE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED AND EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL COMPENSATION, OF FOR ANN EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONTINIONS FOR CONTRACTOR THALL THE SUBFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- TES: 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 REDUESTED 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.
- 2.

PERSONNEL

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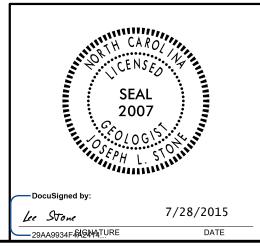
INVESTIGATED BY ____. STONE

DRAWN BY ____. TURNER

CHECKED BY ______. ARGENBRIGHT

SUBMITTED BY _____. ARGENBRIGHT

DATE **JULY 2015**



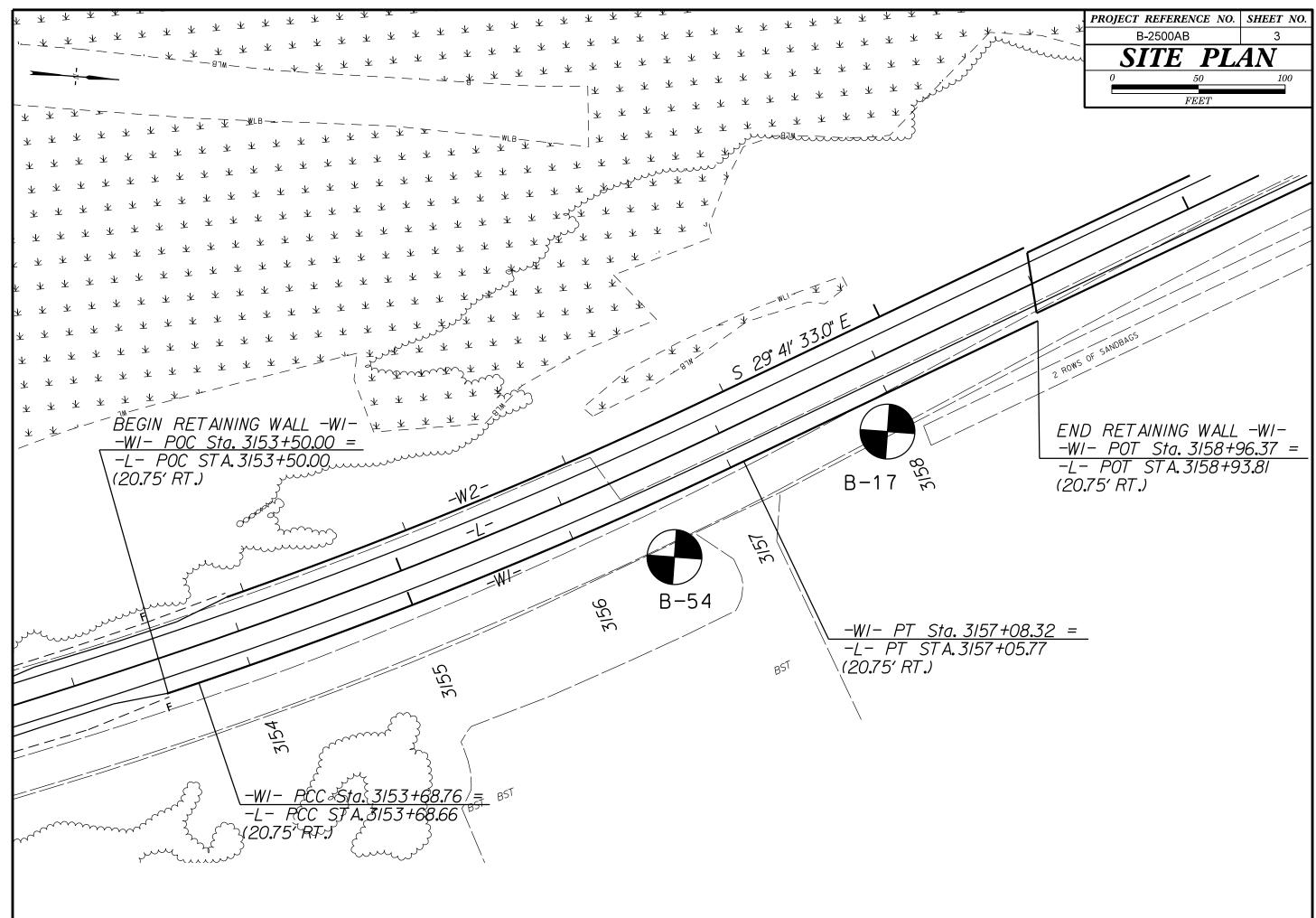
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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 DI586). SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - 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	ADUIFER - 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	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN 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,	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
VERY STIFF.GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.		CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY	BOCK (NCP)	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL SYMBOL	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. 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.
10 50 MX GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 50 ILS SOILS	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS SOILS</u> OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING #40 SOULS WITH	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.
LL – – – 40/ MX 41 MN 40/ MX 41 MN 40/ MX 41 MN 40/ MX 41 MN 41/ MX 41 MN PT 6 MX NP 10/ MX 10/ MX 11/ MN 11/ MN 10/ MX 11/ MN 11/ MN 11/ MN 11/ MN	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.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
		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
UCIAL TYPES STONE EDACS	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND FINE SILLIY UK LLAYEY SILLIY LLAYEY MALLER	✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND		MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITAB		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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	- O-M- Spring or seep	WITH FRESH ROCK.	FORMATION (FM,) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED		(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 CONFIGURESS ON PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) 25/825 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
VERY LOOSE 4		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.
GRANILAR LOOSE 4 TO 10	SOIL SYMBOL SILDE INDICATOR	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 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT THAN ROADWAY EMBANKMENT THAN ROADWAY EMBANKMENT THE AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NDN-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
VERY SOFT < 2 < 0.25	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 < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ 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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTTT ALLUVIAL SOIL BOUNDARY A PIECOMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		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	EXCAVATION I UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER 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 TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (CDR.) (GR.) SAND SAND (SL.) (CL.)		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
	ABBRE VIATIONS 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.	OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF) OF
GRAIN MM 305 75 2.0 0.25 0.05 0.005 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
SOIL MOISTURE - CORRELATION OF TERMS	- CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_{d} - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. 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
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	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 SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULIU; REQUIRES DRYING TO	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:
	HI HIGHLY Y - VERY RATIO	TERM SPACING TERM THICKNESS	
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: FEET
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
	X CME-45B CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO I FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY		INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST	GENILE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		CRAINS ARE DISCIPLET TO SERARATE WITH STEEL PRODE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
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.	VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.

