

ID	WBS ELEMENT	SHEET NO.	TOTAL SHEET
N/A	41732.1	01	12

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

STRUCTURE

SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO.: 41732.1 F.A. PROJ. N/A
COUNTY: Carteret
PROJECT DESCRIPTION: Bridge No. 6 on NC 58 over Intracoastal
Waterway
SITE DESCRIPTION: _____

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SUBMITTED BY:

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DATE:

September 25, 2008

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

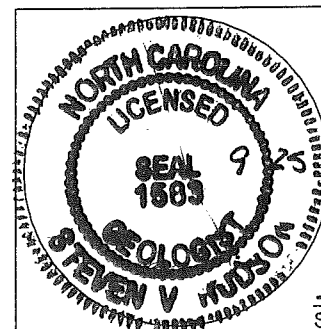
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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 INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

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

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

DRAWN BY: Steven V. Hudson, LG, CWD



SEAL

SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:
 VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
 UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
 GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2, A-3	A-4, A-5, A-6, A-7			
SYMBOL	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7							
% PASSING	= 10	= 40	= 200											
LIQUID LIMIT	50 MX	30 MX 50 MN	51 MN	35 MX	35 MN	35 MN	35 MN	36 MN	36 MN	36 MN	36 MN			
PLASTIC INDEX	6 MX	N.P.		10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX					
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS	CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			HIGHLY ORGANIC SOILS	
GEN. RATINGS AS A SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR			FAIR TO POOR	POOR	UNSUITABLE		

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE
 MODERATELY COMPRESSIBLE
 HIGHLY COMPRESSIBLE

LIQUID LIMIT LESS THAN 30
 LIQUID LIMIT 31 - 50
 LIQUID LIMIT GRATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	>10%	>20%	HIGHLY
			35% AND ABOVE

GROUND WATER

▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
 ▽ STATIC WATER LEVEL AFTER 24 HOURS
 ▽_{PW} PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
 ○_W SPRING OR SEEPAGE

P.I. OF A-7-5 <= L.L. - 30 : P.I. OF A-7-6 >= L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1 1 TO 2 2 TO 4 >4

MISCELLANEOUS SYMBOLS

	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION		TEST BORING	SAMPLE DESIGNATIONS
	SOIL SYMBOL		AUGER BORING	S - BULK SAMPLE
	ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS		CORE BORING	SS - SPLIT SPOON SAMPLE
	INFERRED SOIL BOUNDARIES		MONITORING WELL	ST - SHELBY TUBE SAMPLE
	INFERRED ROCK LINE		PIEZOMETER INSTALLATION	RS - ROCK SAMPLE
	ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION	RT - RECOMPACTED TRIAXIAL SAMPLE
	DIP/DIP DIRECTION OF ROCK STRUCTURES		SPT N-VALUE	CBR - CBR SAMPLE
	SOUNDING ROD		SPT REFUSAL	

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (mm)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)
GRAIN MM	305	75	2.0	0.25	0.05	0.005
SIZE IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL - LIQUID LIMIT PL - PLASTIC LIMIT PLASTIC RANGE (PI)	- SATURATED - (SAT)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

ABBREVIATIONS

AR - AUGER REFUSAL	M.A.D. - MID ATLANTIC DRILLING
BLS - BELOW LAND SURFACE	MED. - MEDIUM
BT - BORING TERMINATED	N/A - NOT APPLICABLE
CL - CLAY	NE - NOT ENCOUNTERED
CPT - CONE PENETRATION TEST	NM - NOT MEASURED
CSE. - COARSE	PMT - PRESSUREMETER TEST
DMT - DILATOMETER TEST	R.C.P. - RECENT COASTAL PLAIN
DPT - DYNAMIC PENETRATION TEST	SAA - SAME AS ABOVE
e - VOID RATIO	SD. - SAND, SANDY
F. - FINE	SL. - SILT, SILTY
FIAD - FILLED IMMEDIATELY AFTER DRILLING	SLI. - SLIGHTLY
FOSS. - FOSSILIFEROUS	TCR - TRICONE REFUSAL
FRAC. - FRACTURED	W. - MOISTURE CONTENT
FRAGS. - FRAGMENTS	V. - VERY
	VST - VANE SHEAR TEST
	γ - UNIT WEIGHT
	γ _d - DRY UNIT WEIGHT

PLASTICITY

NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH
LOW PLASTICITY	0 - 5	VERY LOW
MED. PLASTICITY	6 - 15	SLIGHT
HIGH PLASTICITY	16 - 25	MEDIUM
	26 OR MORE	HIGH

