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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34407.1.1 I.D. NO. R-2245 F.A. PROJECT_**STP-1105(6)** COUNTY____BRUNSWICK PROJECT DESCRIPTION NEW ROUTE FROM SR 1104 (BEACH DR.) NC 211 (SECOND BRIDGE TO OAK ISLAND) SITE DESCRIPTION BRIDGE NO. 206 ON SR 1105 OVER BIG DAVIS CANAL AT -L-STA. 21+50

STATE	STATE PR	OJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34407	'.1.1 (R-2245)	1	13
STATE	PROJ. NO.	F. A. PROJ. NO.	DESCRIP	TION
3440	07.1.1	STP-1105(6)	P.E.	
			CONS	T

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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.

INVESTIGATED BY	FMW	PERSONNEL_ <i>RLE</i>
CHECKED BY	DNA	<i>MLM</i>
SUBMITTED BY_	DNA	DRP
DATESEP	TEMBER 2005	

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

FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE

DRAWN BY: C.D. CZAJKA

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAMS CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

CON DECODIOTION	y	MS, SI MBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE LIMIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	ROCK DESCRIPTION HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED	TERMS AND DEFINITIONS
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	POORLY GRADED)	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.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AOUIFER - A WATER BEARING FORMATION OR STRATA.
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:	GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	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.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR,	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS.
VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERSECOED FINE SAND LAYERS, HIGHLY PLASTIC, A-T-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.	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
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS COMMON MATERIALS	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (.95% PASSING #200) (.95% PASSING #200) ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YELLO SPT REFUSAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LIOUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIOUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIOUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SEDIME	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
% PASSING	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
■ 10 50 MX GRANULAR CLAY PEAT SOILS COILS	ORGANIC MATERIAL GRANULAR SILT- CLAY SOILS SOILS OTHER MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
= 200 15 MX 25 MX10 MX 35 MX35 MX35 MX36 MN 36 MN 36 MN 36 MN 501L5 SOILS	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUID LIMIT 40 MX41 MN 40 MX41 MN 40 MX41 MN 40 MX41 MN 50ILS WITH PLASTIC INDEX 6 MX N.P. 10 MX10 MX10 MX11 MN 10 MX 10 MX 11 MN 1 MN LITTLE OP	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,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANIC	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.	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	GROUND WATER	SLIGHT 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	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS.	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN. RATING	∇PW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA	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.
AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	The state of the s	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	SPRING OR SEEPAGE	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.
CONSISTENCY OR DENSENESS RANGE OF STANDARD COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED COMPACTNESS OR RANGE OF STANDARD COMPACTNESS OR COMPAC	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT2)	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION ROADWAY EMBANKMENT WITH SOIL DESCRIPTION ROADWAY EMBANKMENT WITH SOIL DESCRIPTION DESIGNATIONS	IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE <4	SOIL SYMBOL AUGER BORING S- BULK SAMPLE	SEVERE ALL ROCKS EXCEPT OUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED (SEV.) IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN SS- SPLIT SPOON	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF IESTED. YIELDS SPT N VALUES > 100 BPF	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50	ROADWAY EMBANKMENTS - CORE BORING SAMPLE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
VERY SOFT <2 <0.25	ST- SHELBY TUBE ST- SHELBY TUBE MONITORING WELL SAMPLE	(V. SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH DNLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR	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
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1	INFERRED ROCK LINE A PIEZOMETER RS- ROCK SAMPLE	VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES (100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	INSTALLATION RT- RECOMPACTED SLOPE INDICATOR TRIAXIAL SAMPLE	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	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARD >30 >4	25/025 DIP/DIP DIRECTION OF INSTALLATION CRR - CRR SAMPLE	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.
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES SPT N-VALUE	ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
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	SOUNDING ROD REF SPT REFUSAL	SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.	PARENT ROCK.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	ABBREVIATIONS AR - AUGER REFUSAL PMT - PRESSUREMETER TEST	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	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
(BLDR.) (COB.) (GR.) SHIVU SHIVU (F. SD.) (CL.) (CL.) GRAIN MM 305 75 2,8 0.25 0.05 0.005	AR - AUGER REFUSAL PMT - PRESSUREMETER TEST BT - BORING TERMINATED SD SAND, SANDY CL CLAY SL SILT, SILTY	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SIZE IN. 12' 3'	CPT - CONE PENETRATION TEST SLI SLIGHTLY CSE COARSE TCR - TRICONE REFUSAL	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.	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
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	e - VOID RATIO /d - DRY UNIT WEIGHT	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	F FINE W - MOISTURE CONTENT FOSS FOSSILIFEROUS V VERY	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	OF STRATUM AND EXPRESSED AS A PERCENTAGE.
(SATURATED) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED VST - VANE SHEAR TEST FRAGS FRAGMENTS	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	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 10 CENTIMETERS DIVIDED
PLASTIC SEMISOLID: REQUIRES DRYING TO	MED MEDIUM	FINGERNAIL.	BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING IERM SPACING IERM THICKNESS	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: X AUTOMATIC MANUAL	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET	BENCH MARK: #52 REBAR & CAP
SL SHRINKAGE LIMIT	MOBILE B-	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: 17.56'
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:
PLASTICITY		THINLY LAMINATED C 0.008 FEET INDURATION	
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH	CME-45C HARD FACED FINGER BITS X -N WO	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS -H	FRIARI F RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM	CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
HIGH PLASTICITY 26 OR MORE HIGH	TOTAL STATE OF THE	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. HAND AUGER SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
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.	OTHER OTHER VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER. FYTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
The state of the s	OTHER	EXTREMELY INDURATED SHAMP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	

 ID
 STATE PROJECT NO. SHEET NO. TOTAL SHEETS

 R-2245
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY **GOVERNOR**

P.O. BOX 25201, RALEIGH, N.C. 27611-5201 LYNDO TIPPETT

September 22, 2005

STATE PROJECT:

34407.1.1 R-2245

F.A. PROJECT

STP-1105(6)

COUNTY:

Brunswick

DESCRIPTION:

New Route From SR 1104 (Beach Dr.) to NC 211

(Second Bridge To Oak Island)

SUBJECT:

Revised Geotechnical Report - Bridge Foundation Investigation for

Bridge No. 206 over Big Davis Canal at -L- Sta. 21+50.

This report supercedes the report for Bridge No. 206 over Big Davis Canal on SR 1105, completed by the Geotechnical Engineering Unit and dated November 6, 1997.

Site Description

The bridge site is located on SR 1105 (Middleton Avenue) between SR 1104 (East Beach Dr.) and SR 1190 (West Oak Island Dr.) at the existing bridge over Big Davis Canal. The replacement structure will be constructed along the current alignment. Based on the proposed design, the new structure will be a three span cored slab bridge with an overall length of 165 feet. The bents will have a skew of 90 degrees.

Standard Penetration Test borings were completed at or near each proposed bent location, with two additional borings at stations 20+96 and 22+08. These extra borings were completed under a previous structure design with four interior bents, two more than the current design. In addition to Standard Penetration Tests, rock core was obtained from B1-A. The SPT borings were made with an ATV mounted CME-45B drill machine and advanced by rotary drilling methods using bentonite drilling fluid. An NWD-4 core barrel with N casing was used to obtain the rock core.