B-2500AB

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						END RETAINING WALL -WI -WI- POT Sta. 3158+96.37 -L- POT STA.3158+93.81 (2075' RT.)	-	PRELIMINA DO NOT USE FO	CONSTRUCTION
BEGIN RETAINING WALL -WI-	·		B-54			(20.75' RT,)			
<u>-WI- POC Sta. 3153+50.00 =</u> -I - POC STA. 3153+50.00			3156+49	3157+ 20' F					
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	·	LOOSE TO MEDIUM DENSE W	1TH SOME V	VERY LOOSE	FINE TO COARSE SAND	; 			
		WITH VARYING SILT. CLA	NY. AND SH	IELL CONTENT 9-	SOME ZONES WITH				
	·	TRACE TO HIGH	DRGAN	IC_CONTENT	COASTAL PLAIN	i i i I I I	i i i I I I 		; ;
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	BEGIN RETAINING WALL -WI- -WI- POC SIG 3153+5000 = 		LLOSE TO HEDILAN DENSE W WITH VARYING SILT- CLA URAGE TO HIGH TRACE TO HIGH DENSE TO VE COARSE TO FI COARSE TO FIL SAND GARSING CATERALLY MEDILAN DENSE COARSE TO FIL SAND SOME LLOSE TO HEDILAN DENSE COARSE TO FIL AND SOME LLOSE TO HEDILAN DENSE COARSE TO HEDILAN DENSE TO HEDILAN DENSE COARSE TO HEDILAN DENSE TO HEDILAN DENSE COARSE TO HEDILAN DENSE TO HEDILAN DENS		LODE TO MEDIAN DENE MIN SOME VEN LODE: TO MEDIAN DENE TO MEDIAN TO MEDIAN TO MEDIAN TO				

CONTENTS SHEET NO.

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REFERENCE

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DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _DARE

PROJECT DESCRIPTION PHASE II, NC-12 SHORT-TERM IMPROVEMENTS AT PEA ISLAND

SITE DESCRIPTION WALL 2 AT -L- STA. 3159+06.19, 20.75'LT

STATE PROJECT REFERENCE NO. STATE N.C **B-2500AB**

SHEETS NO.

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

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARRES 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 (IN-PLACE)TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLI MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLI MOISTURE CONDITIONS MAY YARY 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

- 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.

PERSONNEL

CATLIN

INVESTIGATED BY _ J.L. STONE

DRAWN BY __C.P. TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY ______.