EQUIPMENT USED ON SUBJECT PROJECT

<input checked="" type="checkbox"/> DIEDRICH D-50	<input type="checkbox"/> CLAY BITS	<input type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/> MANUAL
<input type="checkbox"/> DIEDRICH D-25	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	<input type="checkbox"/> CORE SIZE:
<input type="checkbox"/> CME-45B ATV	<input type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> - B _____ - H _____
<input type="checkbox"/> CME-550	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> - N _____ - _____
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> HAND TOOLS:
<input type="checkbox"/> AMS POWER PROBE	<input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ADVANCER	<input type="checkbox"/> POST HOLE DIGGER
<input checked="" type="checkbox"/> OTHER JACK-UP BARGE	<input checked="" type="checkbox"/> TRICONE 2 7/8" STEEL TEETH	<input type="checkbox"/> HAND AUGER
	<input type="checkbox"/> TRICONE " " TUNG.-CARBIDE	<input type="checkbox"/> SOUNDING ROD
	<input type="checkbox"/> CORE BIT	<input type="checkbox"/> VANE SHEAR TEST
	<input type="checkbox"/> OTHER _____	<input type="checkbox"/> OTHER _____

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE, GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

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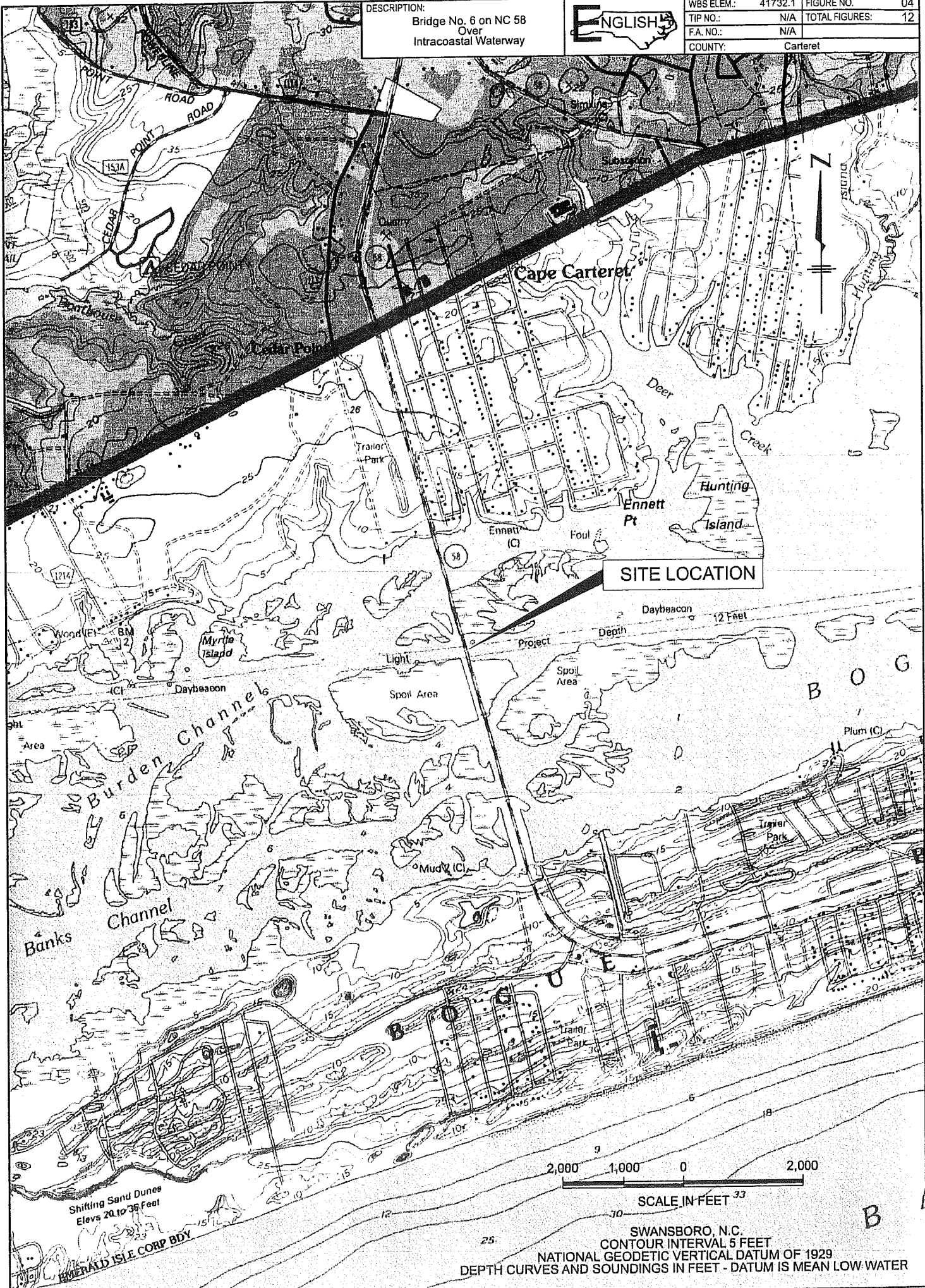
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ROCK DESCRIPTION		TERMS AND DEFINITIONS																										
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. 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 AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. DIRECT PUSH - ADVANCEMENT OF SAMPLE TOOLING UTILIZING DIRECT PUSH METHODOLOGY (ex. GEOPROBE) FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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. HYDRAULIC PUSH (HP) - ADVANCEMENT OF SAMPLING TOOLS UTILIZING MECHANICAL/HYDRAULIC DOWN-FORCE OF DRILLING MACHINE. 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. 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. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - 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. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">WEATHERED ROCK (WR)</td> <td style="width: 15%;"></td> <td>NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES >100 BLOWS PER FOOT</td> </tr> <tr> <td>CRYSTALLINE ROCK (CR)</td> <td></td> <td>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</td> </tr> <tr> <td>NON-CRYSTALLINE ROCK (NCR)</td> <td></td> <td>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</td> </tr> <tr> <td>COASTAL PLAIN SEDIMENTARY ROCK (CP)</td> <td></td> <td>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</td> </tr> </table>	WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES >100 BLOWS PER FOOT	CRYSTALLINE ROCK (CR)		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	NON-CRYSTALLINE ROCK (NCR)		FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COASTAL PLAIN SEDIMENTARY ROCK (CP)		COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	<p style="text-align: center;">WEATHERING</p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V. SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i></p> <p>SEVERE (SEV.) - ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i></p> <p>VERY SEVERE (V. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i></p> <p>COMPLETE - ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>															
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<p>VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>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 PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT - CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</p>																												
FRACTURE SPACING		BEDDING																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>> 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 3 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>< 0.16 FEET</td> </tr> </table>	TERM	SPACING	VERY WIDE	> 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 3 FEET	VERY CLOSE	< 0.16 FEET	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>		TERM	SPACING	VERY THICKLY BEDDED	> 4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET
TERM	SPACING																											
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INDURATION																												
<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; GRAINS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																												
		<p>BENCH MARK: Temporary benchmark set on interior bent. Elevation determined with survey grade GPS. ELEVATION: 100.00</p> <p>NOTES:</p>																										