The site is located at Oak Island on the coast of Brunswick County. Geology at the site generally consists of Pleistocene to Recent age tidal marsh and barrier bar deposits underlain by interbedded sandy limestone and calcareous sandstone of Tertiary age. Big Davis Canal is a man-made 82± foot wide dredged tidal marsh channel. Elevations of natural ground at the site range from -5.5± feet in the channel to 18.5± feet along existing Middleton Avenue. Water levels at EB-1A and EB-2A were measured at elevations of 7.5 feet and 5.5 feet respectively, while the surface of Big Davis Canal was near sea level.

Sheet 3

Soil Description

Subsurface conditions at the site are generally uniform. Surficial soils underlying the embankment at End Bent 1 consist of 20± feet of loose to medium dense fine to coarse sand (A-3). A $2\pm$ foot thick bed of very soft silty clay (A-7-5) underlies the thick sand bed at an elevation of -18.4 feet and grades to a 2± foot thick bed of very loose fine to coarse sand (A-2-4) at an elevation of -21.0± feet. Sandy limestone and calcareous sandstone underlies the sand and clay sediments at an elevation of -23.0± feet. Soils underlying the embankment at End Bent 2 consist of a 4± foot thick surficial bed of soft silty clay (A-7-6) underlain at an elevation of -1.6 feet by approximately 12 feet of very loose to dense fine to coarse sand (A-3) containing a thin (1.3 foot) interbed of very soft silty clay (A-7-6). The sand bed in turn is underlain by 8± feet of soft to very soft silty clay (A-7-5) at an elevation of -13.8 feet. Sandy limestone and calcareous sandstone underlies the sand and clay sediments at an elevation of -21.0± feet.

Soils encountered at the interior bents typically consist of 8 to 18 feet of interbedded very loose to loose sand (A-3, A-2-6), medium dense sand (A-3) and very soft to soft fine sandy to silty clay (A-7-5, A-7-6). These units are underlain at an elevation of $-12.1\pm$ to $-14.1\pm$ feet by a 3 to 9 foot thick bed of very soft silty clay (A-7-6). A sample of this clay was found to have a natural moisture content of 68 percent. A 2 to 4 foot thick very loose sand unit (A-2-4) was penetrated at elevations ranging from -19.0± feet to -23.0± feet in EB1-A, BX-B and B1-A. Sandy limestone/calcareous sandstone underlies the sand and clay sediments at an elevation of -23.0± feet. Split spoon samples taken within this unit penetrated 0.16 to 1.0 feet into the rock yielding SPT blow counts of 21 to 100+ blows/foot. Boring B1-A was advanced from elevation -30.1 to -60.1 feet using an NWD-4 core barrel to obtain samples for determining rock quality. Rock core obtained from Boring B1-A is an extremely fractured to sound sandy limestone and calcareous sandstone of Tertiary age. Core recovery ranged from 33 to 99 percent and Rock Quality Designation (RQD) values ranged from 16 to 96 percent.

Based on the proposed design the existing grade will be raised approximately 1± foot. The existing roadway embankment is composed of approximately 16± feet of very loose to medium dense fine to coarse sand (A-3). The proposed end bent slopes will be mainly constructed within the existing embankment. Some additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

The following rock core samples from Boring B1-A were submitted to be tested for Compressive Strength (Q_n), Young's Modulus (E) and Poisson's Ratio (v):

Sample	<u>Depth</u>
RS-1	27.5 - 28.1 ft.
RS-2	43.9 - 44.6 ft.
RS-3	47.7 - 48.2 ft.
RS-4	56.4 - 56.9 ft.

This Geotechnical foundation report is based on the revised Bridge Survey and Hydraulic Design Report for Big Davis Canal dated February 10, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

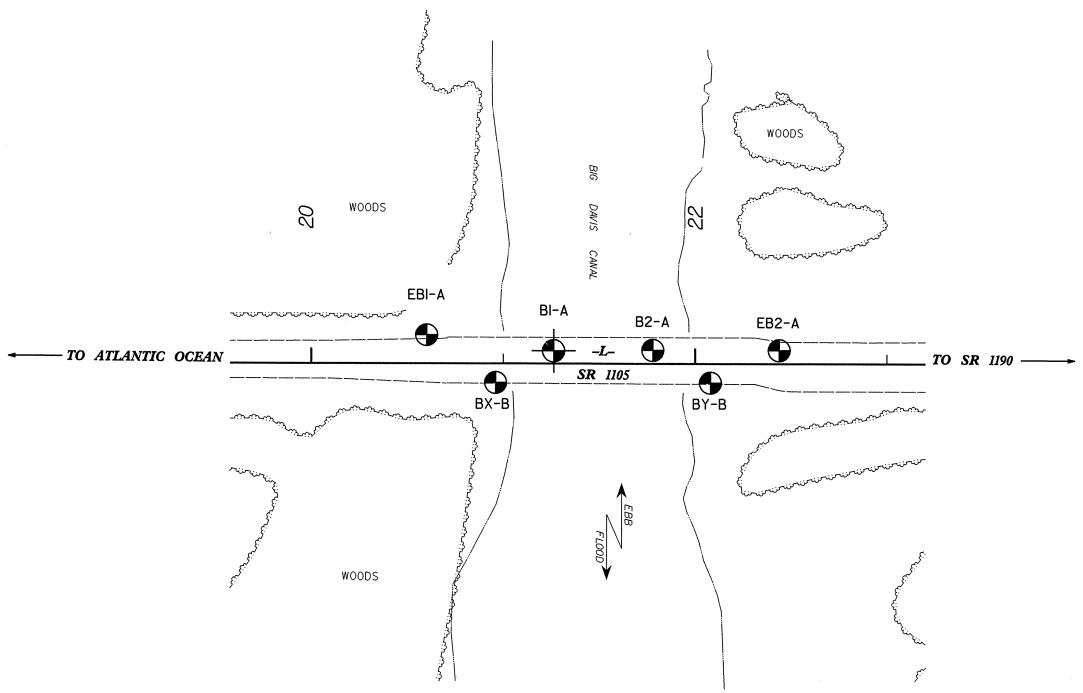
Prepared By:

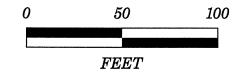
Joseph L Stone, L.G. Engineering Geologist

PROJECT REFERENCE NO.	SHEET NO.
° 34407.1.1	4



TEST SITE PLAN





SAND WITH SHELL FRAGMENTS, SATURATED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

— North	CAROLINA	DEPARTM	ient of	TRANSP	ORTATION	
	GEOTECH	inical un	IIT BORIN	ig log	SHEET 6 OF	
PROJECT NO. 3440	7.I.I ID . R-224	5 COUNTY B	RUNSWICK	GEOLOGIST R.L	. EDWARDS	
SITE DESCRIPTION	BRIDGE NO 206 ON	SR IIOS OVER B	IC DAVIS CANAL		CDOUND WA	7