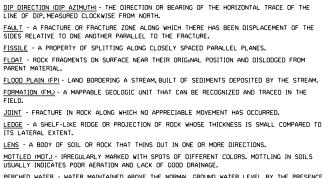
DATE ______ 2015



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

			SOIL	DESCRIPT	ION					GRADATION						ROCK DES	SCRIPTION		
BE PENE ACCORD IS CONSIST	TRATED WITH NNG TO THE BASED ON TH ENCY, COLOR,	H A CON STANDA HE AASH TEXTUR	TINUOUS FLIGHT RD PENETRATION ITO SYSTEM. BASI E. MOISTURE, AAS	POWER AUGER A TEST (AASHTO IC DESCRIPTIONS HTO CLASSIFICA	ND YIELD LES T 206, ASTM (GENERALLY TION, AND OTH	EARTH MATERIALS S THAN 100 BLOWS D1586), SOIL CLASSI INCLUDE THE FOLLO ER PERTINENT FACT IY, ETC. FOR EXAMPL	PER FOOT FICATION VING: ORS SUCH	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS						HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRE ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. 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 REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:					
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: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.							SILSIC		N MATERIAL THAT WOULD YIE	LD SPT N VALUES >			
SOIL LEGEND AND AASHTO CLASSIFICATION						<u></u>		LOGICAL COMPOS	ITION		ROCK (WR)		12.12	100 BLOWS PER FO					
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200)						MES SUCH AS Q	DUARTZ, FELDSPAR, MICA, S WHEN THEY ARE CONSI	TALC, KAOLIN		CRYSTALLINE ROCK (CR)	Ξ			RAIN IGNEOUS AND METAMORF REFUSAL IF TESTED. ROCK T HIST.ETC.					
GROUP CLASS.	A-1 A-1-a A-1-b	A-3 A	A-2 -2-4 A-2-5 A-2-6		A-6 A-7 A-7-5. A-7 <u>-</u> 6	A-1, A-2 A-4, A- A-3 A-6, A-			C	OMPRESSIBILITY			NON-CRYSTAL	LLINE			RAIN METAMORPHIC AND NON- THAT WOULD YEILD SPT RE		
SYMBOL				S					HTLY COMPRESS		LL < 31 LL = 31		ROCK (NCR)			ROCK TYPE INCLUD	ES PHYLLITE, SLATE, SANDSTO DIMENTS CEMENTED INTO ROO	DNE,ETC.	
% PASSING	0000000000								LY COMPRESSIBI		LL > 50		SEDIMENTARY				K TYPE INCLUDES LIMESTONE		
	50 MX 30 MX 50 MX	E1 MA				GRANULAR SILT- SOILS CLAY	MUCK, PEAT			NTAGE OF MATE	RIAL		(CP)				ERING		
	15 MX 25 MX	10 MX 3	5 MX 35 MX 35 MX	35 MX 36 MN 36 M	N 36 MN 36 MN	SOILS	1 LAI	ORGANIC MATERIAL		LS <u>SOILS</u>		ER MATERIAL	FRESH	ROCK	RESH, CRYST	ALS BRIGHT, FEW JOINT	S MAY SHOW SLIGHT STAINING	. ROCK RINGS UNDER	
MATERIAL								TRACE OF ORGANIC M LITTLE ORGANIC MAT			TRACE	1 - 10% 10 - 20%			R IF CRYSTA				
PASSING #40 LL	-		9 MX 41 MN 40 MX			SOILS WITH LITTLE OR		MODERATELY ORGANIC	5-1	10% 12 - 20%	SOME	20 - 35%	VERY SLIGHT (V SLI.)				SOME JOINTS MAY SHOW THIN SHINE BRIGHTLY. ROCK RINGS L		
PI	6 MX		9 MX 10 MX 11 MN			MODERATE	HIGHL Y ORGANIC	HIGHLY ORGANIC	> 10	0% > 20% GROUND WATER	HIGHLY	35% AND ABOVE	-		CRYSTALLINE				
GROUP INDEX	0	0	0 4 M	1X 8 MX 12 M	X 16 MX NO MX	AMOUNTS OF ORGANIC	SOILS					5. 001 · Min	SLIGHT (SLI.)				AND DISCOLORATION EXTENDS		
USUAL TYPES OF MAJOR	STONE FRAGS. GRAVEL, AND	F INE SAND	SILTY OR CLAYEN GRAVEL AND SAND		CLAYEY SOILS	MATTER				L IN BORE HOLE IMMED		R DRILLING					YSTALLINE ROCKS RING UNDER		
MATERIALS	SAND	SHNU	UNHVEL HNU SHNL	J SUILS	5011.5		_			ER LEVEL AFTER 24			MODERATE (MOD.)				COLORATION AND WEATHERING		
GEN. RATING AS SUBGRADE		EXCELLE	IT TO GOOD	FAIR	to poor	FAIR TO POOR	UNSUITABLE			TER, SATURATED ZONE, C	R WATER BE	ARING SIRATA		DULL	SOUND UNDER		HOWS SIGNIFICANT LOSS OF ST		
	ſ	PIOF A-7	-5 SUBGROUP IS ≤	LL - 30 ; PI OF A-	7-6 SUBGROUP IS	5 > LL - 30			SPRING OR S	SEEP			MODERATELY		RESH ROCK.		STAINED. IN GRANITOID ROCK		
			CONSISTE	NCY OR DE	NSENESS				MISCE	ELLANEOUS SYMB	OLS		SEVERE	AND D	SCOLORED A	ND A MAJORITY SHOW K	AOLINIZATION. ROCK SHOWS SE	VERE LOSS OF STRENGTH	
PRIMARY	SOIL TYPE		MPACTNESS OR		F STANDARD IN RESISTENCE	RANGE OF U			ANKMENT (RE)	25/025 DIP & DIP DI	RECTION		(MOD. SEV.)			ATED WITH A GEOLOGIS YIELD SPT REFUSAL	T'S PICK. ROCK GIVES 'CLUNK'	SOUND WHEN STRUCK.	
GENERA			VERY LOOSE	(N-	VALUE)	(TONS/	FT ²)					SLOPE INDICATOR	SEVERE (SEV.)	REDUCI	ED IN STREN	GTH TO STRONG SOIL. I	R STAINED. ROCK FABRIC CLEAR N GRANITOID ROCKS ALL FELD IRONG ROCK USUALLY REMAIN.		
GRANUL	AR	- M	LOOSE EDIUM DENSE		TO 10 TO 30	N//	•	l a ^t	ILL (AF) OTHER	- 131 / Mi	0	CONE PENETROMETER				YIELD SPT N VALUES >			
MATERI (NON-CO	AL DHESIVE)		DENSE VERY DENSE		TO 50 50				Y EMBANKMENT		, () TEST	VERY				STAINED. ROCK FABRIC ELEMA OIL STATUS.WITH ONLY FRAGM		
			VERY SOFT		< 2	< 0	25	- INFERRED SO	IL BOUNDARY	- CORE BORING	•	SOUNDING ROD	SEVERE (V SEV.)	REMAIN	ING. SAPROL	ITE IS AN EXAMPLE OF	ROCK WEATHERED TO A DEGRE	E THAT ONLY MINOR	
GENERA SILT-CI			SOFT IEDIUM STIFF	2	TO 4 TO 8	0.25 TO 0.5 TO	0.5			MW MONITORING V		TEST BORING	COMPLETE				NN. <u>IF TESTED, WOULD YIELD S</u> I DISCERNIBLE, OR DISCERNIBLE		
MATERI (COHESI	AL		STIFF VERY STIFF	8 15	TO 15 TO 30	1 TO 2 TO	2 4	TTTTT ALLUVIAL SO			Ý	← WITH CORE)— SPT N-VALUE	COMPLETE	SCATT			BE PRESENT AS DIKES OR ST		
				E OR GRAI	30 N CI7E	> 4			PECOM	MENDATION SYM			-			ROCK HA	ARDNESS		
										FIED EXCAVATION -		ASSIFIED EXCAVATION -	VERY HARD				RP PICK. BREAKING OF HAND SP	PECIMENS REQUIRES	
U.S. STD. SI OPENING (M				10 40 .00 0.42	60 200 0.25 0.07			UNDERCUT EXCAVATION	🖾 UNSUITAB	BLE WASTE	ACCE	PTABLE, BUT NOT TO BE	HARD			WS OF THE GEOLOGIST	S PILK. LY WITH DIFFICULTY. HARD HA	MMER BLOWS REQUIRED	
BOULDE	R COF	BBLE	GRAVEL	COARSE	FINE		CLAY	SHALLOW UNDERCUT		IFIED EXCAVATION - BLE DEGRADABLE ROCK		NKMENT OR BACKFILL			TACH HAND S				
(BLDR.		COB.)	(GR.)	SAND (CSE. SD.)	SAN (F SI		(CL.)			ABBREVIATIONS			MODERATELY HARD				DUGES OR GROOVES TO 0.25 IN ST'S PICK. HAND SPECIMENS CA		
GRAIN MM	1 305	7	5 2	2.0	0.25	0.05 0.0	95	AR - AUGER REFUSAL	١	MED MEDIUM		- VANE SHEAR TEST			DERATE BLOW				
SIZE IN	. 12	:	3					BT - BORING TERMINATE CL CLAY		MICA MICACEOUS MOD MODERATELY		WEATHERED UNIT WEIGHT	MEDIUM HARD				DEEP BY FIRM PRESSURE OF EICES 1 INCH MAXIMUM SIZE B		
			MOISTURE		TION OF	TERMS		CPT - CONE PENETRATIO	N TEST N	NP - NON PLASTIC	γ_{d} -	DRY UNIT WEIGHT	hand		OF A GEOLO		EIGES I INCH HEATHON SIZE B	THEN DECKS OF THE	
	MOISTURE : TERBERG LIN			MOISTURE CRIPTION	GUIDE FOR	FIELD MOISTURE D	ESCRIPTION	CSE COARSE DMT - DILATOMETER TES		ORG ORGANIC PMT - PRESSUREMETER '	EST <u>S</u>	AMPLE ABBREVIATIONS	SOFT				NIFE OR PICK. CAN BE EXCAVE BY MODERATE BLOWS OF A PI		
			- 541	URATED -		IQUID; VERY WET, US		DPT - DYNAMIC PENETRA e - VOID RATIO		SAP SAPROLITIC SD SAND, SANDY		BULK				DKEN BY FINGER PRESS			
				AT.)		W THE GROUND WA		F - FINE	9	SL SILT, SILTY		- SPLIT SPOON - SHELBY TUBE	VERY SOFT				AVATED READILY WITH POINT O Y FINGER PRESSURE. CAN BE S		
PLASTIC		LIMIT						 FOSS FOSSILIFEROUS FRAC FRACTURED, FRAC 		SLI SLIGHTLY TCR - TRICONE REFUSAL		- ROCK - RECOMPACTED TRIAXIAL		FINGEF	NAIL.				
RANGE <				- (W)		REQUIRES DRYING IMUM MOISTURE	10	FRAGS FRAGMENTS	1	w - MOISTURE CONTENT	CBR	- CALIFORNIA BEARING		FRAC	FURE SP	ACING	BEDD		
" " PL L	PLASTI	C LIMII	·					HI HIGHLY		V - VERY JSED ON SUBJEC		RATIO	TERM VERY WID	IF	MOR	SPACING E THAN 10 FEET	TERM VERY THICKLY BEDDED	THICKNESS 4 FEET	
ОМ			IURE	ST - (M)	SOLID;AT C	OR NEAR OPTIMUM	IOISTURE	DRILL UNITS:			HAMMER		WIDE MODERATE		:	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	
SL		AGE LIM	4IT					Х СМЕ-45В	CLAY B	BITS	X AL	JTOMATIC MANUAL	CLOSE		Ø	1 TO 3 FEET .16 TO 1 FOOT	THINLY BEDDED VERY THINLY BEDDED	0.16 - 1.5 FEET 0.03 - 0.16 FEET	
			- DRY	- (D)		DDITIONAL WATER	10		6" CONT	INUOUS FLIGHT AUGER	CORE S		VERY CLO	DSE	LESS	THAN 0.16 FEET	THICKLY LAMINATED THINLY LAMINATED	0.008 - 0.03 FEET < 0.008 FEET	
	1		Р	LASTICITY				CME-55	8. HOLL	OW AUGERS	-в	н				INDUR	ATION		
				STICITY INDEX		DRY STRE	NGTH	СМЕ-550	HARD F	ACED FINGER BITS	□- □		FOR SEDIMEN	NTARY R	OCKS, INDUR		ING OF MATERIAL BY CEMENT		
	N PLASTIC			Ø-5		VERY L)W	VANE SHEAR TEST	TUNG(CARBIDE INSERTS			FRIAB	LE			FINGER FREES NUMEROUS GRA BY HAMMER DISINTEGRATES S		
MOL	GHTLY PLAS DERATELY PL	LASTIC		6-15 16-25		SLIGH MEDIU			X CASING	W/ ADVANCER		OOLS: DST HOLE DIGGER					SEPARATED FROM SAMPLE V		
HIG	HLY PLASTI	C		26 OR MORE		HIGH		PORTABLE HOIST		E <u>2 ¹⁵/16</u> •STEEL TEETH		AND AUGER	MODEF	RATELY	INDURATED		WHEN HIT WITH HAMMER.		
I				COLOR				4 🗖		E TUNGCARB.		DUNDING ROD	INDUR	ATED			FFICULT TO SEPARATE WITH BREAK WITH HAMMER.	STEEL PROBE;	
						, YELLOW-BROWN, BL			CORE B	BIT	V4	ANE SHEAR TEST					BREAK WITH HAMMER. BLOWS REQUIRED TO BREAK	SAMPI F.	
M	DDIFIERS SU	JCH AS	LIGHT, DARK, ST	REAKED, ETC. AR	E USED TO C	DESCRIBE APPEARAN	CE.						EXTRE	EMELY I	NDURATED		S ACROSS GRAINS.	SHOFLE:	