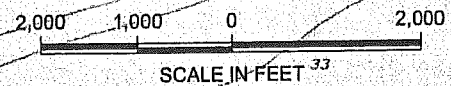
DESCRIPTION:
 Bridge No. 6 on NC 58
 Over
 Intracoastal Waterway



WBS ELEM.:	41732.1	FIGURE NO.	04
TIP NO.:	N/A	TOTAL FIGURES:	12
F.A. NO.:	N/A		
COUNTY:	Carteret		



SITE LOCATION



SWANSBORO, N.C.
 CONTOUR INTERVAL 5 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929
 DEPTH CURVES AND SOUNDINGS IN FEET - DATUM IS MEAN LOW WATER

Shifting Sand Dunes
 Elevs 20.10-36 Feet

EMERALD ISLE CORP BDY

NOTE: ALL STRUCTURE LOCATIONS APPROXIMATE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	41732.1	05	12

B-02

SWANSBORO

EXISTING NORTH FENDER

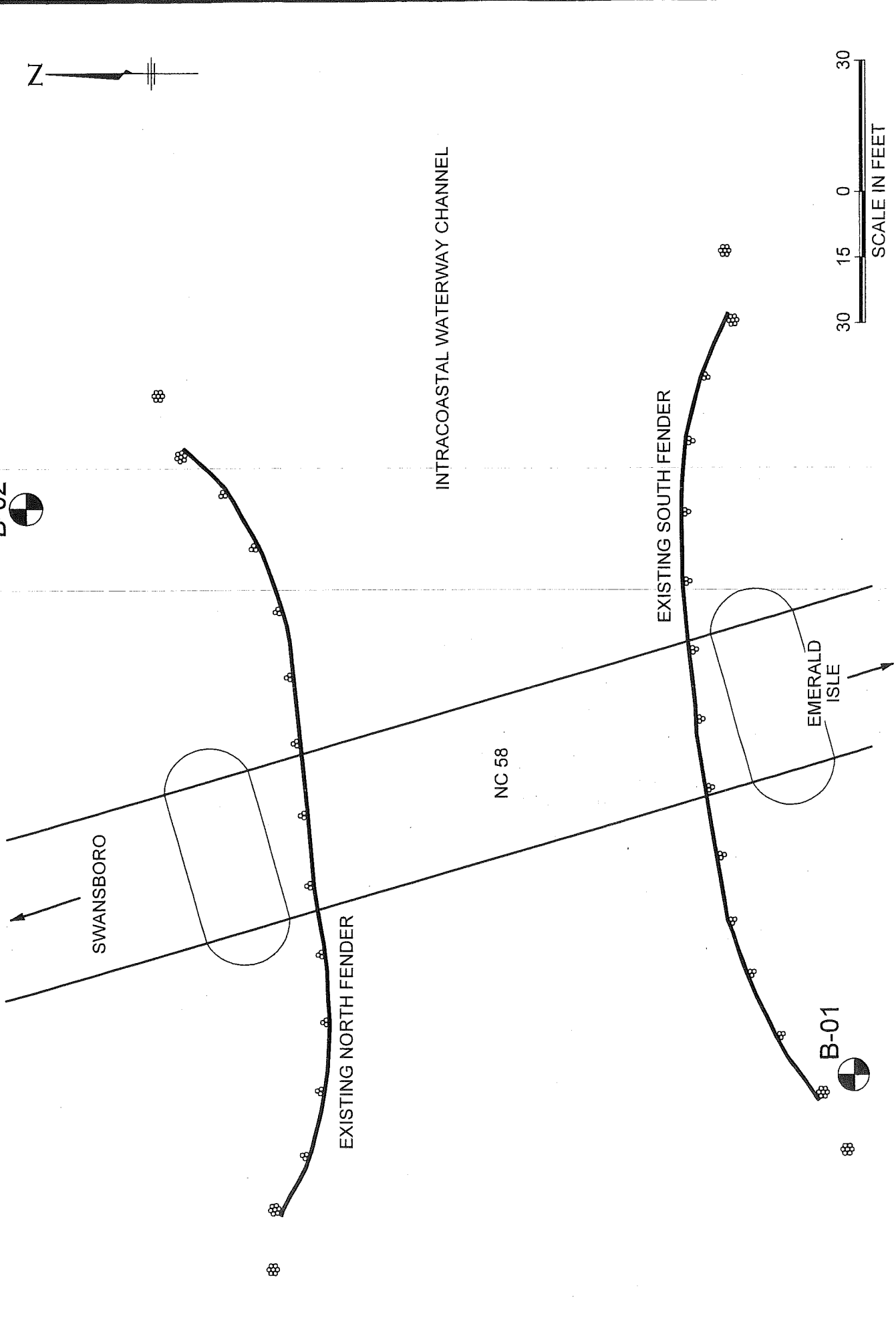
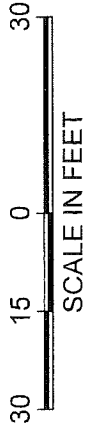
INTRACOASTAL WATERWAY CHANNEL