PROJECT NO.	. 344	407.1.	1	ID.	R-2245	COUNTY	R BRUNSW	/ICK	GEOLOG	SIST R.L. EDWARDS		PROJECT	NO 34	1407		lu di	R-2245	COUNTY BRUNS	MICK	GEOLO	OTOT DI	EDWARDS
SITE DESCRIP	~~~~						ER BIG DA				ROUND WATER	SITE DESC						D5 OVER BIG DA			0101 N.L	GROUND WATER
						0+60	OFFSET		·····		HR. N.M.	BORING N					OCATION 20+	····	I IO'RT		MENT -L-	
COLLAR ELE					NORTHING	0.00	011021	EASTING			HR. . '	COLLAR				MINO IX	NORTHING	JO OFFSE	EASTIN		MENI -L-	0 HR. N.M 24 HR. I.O'
TOTAL DEPT					HINE CME-4	SR	DRILL METH					TOTAL DI				III MA	CHINE CME-45B	חסווו אפי	THOD ROTA		ALID THA	MMER TYPE AUTOMATIC
START DATE					PLETION DAT			FACE WATE				START D					APLETION DATE		RFACE WAT			DEPTH TO ROCK N/A
IDE				NT PEN.		VS PER I		SAMPLE		SOIL AND R						JNT PE		PER FOOT		7.1		
ELEV. (F	i i			5 (FT.)	<u></u>	50		NUMBER	MOI. G	DESCRIPTIO		ELEV.	1	1		0.5 (FT		50 75 10	SAMPLE NUMBER	MOI. G	50	DIL AND ROCK DESCRIPTION
18.4	0.0	1	3 2	1.0	 								‡									
15.0	4.0	2	1 2	2 1.0	X3			SS-9		TAN FINE TO COAR	SE SAND,	0.0	0.0 2.4	3	5 6	7 1.0 1Ø 1.0			SS-16 SS-17	0000	GRAY B SAND W	ROWN FINE TO COARSE ITH SHELL FRAGMENTS, SATURATED
10.0 ‡	8.5	6	8 7	1.0	- 				000 000 000 000	MOIST TO SATUR	ATED	-5.0 -	6.9	WOH	NOHW	VOH I.	o 	=	SS-18		DARK G	RAY SILTY FINE SANDY
<u> </u>					 - + - + -				Y	(ROADWAY EMBAN	KMENT)		‡									CLAY, WET
5.0 🛨	13.5	6	6 6	1.0	12			SS-IO				-10.0 -	<u>∓</u> ∥.9	9	1Ø	11 1.0)		SS-19	0000		ROWN FINE TO COARSE
1 , , ‡		_	_ _	. .		‡			0000				<u></u>							0000	SAND W	TITH SHELL FRAGMENTS,
0.0 ‡	18.5	5	7 5	1.0	<u>*</u> 12+			SS-II	0000			-I5 . 0 -	 16.9	6	7	2 1.0)		-	0000		SATURATED
-5.0 = 2	23 . 5	6	5 3	3 1.0	-				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	GRAY BROWN FINE 1	O COARSE	-20.0	21.9	WOH(woHw	vон I.(SS-20			GRAY SILTY CLAY, WET
-10.0 = 2	28.5	7 :	11 16	5 1.0		27 27		SS-I2	0000	SAND WITH SHELL F		-25.0 -	26.9	32	63	37 0.	6		SS-21		GRAY E	BROWN FINE TO COARSE //TH SHELL GRAGMENTS, SATURATED
-15.0 = 3	33 . 5	10 :	11 1	4 1.0		25			0000 0000 0000 0000 0000 0000	SATURATE	U	-30.0	31.9	5ø		0.	 	+00+	*			REEN VERY CLOSE TO
-20.0 =	38 5 1	NO HIN	пы 1	1.0				SS-I3		DARK GRAY SITLY	CLAY, WET	-35.0 -	± 30 0	7	12	15 1) 0 X 28		66.00		MODERAT	ELY CLOSE FRACTURED
<u> </u>				0				33 13		GRAY BROWN FINE SAND, SATUR			Ŧ						SS-22		VERY S	OFT TO SOFT SANDY
-25.0 +	43.5	17 8	33	0.8			 	SS-14				-40.0 -	41.9	10	9	14 1.0	0 + 23-					NE AND CALCAREOUS
-30.0 +	48.5	5Ø		0.1			<u> </u>			GRAY GREEN VERY		-45.0 -	46.9	50		0.			<u> </u> 		SANI	OSTONE, SATURATED
‡									喜	MODERATELY CLOSE F		-	<u> </u>				ELEVAJIC	ERMINATED -AT-)N [-45.3] FEET :				
-35.0 + 5	53.5	25 1	2 15	5 1.0		<u> </u>		SS-I5		VERY SOFT TO SOF		-50 . 0 -	‡				- +N- SAND	'-				
-40.0 =	58.5	12	9 12	2 1.0					薑	LIMESTONE AND SAI SATURATED		-55.0 -	<u> </u>									
Ī									日	ONTONATED			‡						-			
-45.0 + 6	63.5	5Ø		0.1			100+		一串			-60.0	<u>‡</u>									
ļ _{50.0} ‡					ELEVA	TERMINA	4 FEET J						‡									
-50.0 +					IN -5AF	1DY- FIME	31UNE					-65.0 -	 									
-55.0 ‡												-70 . 0 -	<u>‡</u>									
#												10.0	<u> </u>									
-60.0 +												-75.0	<u> </u>									

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT 1	NO. 33	407	.1.1		ID. F	R-2245	C	OUNTY	BRUNS	VICK	GEOLO	GIST R.L. EDWA	
SITE DESC	RIPTION	BF	RIDGE	E NC	20	6 ON S	R 1105	OVER	BIG DA	VIS CANA	L		GROUND WATER
BORING N	0. BI-	Α	BC	DRING	LOC.	ATION	21+26		OFFSET	7′ LT	ALIGN	MENT -L-	0 HR. N.M.
COLLAR E	LEVATIO)N -	-2.8′			ORTHING	0.00			EASTING			24 HR. N.M.
TOTAL DE	PTH 57	7.3′	D	RILL	MACH	INE CME	-45B	D		HOD ROTA			YPE AUTOMATIC
START DA						LETION D.				FACE WATE	R DEPTH	2.0' DEPTH TO) ROCK
ELEV.	DEPTH (FT.)	l						PER FOO		SAMPLE NUMBER	MOI. G	SOIL AND DESCRIF	
_								1	1===1				
-2.8 - -5.0 -	0.0 2.7	WOH	WOH Ø	1 Ø	1.0 1.0	* [SS-34	0 0	GRAY BROWN FI SAND WITH SHEI SA	NE TO COARSE L FRAGMENTS, T.
-10.0	7.2	8	1Ø	14	1.0		24 -			SS-35		1	TY CLAY, WET. INE TO COARSE LL FRAGMENTS,
-15.0	12.2	WOH	WOH	WOH	1.0	 *0				SS-36		DARK GRAY SIL	1.
-20.0	17.2	WO+	W OH	3	1.0	 			 				INE TO COARSE LL FRAGMENTS,
-25.0		32	26	20	1.0			X 46		SS-37		54	\
-		32	20	20	1.0		<i>- '</i>					GRAY GREEN SA AND CALCAREOUS	ANDY LIMESTONE SANDSTONE, SAT
-30.0 -										RS-I		RQD	43% 16% /CALC. S.S.
-35 . 0 -	-						<u> </u>					REC ROD	. 72% 27% OUS S.S.
-40.0												REC RQD	. 33% 16%
-45.0	_									RS-2		CALCARE REC RQD	0US S.S. 99% 96%
-50.0										RS-3		CALCARE REC ROD	OUS S.S. . 93% . 72%
-55.0												CALCARE REC	OUS S.S. . 97% . 71%
-60.0	_	ļ				 BORII	 	RMINATI	D-AF-	RS-4		1	OUS S.S.
-65.0						ELE	VATIOI N -CAL	N =60.1 CAREOL STONE.	FEET				
-70.0	_												
-75.0													
-80.0		3											ť