PROJECT REFERENCE NO. **B-2500AB**



TERMS AND DEFINITIONS

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, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM

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. $\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

ADUIFER - A WATER BEARING FORMATION OR STRATA.

SURFACE.

OF SLOPE.

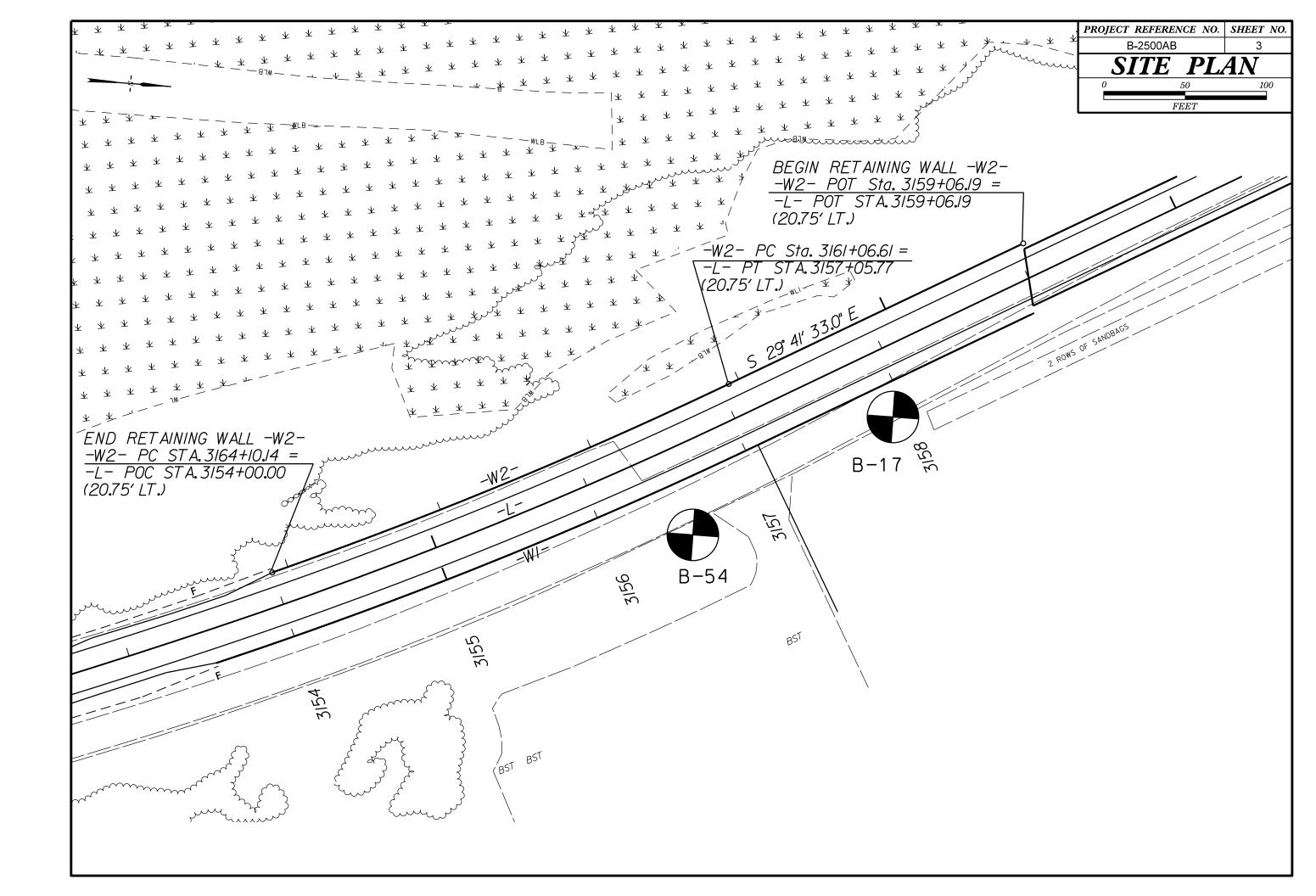
HORIZONTAL .

ELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. VIDENT BUT ARE KAOLINIZED

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. RE DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE STRONG ROCK T ONLY MINOR VALUES < 100 BPF OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK OUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS EQUAL TO OR CREATER 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 S REQUIRES 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 LOWS REQUIRED 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. EEP CAN BE ETACHED STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL R PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. $\underline{STRATA CORE RECOVERY (SREC.)}$ - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS IT. SMALL. THIN 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 AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: THICKNESS 4 FEET ELEVATION: .5 - 4 FEET 16 - 1.5 FEET NOTES: 3 - Ø.16 FEET 08 - 0.03 FEET 0.008 FEET AT, PRESSURE, ETC. TEEL PROBE:

DATE: 8-15-14

FEET



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			WALL –W2	. 2		ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
30			-W2	<u></u>		INCOMPI DO NOT USE F	LETE PLANS
	END RETAINING WALL -W2- - <u>W2- PC STA.3164+1014 =</u> -L- POC STA.3154+00.00	B-17	B-54				NARY PLAN E FOR CONSTRUCTION
20	-L- POC STA, 3154+00,00 (2075' LT.)	3160+24	3161+65				
		62' LT	75' LT		BEGIN RET AINING WALL -W2- -W2- POT Sta, 3159+06J9 = -L- POT STA, 3159+06J9 (20.75' LT.J	_	
10					-L- POT. STA.3/59+06J9 (20.75' LT.J		
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	DENSI	TO VERY		SOME SILT/CLAY			
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	SAND GRADING LA		·	SANDY SILTS AND CLAYS			
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CONTENTS SHEET NO.

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REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY DARE

PROJECT DESCRIPTION PHASE II, NC-12 SHORT-TERM IMPROVEMENTS AT PEA ISLAND

SITE DESCRIPTION WALL 3 AT -L- STA. 3186+50, 20.75'LT

STATE PROJECT REFERENCE NO. STATE SHEETS N.C **B-2500AB** 1 4

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATIO GEOTECHNICL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED 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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 NUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DETAILS SHOWN ON THE SUBSURFACE PLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO RE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED AND EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL COMPENSATION, OF FOR ANN EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONTINIONS FOR CONTRACTOR THALL THE SUBFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- TES: 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 REDUESTED 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.
- 2.

PERSONNEL

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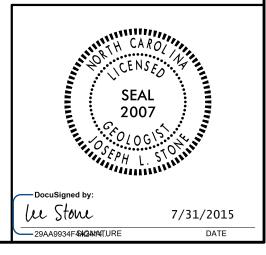
INVESTIGATED BY ____. STONE

DRAWN BY ____. TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY _____. ARGENBRIGHT

DATE **JULY 2015**



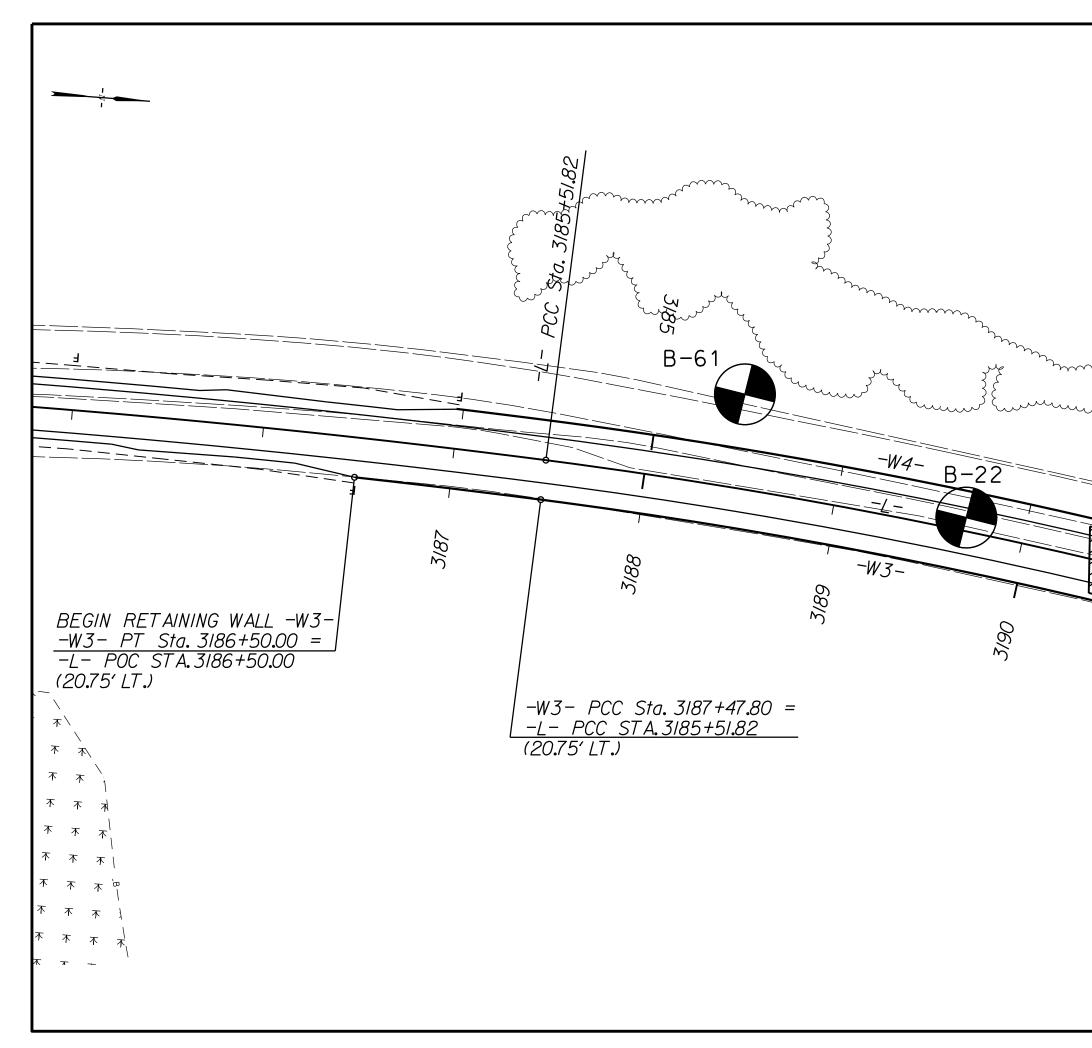
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