NC 58

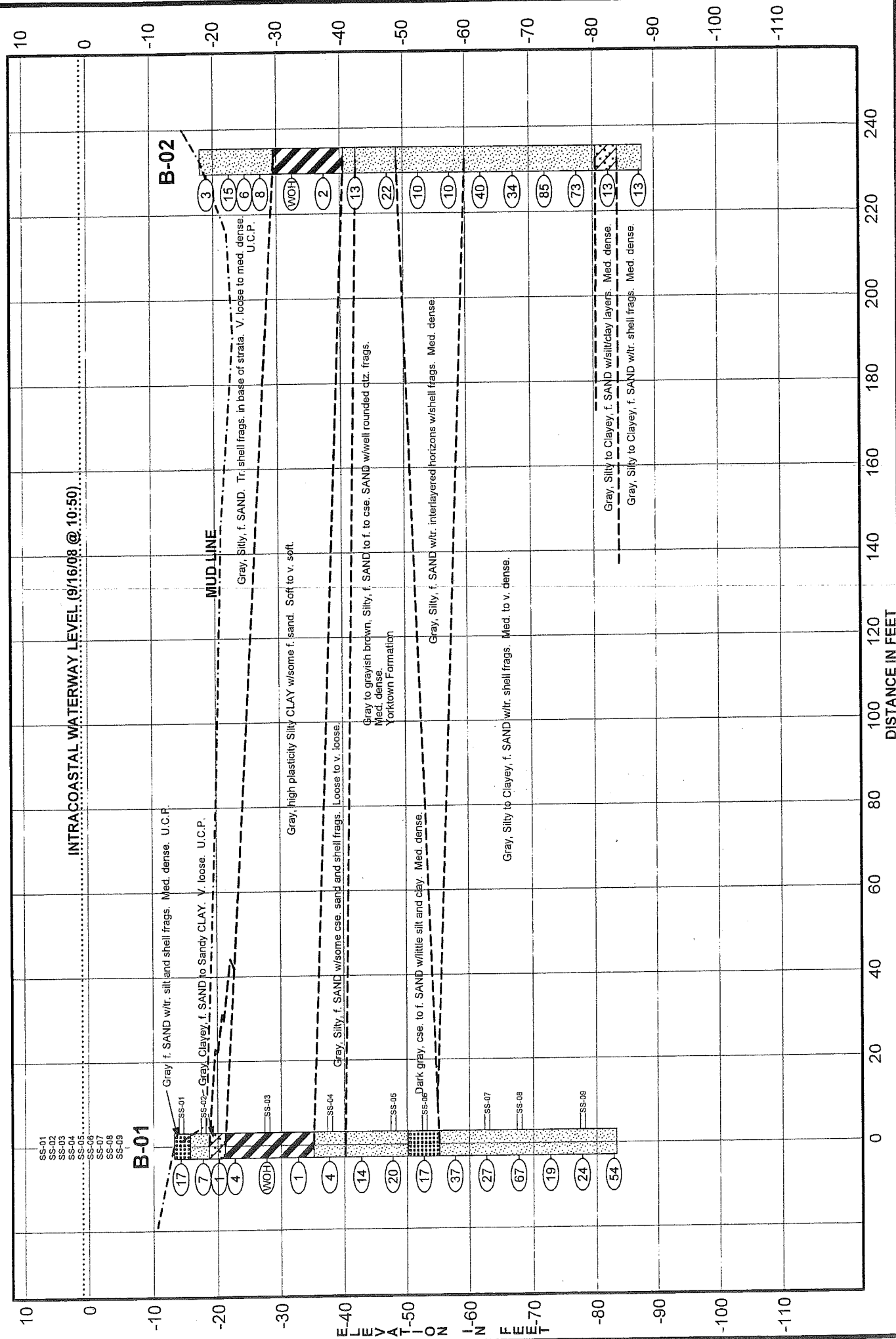
EXISTING SOUTH FENDER

EMERALD ISLE

B-01



PROFILE BETWEEN B-01 AND B-02





NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

ID	WBS ELEMENT	NO.	SHEETS
N/A	41732.1	07	12

PROJECT NO. 41732.1	ID. N/A	COUNTY Carteret	GEOLOGIST Tom Stetler
SITE DESCRIPTION Bridge No. 6 on NC 58 over Intracoastal Waterway			GROUND WTR (ft)
BORING NO. B-01	STATION N/A	OFFSET N/A	ALIGNMENT N/A
COLLAR ELEV. -13.2 ft	TOTAL DEPTH 70.0 ft	NORTHING 341,934	EASTING 2,581,556
DRILL MACHINE Diedrich D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 09/12/08	COMP. DATE 09/12/08	SURFACE WATER DEPTH 13.2ft	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
0													
-13.2	0.0										▼	WATER SURFACE (09/12/08)	
												MUD LINE	0.0
-16.7	3.5	7	9	8	17					SS-01	Sat.	UNDIFFERENTIATED COASTAL PLAIN Gray, f. SAND w/tr. silt and shell frags. Med. dense.	2.5
-19.2	6.0	10	4	3	7					SS-02	Sat.	Gray, f. SAND w/little interlayered silt. Loose.	5.5
-21.7	8.5	9	1	0	1						Sat.	Gray, Clayey, f. SAND to Sandy CLAY. V. loose.	8.0
		WOH	3	1	4						Sat.	Gray, high plasticity Silty CLAY w/some f. sand. Soft to v. soft.	
-26.7	13.5	WOH	WOH	WOH	WOH					SS-03	Sat.		
-31.7	18.5	1	0	1	1						W		
-36.7	23.5	3	1	3	4					SS-04	Sat.	Gray, Silty, f. SAND w/some cse. sand and shell frags. Loose.	22.0
-41.7	28.5	6	7	7	14						Sat.	COASTAL PLAIN Gray, well graded Silty, f. SAND w/tr. shell and rock (L.S.) frags. Med. dense. Driller Note: Well rounded qtz. gravel in cuttings from depth of 27 to 28.5 ft. Yorktown Fm.	27.0
-46.7	33.5	8	8	12	20					SS-05	Sat.		
-51.7	38.5	8	8	9	17					SS-06	Sat.	Dark gray, cse. to f. SAND w/little silt and clay. Med. dense.	37.0
-56.7	43.5	15	16	21	37						Sat.	Gray, Silty to Clayey, f. SAND w/tr. shell frags. Med. to v. dense.	42.0
-61.7	48.5	8	11	16	27					SS-07	W		
-66.7	53.5	27	34	33	67					SS-08	M		
-71.7	58.5	5	9	10	19						M		
-76.7	63.5	10	11	13	24					SS-09	M		
-81.7	68.5	21	29	25	54						M		
												Boring Terminated at Elevation -83.2 ft in v. dense Silty, f. SAND w/shell frags. Yorktown Formation	70.0