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL UNIT CORE BORING REPORT

	CT NO.: 3					2245	COUNTY: Brunswick BORING NO.: B1-A
			lge No. 2	206 on S	R 1105	over Big	Davis Canal
	AR ELEV.					NWD-4	EQUIPMENT: CME-45B
	ER: MLM					T: EAW,	
TOTAL	DEPTH:		·	TOT	AL RUI	N: 30°	DATE: 9-10-97
		DRILL				CANAD	
ELEV.	DEPTH	RATE	RUN	RQD	REC	SAMP NO.	FIELD CLASSIFICATION AND REMARKS
(FT.)	(FT.)	MN/FT	(FT.)	%	%	NO.	LIGHT CDAY DETUDN TO 2022 DADY
-30.0	27.2	1.40	1			DC 1	LIGHT GRAY RETURN TO 28.2', DARK GRAY GREEN RETURN TO 32.2', VERY
		0:45	1		10	RS-1	
		0:30	5.0	16	43	(27.5-	CLOSE TO MOD. CLOSE FRACT. GRAY
		0:30				28.1)	BROWN SANDY LIMESTONE
-35.0	32.2	0:30					CALCAREOUS SANDSTONE
		0:45					DARK GRAY GREEN RETURN
		0:30					VERY CLOSE TO MOD. CLOSE FRACT.
		0:20	5.0	27	72		GRAY BROWN CALCAREOUS SANDSTONE
		0:15	1				
-40.0	37.2	0:15					
10.0		0:30	<u> </u>				DARK GRAY GREEN RETURN TO 39.0'
		0:45	1				LOST RETURN AT 39.0'
		0:30	5.0	16	33		VERY CLOSE TO MOD. CLOSE FRACT.
		0:30	3.0	10	33		GRAY BROWN CALCAREOUS SANDSTONE
45.0	42.2	0:15	-	_			GRAT BROWN CALCAREOUS SHIRDSTONE
-45.0	42.2			 	1	 	LIGHT GRAY RETURN TO 43.3'
		1:05	- .			RS-2	LOST RETURN AT 43.3' VERY CLOSE TO
		0:55	- A	06	00	(43.9-	
		0:35	5.0	96	99	1 `	MOD. CLOSE FRACT. SANDY FOSSIL.
		0:20	4			44.6)	LIMESTONE/DARK GRAY CALCAREOUS
-50.0	47.2	0:40	<u> </u>			<u> </u>	SANDSTONE W/ SOLUTION VOID AT 43.3'
		1:10	_				LIGHT GRAY RETURN
		1:05	_			RS-3	SOUND GRAY SANDY FOSSILIFEROUS
		0:40	5.0	72	93	(47.7-	LIMESTONE TO 49.2' /TAN VERY CLOSE
		0:40				48.2)	TO MOD. CLOSE FRACT. FOSSIL. SANDY
-55.0	52.2	0:50					LIMESTONE
		0:35					DARK GRAY RETURN
		0:40				RS-4	VERY CLOSE TO MOD. CLOSE FRACT.
		0:35	5.0	71	97.	(56.4-	CLAYEY FOSSILIFEROUS CALCAREOUS
	44.40	0:30	7			56.9)	SANDSTONE
-60.0	57.3	0:30	1				
			1				
			1				
			1				
		ļ	4				

north carolina department of transportation | north carolina department of transportation GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