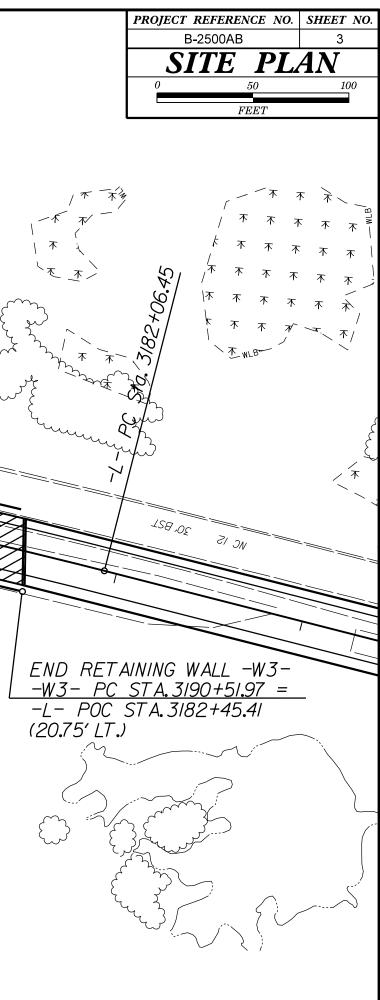
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOLL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DISB6). SOLL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MONISTURE, AASHTO L CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TEST ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø. BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK.
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:
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SP1 ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200) (> 35%, PASSING *200) ()	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS OUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE
CROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, ETC.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7		POCK (MCD)
SYMBOL SOCIETY STATES	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN
2 PASSING *10 50 MX GRANULAR SILT-	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SHELL BEDS, ETC.
*40 30 MX 50 MX 51 MN SOILS CLAY PEAT	GRANULAR SILT - CLAY	WEATHERING
• 2000 15 MX 25 MX 35 MX 35 MX 36 MN 36 MN <th< td=""><td>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%</td><td>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLI) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER H</td></th<>	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C (V SLI) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER H
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE OPENIO	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX Is MX ND MAUUNTS OF OFGANIC USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY OF MAJOR ORGANIC SOILS SOILS <td>✓ water level in Bore Hole immediately after Drilling ✓ static water level after 24 Hours</td> <td>SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO (SLI.) I INCH. DPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEF</td>	✓ water level in Bore Hole immediately after Drilling ✓ static water level after 24 Hours	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO (SLI.) I INCH. DPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONA CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEF
MATERIALS SAND SHID CHARLENNES SHID SOLES SOLES	∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECT (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	EI O_IIIV⊷ SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK.
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 F
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPACTNESS OR CONSISTENCY (N-VALUE) COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SI STALLATION	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS 4
GRANULAR LUUSE 4 IU IU MEDIUM DENSE 10 TO 30 N/O		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
MATERIAL (NON-COHESIVE) DENSE VERY DENSE 30 TO 50 > 50 10 TO 50 VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING COME PENETROMETER THAN ROADWAY EMBANKMENT	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS O (V SEV.) REMAINING, SAPPOLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DECREE THAT
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 320 2 TO 4		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N N</u> COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCENNIBLE, OR DISCENNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS ALSO AN EXAMPLE.
HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A INSTALLATION - SPT N-VALUE	ROCK HARDNESS
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN
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 - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B
	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.
BOOLDER COBBLE OWNTEL SAND SAND SLIT CLIT (BLDR.) (COB.) (GR.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.) GRAIN MM 305 75 2.0 0.25 0.05 0.005	ABBRE VIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DI HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE D BY MODERATE BLOWS.
SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	BT - BORING TERMINATED MICA, - MICACEOUS WEA, - WEATHERED CL CLAY MOD MODERATELY - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC - DRY UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE O HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD POINT OF A GEOLOGIST'S PICK.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC CONTROLLATIONS DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
- 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 FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH
PLASTIC SEMISOLID: REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL. FRACTURE SPACING BEDDING
	HAGS HAGMENIS // - MUISIDRE CUNIENI CBR - CALIFURNIA BEARING HI HIGHLY V - VERY RATIO	TERM SPACING TERM
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEODED WIDE 3 TO 10 FEET THICKLY BEODED 1 MODERATELY CLOSE 1 TO 3 FEET THINLY BEODED 0.
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	X CME-45B CLAY BITS X AUTOMATIC MANUAL CME-55 6* CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDE 0.0 VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY	□	INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	Image for the second	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR	TRICONE TUNGCARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.
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 VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS.

PROJECT REFERENCE NO.

B-2500AB

TERMS AND DEFINITIONS ED. AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. IS OFTEN AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. $\frac{\text{Argillaceous}}{\text{A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.}$ N VALUES > 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 CK THAT SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. AL PLAIN IF TESTED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. MAY NOT YIELD 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. STONE, CEMENTED DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT BOCKS OR CUTS MASSIVE ROCK. RINGS UNDER $\underline{\text{DIP}}$ - The angle at which a stratum or any planar feature is inclined from the horizontal. OATINGS IF OPEN. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE ICK UP TO SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR BLOWS. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. . IN Y. ROCK HAS AS COMPARED 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 FIELD. FELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. 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. VIDENT BUT 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. RE DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. ONLY MINOR ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND 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 S. SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. S REQUIRES <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 LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT EEP CAN BE OR SLIP PLANE. ETACHED STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL OR PICK POINT. WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS IT. SMALL, THIN 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 AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: THICKNESS 4 FEET 1.5 - 4 FEET ELEVATION: FEET 16 - 1.5 FEET NOTES: 13 - 0.16 FEET 18 - 0.03 FEET 0.008 FEET AT. PRESSURE, ETC. TEEL PROBE: PROBE: DATE: 8-15-14





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-10		LOOSE DENSE F	INE		TO COARSE SAND WITH VA	RYING VERY SOFT SILT.		
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ALCOSE TO MEDIUM DENSE WIT SILTY TO CLAYEY, FINE TO ZONES OF COARSE SAND WITH	H SONE VERY LOOSE COARSE SAND WITH	WITH	ZONES OF COARSE	SAND WITH SHELLS				
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CONTENTS SHEET NO.