NEW NCDOT BORE SINGLE 208-058 NCDOT BRIDGE #6 OVER ICW G.P.L. CATTIN G.D.T. 9/19/08



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

ID	WBS ELEMENT	SHEET NO.	TOTAL SHEETS
N/A	41732.1	08	12

PROJECT NO. 41732.1	ID. N/A	COUNTY Carteret	GEOLOGIST Tom Stetler
SITE DESCRIPTION Bridge No. 6 on NC 58 over Intracoastal Waterway			GROUND WTR (ft)
BORING NO. B-02	STATION N/A	OFFSET N/A	ALIGNMENT N/A
COLLAR ELEV. -18.0 ft	TOTAL DEPTH 70.0 ft	NORTHING 342,126	EASTING 2,581,687
DRILL MACHINE Diedrich D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 09/15/08	COMP. DATE 09/15/08	SURFACE WATER DEPTH 17.3ft	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-18.0	0.0											WATER SURFACE (09/15/08)	
-18.0	0.0											MUD LINE	0.0
-21.5	3.5	12	2	1	3						Sat.	UNDIFFERENTIATED COASTAL PLAIN Gray, Silty, f. SAND. Tr. shell frags. in base of strata. V. loose to med. dense.	
-24.0	6.0	2	6	9	6						Sat.		
-26.5	8.5	2	2	4	8						Sat.		
-26.5	8.5	8	5	3	8						Sat.		
-31.5	13.5	WOH	WOH	WOH	WOH						W	Gray, high plasticity Silty CLAY. V. soft to soft.	11.5
-36.5	18.5	WOH	WOH	2	2						W		
-41.5	23.5	2	1	12	13						Sat.	Gray, Silty, f. SAND. V. loose.	22.5
-46.5	28.5	24	15	7	22						Sat.	COASTAL PLAIN Gray to grayish brown, f. SAND grading to f. to cse. SAND w/well rounded qtz. frags. Med. dense. Driller Note: Well rounded qtz. gravel in cuttings from depth of 27 to 28.5 ft. Yorktown Fm.	31.0
-51.5	33.5	5	4	6	10						Sat.	Gray, Silty, f. SAND w/tr. interlayered horizons w/shell frags. Med. dense.	
-56.5	38.5	8	4	6	10						Sat.		
-61.5	43.5	15	19	21	40						Sat.	Gray, Silty to Clayey, f. SAND w/tr. shell frags. Med. to v. dense.	42.0
-66.5	48.5	10	15	19	34						W		
-71.5	53.5	30	41	44	85						M		
-76.5	58.5	27	31	42	73						M		
-81.5	63.5	5	6	7	13						M	Gray, Silty to Clayey, f. SAND w/silt/clay layers. Med. dense.	62.5
-86.5	68.5	8	6	7	13						W	Gray, Silty to Clayey, f. SAND w/tr. shell frags. Med. dense.	66.0
												Boring Terminated at Elevation -88.0 ft in med. dense Silty, f. SAND. Yorktown Formation	70.0

NEW NCDOT BORE SINGLE 208-058. NCDOT-BRIDGE #6 OVER ICW.GPJ. CATLIN.GDT 9/19/08



GEOTECHNICAL
LABORATORIES

Wilmington, NC

LABORATORY SUMMARY SHEET

PROJECT #: 41732.1
TIP #: N/A
F.A. #: N/A
COUNTY: Carteret

SHEET No.	TOTAL SHEETS
09	12

CATLIN PROJECT:
NCDOT - Bridge No. 6 over ICW
CATLIN PROJECT: 208-058

SITE DESCRIPTION:
Bridge No. 6 on NC 58 over Intracoastal Waterway

AASHTO Standard Specifications

(As modified by NCDOT, Material and Tests Unit, 2000.)

Submitted By: SVH Date Submitted: 9/15/2008 Report By: MDM Report Date: 9/19/2008

TEST RESULTS

Field Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06
Lab Sample Number	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06
Retained #4 Sieve %	1.7	1.9	0	1.4	0.1	0
Passing #10 Sieve %	96.9	97.8	100	97.4	99.7	99.6
Passing #40 Sieve %	98	100	100	88	97	95
Passing #200 Sieve %	5	15	85	16	11	8

MINUS NUMBER 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret. #60 %	6.2	0.8	0.3	21.7	13.4	21.2
Fine Sand Ret. #270 %	88.9	86.5	19.3	65.3	78.2	71.3
Silt 0.05 - 0.005mm %	2.1	5.9	36.6	7.2	4.5	2.6
Clay <0.005mm %	2.8	6.8	43.8	5.8	3.9	4.9

Liquid Limit (LL)	17	21	68	19	24	23
Plasticity Index (PI)	NP	NP	46	NP	NP	NP
AASHTO Classification /Group Index	A-3(0)	A-2-4(0)	A-7-6(42)	A-2-4(0)	A-2-4(0)	A-3(0)
Station						
Offset						
Alignment						
Boring Identification	B-01	B-01	B-01	B-01	B-01	B-01
Depth ()	0.0	3.5	13.5	23.5	33.5	38.5
to	1.5	5.0	15.0	25.0	35.0	40.0
Field Moisture Content						

NP = Non-Plastic

Michael Mason
Laboratory Manager



GEOTECHNICAL
LABORATORIES

Wilmington, NC

LABORATORY SUMMARY SHEET

PROJECT #: 41732.1
TIP #: N/A
F.A. #: N/A
COUNTY: Carteret

SHEET NO.	TOTAL SHEETS
10	12

CATLIN PROJECT:

NCDOT - Bridge No. 6 over ICW

CATLIN PROJECT: 208-058

SITE DESCRIPTION:

Bridge No. 6 on NC 58 over Intracoastal Waterway

AASHTO Standard Specifications

(As modified by NCDOT, Material and Tests Unit, 2000.)