DRAIROR NO. 2440711 IN D. CO.	DAE CONTINUE DELINION I	SEAL ACTOR D. L. EDWARDS			·	SHEET 8 OF 13
PROJECT NO. 34407.I.I ID. R-22		GEOLOGIST R.L. EDWARDS	<u> </u>	R-2245 COUNTY BRUNS		GIST R.L. EDWARDS
	N SR 1105 OVER BIG DAVIS CANAL			206 ON SR 1105 OVER BIG DA		GROUND WATER
BORING NO. B2-A BORING LOCATION			BORING NO. BY-B BORING LO			IENT -L- 0 HR. N.M.
COLLAR ELEVATION -0.4' NORTH		24 HR. N.M.	COLLAR ELEVATION 3.3'	NORTHING	EASTING	24 HR. N.M.
TOTAL DEPTH 45.0' DRILL MACHINE (HOD ROTARY W/M	
	N DATE 9/3/97 SURFACE WATER DI	7 I			RFACE WATER DEPTH	N/A DEPTH TO ROCK
ELEV. (FT.) 0.510.510.51(FT.)	BLOWS PER FOOT SAMPLE SAMPLE NUMBER	SOIL AND ROCK DESCRIPTION	ELEV. DEPTH BLOW COUNT PE		SAMPLE V 6 9 NUMBER MOI G	SOIL AND ROCK DESCRIPTION
-0.4 + 0.0 WOH 1 2 1.0 \$3		0000	(FT.) 0.5/0.5/0.5 (FT	.,, 0 23 30 13 10	NUMBER MOI. Ğ	DESCRIPTION
± 0.0 1 2 1.0 1 3	<u>'</u>	GRAY BROWN FINE TO COARSE	3.3 0.0 WOHWOH 1 1.0	 	SS-23 ::::	
-5.0 ± 5.1 4 Ø 1 1.0 ¥ 5	+	SAND WITH SHELL FRAGMENTS,	$\begin{vmatrix} 0.0 & \pm & 3.9 \\ 2.0 & \pm & 3.9 \\ 3.0 & 1.0 \\ 3.0 & $	\\ \	SS-23	BROWN FINE TO COARSE SAND
+ 5.1 4 6 1 1.0 \$1.5		CATUDATED	0.0	D X-3	0000	WITH SHELL FRAGMENTS, SATURATED
$\begin{vmatrix} -10.0 & \frac{1}{2} & 9.7 & 1 & & & & & & & & & $		GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED DARK GRAY CLAYEY FINE SAND,		\ 	0000	
$\begin{vmatrix} -10.0 & + 9.7 & 1 & Ø & Ø & 1.0 & & & & & & & & & & $	+	DARK GRAY CLAYEY FINE SAND,		/		DARK GRAY FINE SANDY AND
		SATURATED				SILTY CLAY, WET
-15.0 + 14.7 WOHWOHWOH 1.0 * 0 1	SS-30		-10.0 🛨 13.2 WOH 7 11 1.0) X -1 <u>8 + +</u>	SS-24	GRAY BROWN FINE TO COARSE
		DARK GRAY SILTY CLAY, WET		- <i> </i>	SS-24	GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
$ -20.0 \pm 19.7 \text{ WOH} 1 1 1.0 $		DARK GRAT SILTI CLAT, WET	-15.0 1 8.2 WOHWOHWOH 1.0) 	SS-25	
-25.0 + 24.7 28 33 37 1.0			$-20.0 \pm 23.2 \text{ WOH } 1 \mid 2 \mid 0.$	9		DARK GRAY SILTY CLAY, WET
		GRAY GREEN VERY CLOSE TO		~ f\ftt		
300 + 20 7 50		Similar Steel Vent Sesse 10		+ + + 100 + 3		
-30.0 ± 29.7 5Ø 0.1		MODERATELY CLOSE FRACTURED	$ -25.0 + 28.2 5\emptyset 0.$			
	<u></u>	VEDY COST TO COST CAUDY				GRAY GREEN VERY CLOSE TO
-35.0 34.7 11 10 26 1.0 :	 - X -36 - - SS-33	VERY SOFT TO SOFT SANDY	-30.0 🛨 33.2 37 21 14 1.0) <u> </u>	SS-26	MODERATELY CLOSE FRACTURED
		LIMESTONE AND CALCAREOUS				MODERATELY GEOGE TRACTORES
-40.0 3 9.7 14 13 12 1.0 			-35.0 + 38.2 21 16 6 1.0)		VERY SOFT TO SOFT SANDY
		GRAY GREEN VERY CLOSE TO MODERATELY CLOSE FRACTURED VERY SOFT TO SOFT SANDY LIMESTONE AND CALCAREOUS SANDSTONE, SATURATED				
-45.0 <u>+ 44.7 50</u> 0.1 <u></u>			-40.0 + 43.2 1Ø 12 12 1.0)	SS-27	LIMESTONE AND CALCAREOUS
	ORING TERMINATED AT		1 40.0 + 45.2 12 12 13	` <u> }</u>	SS-27	SANDSTONE, SATURATED
	TLEVATION 1-45.4 FEET	·	$\frac{1}{45.0}$ $\frac{1}{48.2}$ $\frac{1}{50}$ 0.			·
-50.0 + - 14	IN-\$ANDY LIMESTONE; -		-45.0 + 48.2 500 0.			······································
	<u></u>			BORING TERMINATED AT -		
-55.0 +			-50.0 +	SANDY LIMESTONE		
-60.0 +			-55.0 +			
\pm \pm \pm \pm \pm \pm						
-65.0 +			-60.0 +			
			""			
-70.0 +						
TOO T	==E=======		-65.0 +	 		
	<u></u>	.		 		
-75.0 +			-70.0 +			
-80.0 +			-75.0 +			
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

			(6		ווע	ECHI			וואוע	U	BOR	ING			3	SHEET 9	OF 13
PROJECT	NO. 34	407				R-2245		OUNTY	BRU				OLO	GIST	R.L. EDWAF	RDS	
SITE DESC									BIG	DA'	VIS CANA	۸L				GROUN	D WATER
BORING 1		2-A		ORING		ATION	22+44	4	OF	FSET	7' LT		JGN	MENT	-L-	0 HR.	N.M.
COLLAR						ORTHING		Т.			EASTING				- 	24 HR.	12.8′
TOTAL D						INE CME			DRILL		IOD ROTA				HAMMER TY	 	OMATIC
START D	DEPTH					ETION D				SUK	FACE WATI		TH	N/A	DEPTH TO		
ELEV.	(FT.)	1			1 1			PER FO	75	IOO	SAMPLE NUMBER	'/	Ď		SOIL AND DESCRIP		
	1 1.7	0.5	0.5	0.5	([.1./	Ĭ <u>.</u>	-		 		INDINIDER	MOI.	Ğ		DESCINI	11014	
18.3	0.0	1	2	2	1.0	 	 	 	 	寸			000 000 000				
15.0 -	± 4.0	1	2	2	ا ، ا	 		+	1	==			000				
	+ 4.0	1	~	2	1.0	 - - - - - - - - -		+	1		SS-I			T	AN FINE TO C	OARSE S	AND,
10.0 -	∓ + 8.5	2	3	3	ا ,		<u> </u>	F ===	}==	_			000		MOIST TO SA	ATURATE	D
10.0	± °.5	~	3	3	1.0	1-1-0-	<u> </u>	<u> </u>	 				000		(ROADWAY EM	RANKMEN	IT)
	‡					#===	<u> </u>	‡===	===			_	000		WOADWAT EN	DAMMILI	
5.0 -	+ 13 . 5	1	1	1	1.0	¥2	<u> </u>	‡===	 		SS-2		000				
	T					<u> </u>		<u> </u>	<u> </u>	= =				ים	ARK GRAY SIL	TV CLAV	WET
0.0 -	± 18 . 5	WOH	1	1	1.0	2		 			SS-3						
	‡					/-		+	 	-1			0000	GR	AY BROWN FIN SAND.SAT	NE TO CO	DARSE
-5.0 -	± 23.5	8	11	15	1.0		X 26 -	+	1		SS-4		0000	GR	AY BROWN FIN		DARSE
	Ŧ]==				0000	i	ND WITH SHEL		
-10.0 -	± 28.5	WOH	3	7	1.0	- X-10		 	 		SS-5		****		SATUR.		WET
	‡ 20.3			′	'•	- <i>f</i>	<u> </u>	 	 	-			0000	GR	ARK GRAY SIL AY BROWN FIN	I <u>Y CLAY</u> IE TO CO	MET DARSE
-15.0 -	Ξ,,,]	7		 	 			0014	****	SÃ	AY BROWN FIN ND WITH SHEL SATURA	L FRAGM	ĖNTS,
15.0	+ 33 . 5	WUH	WUH	WUH	1.0	£G	<u> </u>		<u> </u>	-1	SS-6	68%			JATOM	1120	
	‡					#	<u> </u>		1					D	ARK GRAY SIL	TY CLAY	, WET
-20.0 -	± 38 . 5	WOH	1	2	1.0	¥3	<u> </u>	+	<u> </u>								
	‡						<u> </u>		1				弄				
-25.0 -	± 43 . 5	27	49	51	0.9		<u> </u>]===	100) 			臣				
	‡						<u> </u>			= =			逹	GF	RAY GREEN VE	RY CLOS	SF TO
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R-2245 Bridge No. 206 ON SR 1105 OVER BIG DAVIS CANAL