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REFERENCE

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DESCRIPTION TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY DARE

PROJECT DESCRIPTION PHASE II, NC-12 SHORT-TERM IMPROVEMENTS AT PEA ISLAND

SITE DESCRIPTION WALL 4 AT -L- STA. 3182 + 54.52, 20.75'RT

STATE PROJECT REFERENCE NO. STATE SHEETS N.C **B-2500AB** 1 4

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATIO GEOTECHNICL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED 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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 NUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DETAILS SHOWN ON THE SUBSURFACE PLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO RE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED AND EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACTUAL COMPENSATION, OF FOR ANN EXTENSION OF TIME FOR ANY REASON RESULTING FOR THE ACTUAL CONTINIONS FOR CONTRACTOR THALL THE SUBFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- TES: 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 REDUESTED 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.
- 2.

PERSONNEL

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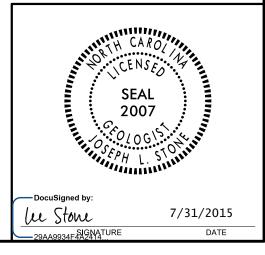
INVESTIGATED BY ____. STONE

DRAWN BY ____. TURNER

CHECKED BY ______. D.N. ARGENBRIGHT

SUBMITTED BY _____. ARGENBRIGHT

DATE **JULY 2015**



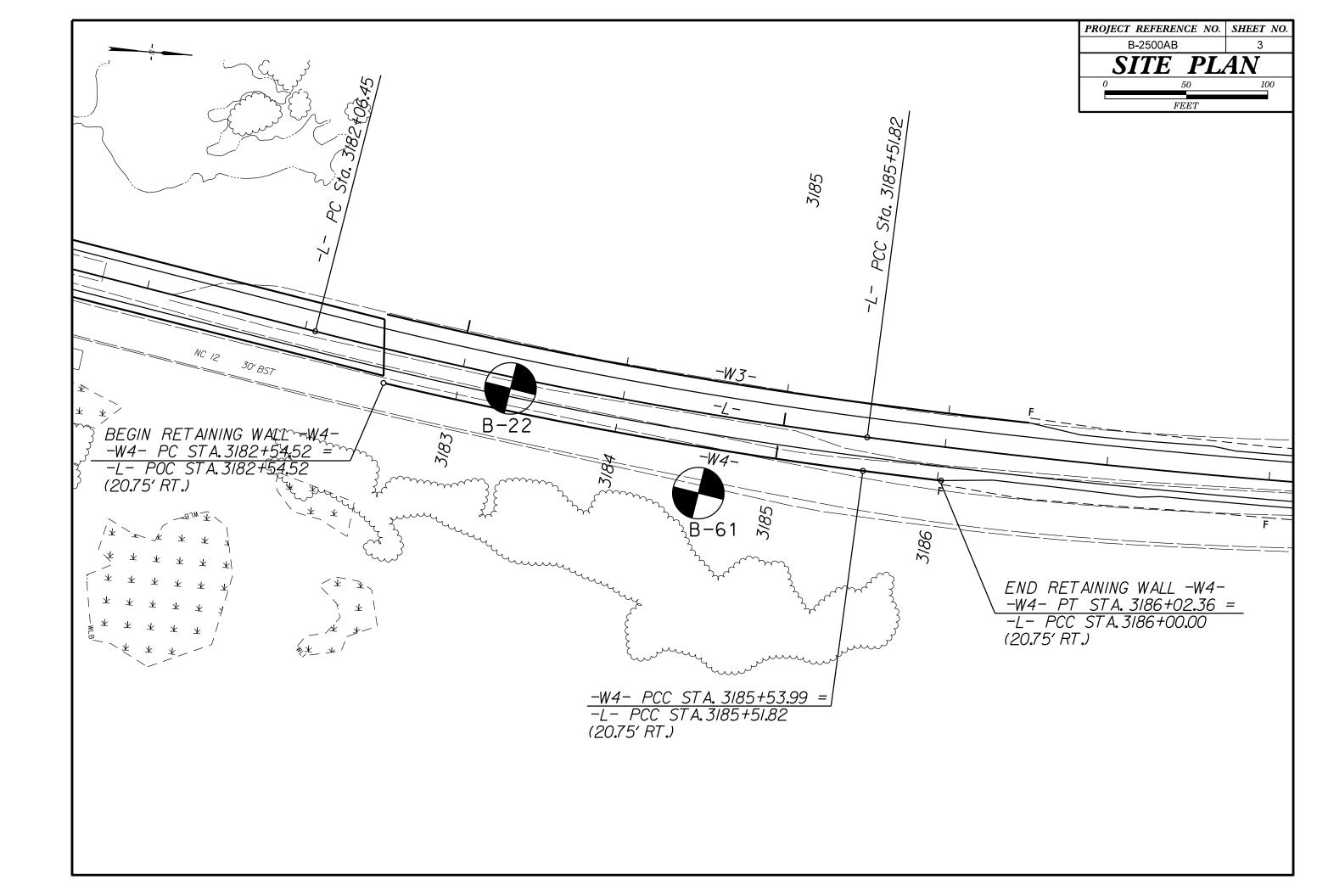
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