Submitted By: SVH Date Submitted: 9/15/2008 Report By: MDM Report Date: 9/19/2008

TEST RESULTS

Field Sample Number	SS-07	SS-08	SS-09			
Lab Sample Number	SS-07	SS-08	SS-09			
Retained #4 Sieve %	0	0	0			
Passing #10 Sieve %	100	100	99.9			
Passing #40 Sieve %	99	99	99			
Passing #200 Sieve %	15	13	17			

MINUS NUMBER 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret. #60 %	3.2	4.8	3.9			
Fine Sand Ret. #270 %	84.6	84.3	81.3			
Silt 0.05 - 0.005mm %	5.3	5.0	5.8			
Clay <0.005mm %	6.9	5.9	9.0			

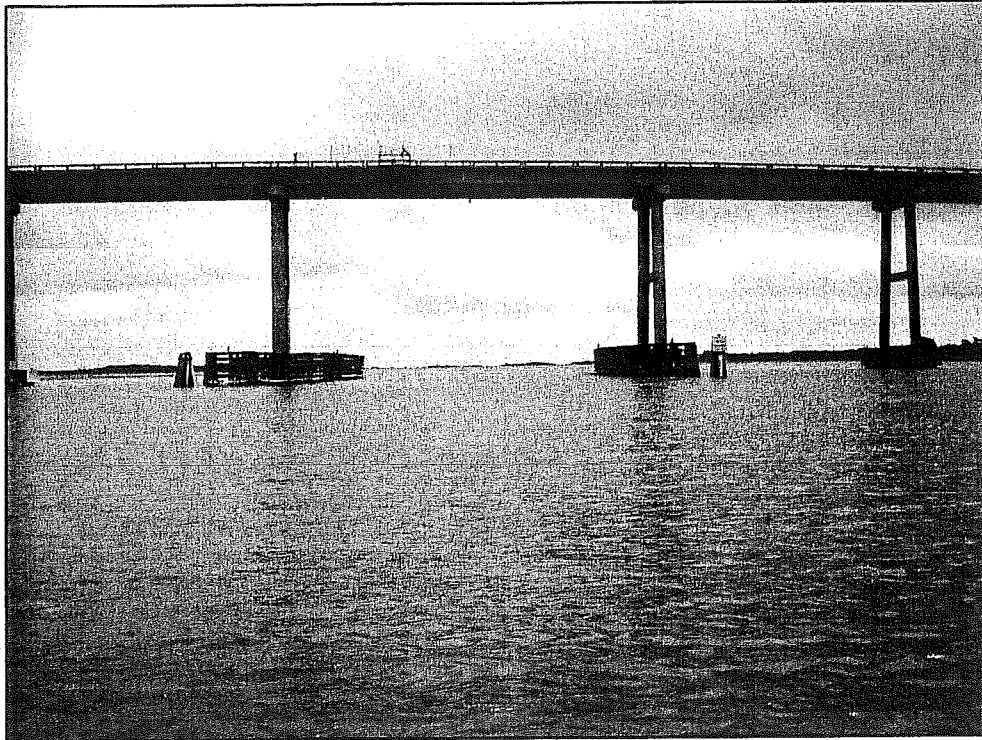
Liquid Limit (LL)	24	23	22			
Plasticity Index (PI)	NP	NP	NP			
AASHTO Classification /Group Index	A-2-4(0)	A-2-4(0)	A-2-4(0)			
Station						
Offset						
Alignment						
Boring Identification	B-01	B-01	B-01			
Depth ()	48.5	53.5	63.5			
to	50.0	55.0	65.0			
Field Moisture Content						