HOLE#	SAMPLE#	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB2-A	SS-1	100	89	5	38.9	56.5	2.6	2.0	15	NP	A3(0)	4.0-5.5		
	SS-2	100	83	3	47.4	50.4	0.2	2.0	18	NP	A3(0)	13.5-15.0		
	SS-3	100	95	70	15.1	15.1	25.7	44.2	59	30	A76(21)	18.5-20.0		
	SS-4	100	96	4	37.0	59.9	2.0	1.0	18	NP	A3(0)	23.5-25.0		
	SS-5	100	98	60	7.0	34.7	28.1					28.5-30.0		
	SS-6	100	99	98	1.0	1.0	25.7	72.3	74	41	A75(49)	33.5-35.0	68.3	
	SS-7	100	58	23	61.2	18.3	16.5	4.0	18	NP	A24(0)	48.5-50.0		
	SS-8	89	69	33	44.8	19.7	23.5	12.0	25	3	A24(0)	58.5-60.0		
EB1-A	SS-9	85	78	3	36.6	59.5	1.8	2.0	15	ND	A3(0)	4.0-5.5		
	SS-10	100	91	5	35.4	60.0	2.5				A3(0)	13.5-15.0		
	SS-11	100	99	4	15.6	81.4	0.0				A3(0)	18.5-20.0		
	SS-12	100	86	3	42.6	54.8	0.6				A3(0)			
	SS-12	100	99	86	2.6	13.7	23.5				• ,	28.5-30.0 38.5-40.0		
	SS-14	47	24	12	60.6	18.3	11.0				A75(29)			
	SS-15	87	53	20	61.8	17.5	14.7				A1a(0)			
	00-10	01	33	20	01.0	17.5	14.7	0.0	1 /	INP	A24(0)	53.5-55.0		
BX-B	SS-16	97	85	5	39.6	55.4	1.0	4.0	12	NP	A3(0)	1.0-1.5		
	SS-17	100	97	4	25.1	71.6	1.3				A3(0)	2.4-3.9		
	SS-18	98	96	61	3.8	40.6	27.5				A75(10)			
•	SS-19	100	99	3	40.5	56.9	0.6				A3(0)	11.9-13.4		
	SS-20	100	99	93	1.2	6.4	26.1					21.9-23.4		
	SS-21	33	14	6	68.1	14.9	7.0				A1a(0)	26.9-28.4		
	SS-22	90	55	26	59.0	_~ 18.1	16.9				A24(0)			
BY-B	SS-23	100	90	4	39.0	57.1	1.9	2.0	20	ND	A3(0)	1.0-1.5		
	SS-24	100	92	5	43.3	52.4	2.3				A3(0)	13.2-14.7		
	SS-25	100	99	97	1.6							18.2-19.7		
	SS-26	65	31	15	64.7	14.3	15.1					33.2-34.7		
	SS-27	88	58	24	59.2	15.5	17.3					43.2-44.7		
D2 A	CC 20	04	00	0	20.0	04.7	0.4	4.0	00	ND	40(0)	5400		
B2-A	SS-28	91	83	8	30.8						A3(0)			
	SS-29	100	99	27	13.5	63.1					` ,	9.7-11.2		
	SS-30	100	99	93	2.2	4.8						14.7-16.2		
	SS-31	100	99	93	1.4	6.8						19.7-21.2		
	SS-32	60	23	11	71.3	14.1	6.6				• ,	24.7-26.2		
	SS-33	89	61	27	52.0	20.1	21.9	6.0	23	NΡ	A24(0)	34.7-36.2		
B1-A	SS-34	79	69	3	42.2	54.1	0.7	3.0	19	NP	A3(0)	1.0-1.5		
	SS-35	100	97	4	30.9	65.9	1.2				A3(0)	7.2-8.7		
	SS-36	100	100	98	1.0	1.8					` '	12.2-13.7		
	SS-37	66	41	19	52.0	20.5						22.2-23.7		

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 34407.1.1 ID: R-2245 COUNTY: Brunswick
DESCRIPTION(1): Bridge No. 206 on SR 1105 over Big Davis Canal
INFORMATION ON EXISTING BRIDGE Information obtained from:
BR. NO.: 206 BR. LENGTH: 161 NO. BENTS: 6 NO. BENTS IN: CHANNEL: 4 FLOODPLAIN: 2
FOUNDATION TYPE:Timber Piles
EVIDENCE OF SCOUR(2):
ABUTMENTS OR END BENT SLOPES: Severe end slope erosion at both end bents
INTERIOR BENTS:none ebserved
CHANNEL BED: none observed
CHANNEL BANKS: none abserved
EXISTING SCOUR PROTECTION:
TYPE(3):concrete and rock slope protection at end bents
EXTENT(4): east side of bridge to toe of fill
EFFECTIVENESS(5): poor-cracking and sloping observed
OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.):none observed
DESIGN INFORMATION
CHANNEL BED MATERIAL(7): sand (SS-34)
CHANNEL BANK MATERIAL(8): sand (SS-16)
CHANNEL BANK COVER(9): grass
FLOOD PLAIN WIDTH(10): 650 feet
FLOOD PLAIN COVER(11): marsh grass and trees along spoil banks

						SHEET 1
DES	SIGN INFORMA	TION CONT.				
STR	REAM IS:	DEGRADING	AGGRADING	X	_EQUILIBRIUM (12)	
OTH	IER OBSERVATI	ONS AND COMMENTS:	Bridge lies withi	n tidal :	zone	
CHA	NNEL MIGRATIO	ON TENDENCY (13):	unlikely			
GEC	JIECHNICALLY /	ADJUSTED SCOUR ELE	VATIONS(14):			
	It is unlikely that	at overtopping scour will e	xtend below an elev	ation o	f -9.8 feet at B1-A and B	2-A
	An elevation of	f-9.8 feet generally corres	ponds with the base	of rec	ent sediments and is 4.6	feet
	higher than the	theoretical scour elevatio	n provided by the H	vdrauli	cs Unit.	
				,	•	

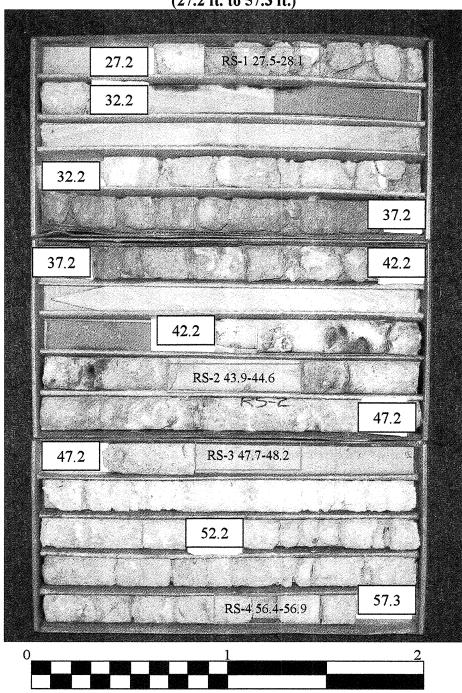
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	REPORTE	ED BY: [fun]		Manager, eq., e.,	DATE:09-22	-05
			O			
			INSTRUCTIONS			
(1)		PTION OF THE SPECIFIC SITE	E, INCLUDING ROUTE			
(2)		NCE OF SCOUR AT THE EXIST NS, DEGRADATIONS, ETC.)	TING END BENTS OR A	BUTME	NTS (UNDERMINING, SLOUC	3HING,
(3) (4)		NG SCOUR PROTECTION (RIF (TENT OF ANY EXISTING SCO				
(5)		HER OR NOT THE SCOUR PRO		O BE W	ORKING.	
(6) (7)		FALLEN TREES, DEBRIS AT E HANNEL BED MATERIAL BASE		∧ NID/∩D	CAMDI EC	
(8)		HANNEL BANK MATERIAL BAS				
(9) (10)		ANK COVERING (GRASS, TRE		TC.)		
(11)		XIMATE FLOOD PLAIN WIDTH :OOD PLAIN COVERING (GRA:		TC.)		
(12)	CHECK THE APPR	OPRIATE SPACE AS TO WHE	THER THE STREAM IS	DEGRA		_
(13)		DTENTIAL OF THE BODY OF V KIMATELY 100 YEARS).	WATER TO MIGRATE LA	AIERAL	LY DURING THE LIFE OF TH	E
(14)		CHNICALLY ADJUSTED SCOU	R ELEVATION EXPECT	ED OVE	R THE LIFE OF THE BRIDGE	=

(APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY, CORE RECOVERY PERCENTAGE, PERCENTAGE RQD, DIFFERENTIAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OTHER

TESTS DEEMED APPROPRIATE, AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

CORE PHOTOGRAPH

B1-A STA. 21+26 (27.2 ft. to 57.3 ft.)





FEET

34407.1.1 R-2245
Brunswick Co.
Bridge No. 206 on SR 1105 over Big Davis Canal



View looking north toward End Bent 2

CONTENTS:

5

6-7

DESCRIPTION

SITE PLAN

CROSS SECTIONS

SCOUR REPORT CORE PHOTOGRAPHS

SOIL TEST RESULTS

SITE PHOTOGRAPH

PROFILE

LEGEND

TITLE SHEET

STRUCTURE INVENROTY REPORT

BORE LOG & CORE REPORTS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PR	ROJECT_	34407	7.1.1	I.D. N	o. <u>R</u> -	-2245	<u> </u>
F.A. PROJ	ECT_ S7	P-110 5	5(6)				
COUNTY_	BRUN	ISWIC	CK				,
PROJECT	DESCRI	PTION	NEW	RO	UTE		
FROM						NC	<i>211</i>
_(SECON	ID BRI	DGE	TO O	AK 1	SLA	ND)	
SITE DESC	CRIPTION	NEW	BRI	DGE	NO.	229	_
ON SR							
WATER	WAY A	T $-L$	STA.	58 + 00)		

STATE STATE PROJECT REFERENCE NO, SHEET TOTAL SHEETS N.C. 34407.1.1 (R-2245) 1 19 STATE PROJ. NO. P. A. PROJ. NO. STP-1105(6)

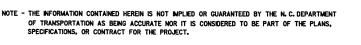
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

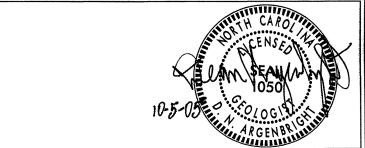
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE WHIMIN THE BOXENCE. THE LEGEREE OF RELIABILITY MINERENT 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 CONSDERABLY 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.

INVESTIGATED BY F. M. WESCOTT PERSONNEL S&ME CHECKED BY D. N. ARGENBRIGHT J. L. STONE SUBMITTED BY D. N. ARGENBRIGHT OCTOBER 2005