	SOIL DESCRIPTION	GRADATION		TERMS AND DEFINITIONS
	BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EOUAL TO OR LESS THAN 0.1 FOOT PER 60	
				ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,		ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	
			WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	
		MINERALOGICAL COMPOSITION		
		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	
	GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	EINE TO COAPE CRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
	CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7		BOOK (MCD) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	
	SYMBOL SYMBOL		RUCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	1
	2 PASSING		SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	
	*10 50 MX GRANULAR CLAY MUCK,			DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
		GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL		
	MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%		
	PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE UN HIGHLY	HIGHLY ORGANIC > 10% > 20%. HIGHLY 35% AND ABOVE		
		GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	
	USUAL TYPES STONE FRAGS. FINE STITY OR CLAYEY STITY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING		
	UF MAJUR GRAVEL, AND SAND CRAVEL AND SAND SOLIS SOLIS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS		
		✓ PW_ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD,) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	
				FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
Image: International problem in the United by a prob			MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	
Important Control in the last in the l		MISCELLANEOUS SYMBOLS		
Landand weight for the first for the fi	PRIMARY COLI TYPE UMPAUTNESS UR DENETRATION DESISTENCE COMPRESSIVE STRENGTH			
Computer with the target of the target of the target of target	CUNSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION - OF ROCK STRUCTURES		
Mark Mark <th< td=""><td></td><td></td><td></td><td>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</td></th<>				LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
Inter-out-out-out-out-out-out-out-out-out-out	MATERIAL MEDIUM DENSE 10 TO 30 N/A			
Norm Open and the party C - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	(NON-COHESIVE) DENSE 30 10 50			
COUNTY The Time 100 /				
NUMBER NUMBR NUMBR NUMBR <td>GENERALLY SOFT 2 TO 4 0.25 TO 0.5</td> <td></td> <td></td> <td>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</td>	GENERALLY SOFT 2 TO 4 0.25 TO 0.5			RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
LICE Delive Verset # 100 To 3 3 To 4 Verset # LUDBORD A case a lower A case a lowe				
Image: Decision of the constraint of the co	(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER - SPT N-VALUE		
Constant of the constant			ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
Display or prime Const. <				
Build Other Description Descr		EXCAVATION Z UNSUITABLE WASTE		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
Image: Indian Image: I		SHALLUW UNLLASSIFIED EXLAVATION - EMPANYMENT OF PACKETU		
Deal PM 20 2.8 0.80 0.400 PET - MEDIAN VET -	BUDEDER CUBBLE GRAVEL SAND SAND SILT CLAY			SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
Constraint Constra				
SOIL OBJECT COUNT RECENTION OF TERMS C/- UNIT VEGAT PMOL				
Start Construction Set of the second processing of the second procesing of the second processing of the second p		CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	
watteneepe Linits Description Duble, bit FlatD witche Deschiption Diff - Durande Setting FlatD witche Deschiption Switche Bank of a PIDE Roll of Bank of Bank of a PIDE Roll of Bank of Bank of a PIDE Roll of Bank of a PIDE Roll of Bank of Bank of a PIDE Roll of Bank o		CSE COARSE ORG ORGANIC		
L - Salinate - UsualLY LUDD, VET, VSUALLY Salinate - UsualLY LUDD, VET, VSUALLY Salinate - UsualLY Salinate - Salinat			FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
Lindid Linit Gal J FROM BELOW THE GROUP WATER TABLE F - File St Sile, St. JUTY St. JUTY St Sile, St. JUTY <td></td> <td></td> <td></td> <td>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</td>				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
PLASTIC LIMIT - VET - (W) SEMIDUCURE DURING				THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
MILE VELL <wi< th=""> ATTAIN OPTIMUM MOISTURE FRAGMENTS Iff - HIGHLY CORE CALLFORMA BEARING V EVY FRACTORE SPACING TO B - CALLFORMA BEARING VERY FRACTORE SPACING TO B - CALLFORMA BEARING VERY FRACTORE SPACING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING VERY FRACTORE SPACING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING VERY FRACTORE SPACING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING THAL FEAL FOR SECTIONS HENCING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING THAL FEAL FOR SECTIONS HENCING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING THAL FEAL FOR SECTIONS HENCING TO B - CALLFORMA BEARING TO B - CALLFORMA BEARING THAL FEAL FOR SECTIONS HENCING TO B - CALLFORMA BEARING THAL FEAL FOR SECTIO</wi<>	PLASTIC SEMISOLID. PEOLIDES DRYING TO			TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
OM OPTIMUM MOISTURE - MOIST - 69 SOL Dig AT OR NEAR OPTIMUM MOISTURE EOUIPMENT USED ON SUBJECT PROJECT VERY MUDE MORE THAN 10 FEET VERY MUDE 4 FEET SHR INKAGE LIMIT - DRY - (D) RECUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE OPTIMUM MOISTURE EOUIPMENT USED ON SUBJECT PROJECT VERY MUDE MORE THAN 10 FEET VERY MUDE 15 - 4 FEET THICK V LOSE 15 - 4 FEET THICK V LOSE 15 - 4 FEET THICK V LOSE 0.6 - 1.5 FEET NOTES: OPTIMUM MOISTURE - DRY - (D) RECUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE OR - 639 6 CONTINUOUS FLIGHT AUGER CORE 5125 NOTES:				BENCH MARK:
OM OPTIMUM MOISTURE - MOIST - (M) SOLID, AT OR NEAR OPTIMUM MOISTURE ORLU UNITS: AUXACING TOOLS: HAMMER TYPE: WIDE 1 0 3 FEET THICKLY BEDDED 0,5 - 4 FEFT VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 - 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 FEET VERY FUNKLY BEDDED 0,8 5 FEET VERY FUNKLY BEDDED 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 FEET VERY FUNKLY BEDDED 0,8 3 FEET VERY FUNKLY BEDDED 0,8 5 FEET VERY FUNKLY BED				
SL SHRINKAGE LIMIT REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE CLAY BITS Image: ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE Image: ADDITIONAL WATER TO ADDITIONAL	OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE Cme = 55 G = CM = 75 G = CM =			CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
PLASTICITY DRY STRENGTH CME-55 8' HOLLOW AUGERS CUTE 's INDURATION INDURATION MOD PLASTIC 0-5 VERY LOW -<				
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HIGHLY PLASTIC 26 OR MORE HIGH PORTABLE HOIST I TRICONE 2 15//6* STEEL TEETH POST HOLE DIGGER MODERATELY INDURATED GRAINS CAR BE SEPARATE WITH STEEL PROBE; COLOR I TRICONE	SLIGHTLY PLASTIC 6-15 SLIGHT			
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DESCRIPTIONS MAY INCLUDE COLOR OR COUR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).				
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	TOUTIENS SUCH AS LIGHT, MARK STREAKED, ETC. MAE USED TU DESCRIBE AFFEARANCE.			DATE: 8-15-14

PROJECT REFERENCE NO.

B-2500AB

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	PROJECT REFERENCE NO.	SHEET NO.
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	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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