NP = Non-Plastic

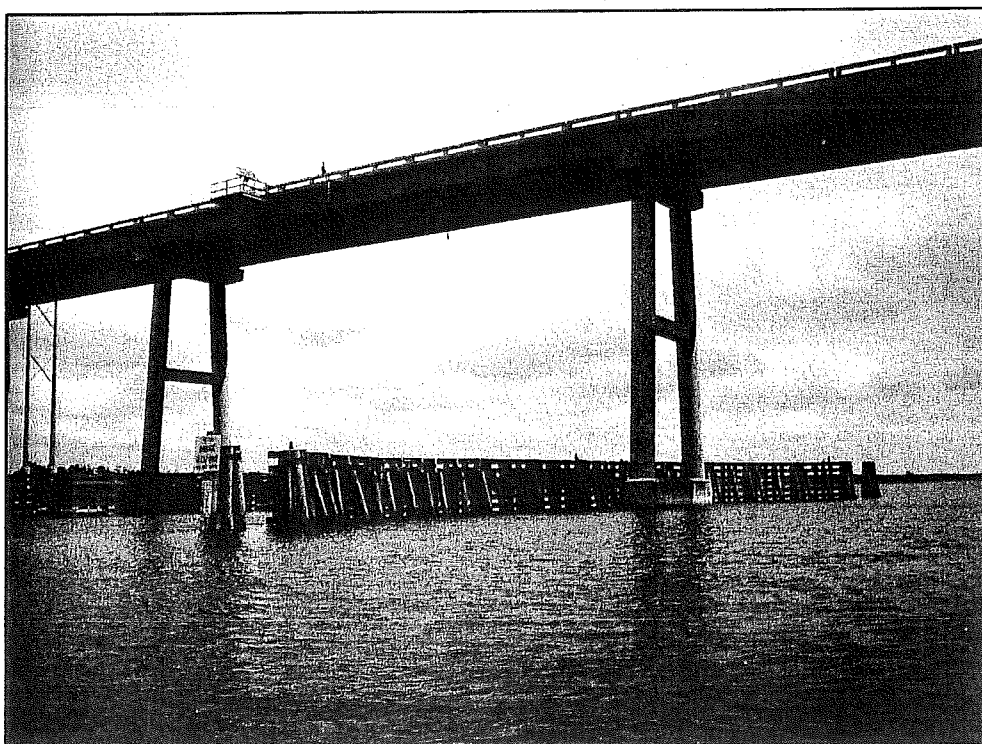
Laboratory Manager

DOT LAB 8.5X11 208-058 NCDOT-BRIDGE #6 OVER ICW.GPJ CATLIN.GDT 9/19/08

ID	WBS ELEMENT	SHEET NO.	TOTAL SHEETS
N/A	41732.1	11	12



WEST OF BRIDGE #6 FACING EAST
NORTH FENDER ON LEFT SOUTH FENDER ON RIGHT

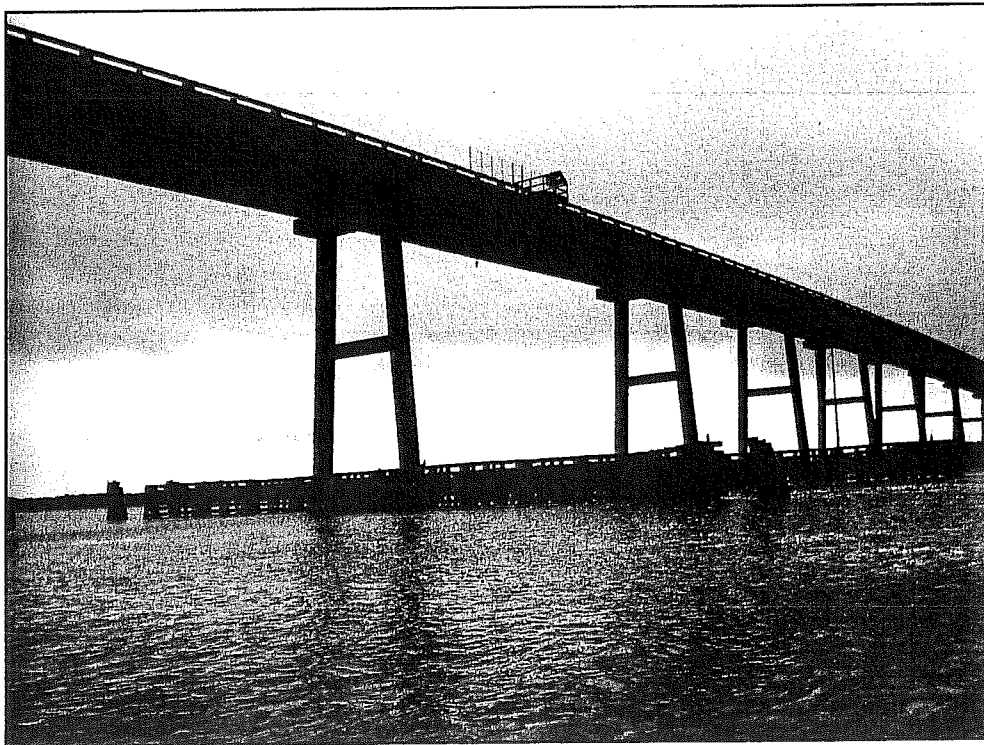


WEST OF BRIDGE #6 FACING ENE
SOUTH FENDER IN FOREGROUND

ID	WBS ELEMENT	SHEET NO.	TOTAL SHEETS
N/A	41732.1	12	12



EAST OF BRIDGE #6 FACING WEST
NORTH FENDER ON RIGHT SOUTH FENDER ON LEFT



WEST OF BRIDGE #6 FACING SE
NORTH FENDER IN FOREGROUND