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



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED WOULD YIELD SPT REFUSAL, AN INFERRED TERMS AND DEFINITIONS <u>WELL GRADED</u>- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARS UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED FARTH MATERIALS ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. ROCK LIN DIOCATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD TIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD TIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø.I FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF LOCATION DOOR OF THE PROPERTY OF THE PR SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR MEATHERED EARTH MATERIAL WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YELDS LESS THAN 180 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO LASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: AQUIFER - A WATER BEARING FORMATION OR STRATA. GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS ARENACEOUS - APPLIED TO ROCKS THAT HAVE REEN DERIVED FROM SAND OR THAT CONTAIN SAND. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS: RGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR. NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. WEATHERED ROCK (WR) R HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION AS SHALE SLATE ETC. SUBANGULAR, SUBROUNDED, OR ROUNDED. VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERREDOED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL SOIL LEGEND AND AASHTO CLASSIFICATION MINERALOGICAL COMPOSITION IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT CRYSTALLINE ROCK (CR) GENERAL WOULD STELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. GRANULAR MATERIALS SILT-CLAY MATERIALS MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS GROUND SURFACE. ORGANIC MATERIALS (.35% PASSING *200) WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN
SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE
INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD COMPRESSIBILITY GROUP A A-3 A-4 A-5 A-6 A-7 NON-CRYSTALLINE ROCK (NCR) COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM A-6, A-CLASS. A-a A-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 COASTAL PLAIN SEDIMENTARY ROCK LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50 SYMBOL 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. HIGHLY COMPRESSIBLE SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED PERCENTAGE OF MATERIAL PASSING WEATHERING DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT SILT-* 10 * 40 MUCK, PEAT GRANULAR SILT- CLAY CLAY ORGANIC MATERIAL ROCKS OR CUTS MASSIVE ROCK. OTHER MATERIAL SOTI S SOILS SOILS SOILS FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER * 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE RACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% HAMMER IF CRYSTALLINE. LITTLE ORGANIC MATTER 3 - 5% 5 - 12% TOURD I THEY ONFRATELY ORGANIC VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, 20 - 35% DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF PLASTIC INDEX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF IGHLY ORGANIC V. SLI.) LITTLE OR >10% >20% HIGHLY 35% AND ABOVE THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. HIGHLY GROUP INDEX MODERATE OF A CRYSTALLINE NATURE. USUAL TYPES STONE FRAGS. FINE GRAVEL AND 0 0 4 MX 8 MX 12 MX 16 MX No M GROUND WATER FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE AMOUNTS OF ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO SOILS SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. SILTY SOILS CLAYEY SOILS STLTY OR CLAYEY ORGANIC WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR MATTER CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. GRAVEL AND SAND \blacksquare STATIC WATER LEVEL AFTER 24 HOURS. SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN MODERATE GEN. RATIN FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM VPW. FAIR TO GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATE (LOOM) AS A EXCELLENT TO GOOD FAIR TO POOR POOR INCHITAR POOR DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY OW-SPRING OR SEEPAGE WITH FRESH ROCK. P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30 MODERATE! Y ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL CONSISTENCY OR DENSENESS MISCELLANEOUS SYMBOLS FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN AND DISCOLORED AND A MAJORITY SHOW KADLINIZATION BOCK SHOWS SEVERE LOSS OF STRENGTH CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK. PRIMARY SOIL TYPE ROADWAY EMBANKMENT OPT DHT TEST BORING IF TESTED, WOULD YIELD SPT REFUSAL SAMPLE JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. WITH SOIL DESCRIPTION DESIGNATIONS SEVERE ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCE LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. VERY LOOSE IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. \oplus GENERALLY SOIL SYMBOL AUGER BORING S- BULK SAMPLE LOOSE **GRANULAR** MEDIUM DENSE N/A LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MATERIA ARTIFICIAL FILL OTHER THAN SS- SPLIT SPOON IF TESTED, YIELDS SPT N VALUES > 100 BPF CORE BORING (NON-COHESIVE) 30 TO 50 MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SAMPLE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT VERY DENSE >50 ST- SHELBY TUBE SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK INFERRED SOIL BOUNDARIES VERY SOFT **O SAMPLE REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SLICH THAT ONLY MINOR PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN (0.25 MONITORING WELL GENERALLY SOFT 2 TO 4 VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF 0.25 TO 0.5 INFERRED ROCK LINE RS- ROCK SAMPLE MEDIUM STIFF PIEZOMETER SILT-CLA 0.5 TO 1 1 TO 2 2 TO 4 Δ ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. OMPLETE MATERIAL 8 TO 15 INSTALLATION RT- RECOMPACTED ALLUVIAL SOIL BOUNDAR' ***** VERY STIFF (COHESIVE) 15 TO 30 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 SLOPE INDICATOR INSTALLATION TRIAXIAL SAMPLE \bigcirc DIP/DIP DIRECTION OF ROCK STRUCTURES CBR - CBR SAMPLE ROCK HARDNESS EXPRESSED AS A PERCENTAGE. E OR GRAIN SI - SPT N-VALUE SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES VERY HARD S. STD. SIEVE SIZE . SOUNDING ROD REF - SPT REFUSAL SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL PENING (MM) 4.76 0.42 0.25 0.075 0.053 CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED **ABBREVIATIONS** HARD TO DETACH HAND SPECIMEN. COARSE FINE COBBLE GRAVEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS BOULDER SILT (SL.) CLAY (CL.) AR - AUGER REFUSAL PMT - PRESSUREMETER TEST (COB.) CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE BT - BORING TERMINATED SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. SD. - SAND, SANDY EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED. CL - CLAY St. - SILT, SILTY GRAIN MM 305 SIZE IN. 12* BY MODERATE BLOWS. 75 2.0 0.25 0.05 0.005 CPT - CONE PENETRATION TEST STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CSE, - COARSE TCR - TRICONE REFLISAL 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE SOIL MOISTURE - CORRELATION OF TERMS DMT - DILATOMETER TEST γ - UNIT WEIGHT A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN Ø.1 FOOT PENETRATION POINT OF A GEOLOGISTS PICK. DPT - DYNAMIC PENETRATION TEST SOIL MOISTURE SCALE FIELD MOISTURE 7d - DRY UNIT WEIGHT GUIDE FOR FIELD MOISTURE DESCRIPTION VOID RATIO CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS SOFT <u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. W - MOISTURE CONTENT F. - FINE FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN FOSS. - FOSSILIFFROUS PIECES CAN BE BROKEN BY FINGER PRESSURE. SATURATED USUALLY LIQUID: VERY WET, USUALLY 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 10 CENTIMETERS DIVIDED
BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. VST - VANE SHEAR TEST FRAC. - FRACTURED VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH FRAGS. - FRAGMENTS LIQUID LIMIT SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY MED. - MEDIUM ASTIC SEMISOLID: REQUIRES DRYING TO RANGE - WET - (W) TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. EQUIPMENT USED ON SUBJECT PROJECT ATTAIN OPTIMUM MOISTURE FRACTURE SPACING BEDDING (PI) PLASTIC LIMIT THICKNESS BENCH MARK: *202 RRS SET IN I2" OAK, 2I2.74' LT OF -L-STA. 54+37.88, EL = 22.35' & *204 RRS SET IN I2" OAK, 595.94' RT OF -L- STA. 6I+60.20, EL = 29.92' ELEVATION: TERM TERM ADVANCING TOOLS HAMMER TYPE: SPACING DRILL UNITS: VERY THICKLY BEDDED > 4 FEET SOLID: AT OR NEAR OPTIMUM MOISTURE VERY WIDE MORE THAN 10 FEET - MOIST - (M X AUTOMATIC X MANUAL OPTIMUM MOISTURE CLAY BITS THICKLY BEDDED 1.5 - 4 FFFT WIDE 3 TO 10 FEET MOBILE B-SHRINKAGE LIMIT THINLY BEDDED MODERATELY CLOSE 1 TO 3 FEET 6' CONTINUOUS FLIGHT AUGER VERY THINLY BENDEN 0.03 - 0.16 FFFT REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE CORE SIZE: CLOSE 0.16 TO 1 FEET NOTES. - DRY - (D) BK-51 VERY CLOSE LESS THAN 0.16 FEET X 8" HOLLOW AUGERS -B____ THINLY LAMINATED < 0.008 FEET INDURATION PLASTICITY HARD FACED FINGER BITS X CME-450 X -N WD4 FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. PLASTICITY INDEX (PI) DRY STRENGTH TUNG.-CARBIDE INSERTS П-н____ NONPLASTIC X CME-550 0-5 VERY LOW RUBBING WITH FINGER FREES NUMEROUS GRAINS FRIABLE LOW PLASTICITY MED. PLASTICITY SLIGHT X CASING W/ ADVANCER HAND TOOLS: GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MEDIUM PORTABLE HOIST X TRICONE 2-15/16 STEEL TEETH GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: POST HOLE DIGGER HIGH PLASTICITY 26 OR MORE HIGH MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER. TRICONE HAND AUGER X OTHER CME-750 GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; SOUNDING ROD INDURATED X CORE BIT DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY VANE SHEAR TEST OTHER MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. OTHER_ SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED OTHER SAMPLE BREAKS ACROSS GRAINS

STATE PROJECT NO. SHEET NO. TOTAL SHEET

34407.1.1

R-2245



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY **G**OVERNOR

LYNDO TIPPETT SECRETARY

October 5, 2005

STATE PROJECT:

34407.1.1 R-2245

F. A. PROJECT:

STP-1105(6) Brunswick

COUNTY: DESCRIPTION:

New Route from SR 1104 (Beach Dr.) to NC 211 (Second

bridge to Oak Island)

SUBJECT:

Geotechnical Report - Bridge Foundation Investigation for

SR 1105 over The Intracoastal Waterway at -L- Station 58+00

Site Description

The proposed bridge site is located at a new location over the Intracaostal Waterway in Oak Island. The structure will be constructed along the existing SR 1105 alignment, as well as cross-country to tie in to the new location portion of R-2245 roadway. Based on the proposed design, the new structure will have five spans with a length of 980 feet. The bents will have a skew of 90 degrees.

One Standard Penetration Test (SPT) boring was made at or near each proposed bent location to provide subsurface information relative to foundation design. Two additional Standard Penetration Tests were performed at the interior bents in the Intracoastal Waterway. Rock core was obtained from these additional borings, B2-A and B3-B. The borings were made with ATV mounted CME-550, CME-750 and barge mounted CME-45C drill machines and were advanced by rotary drill methods using bentonite drilling fluid. An NWD-4 core barrel with N casing was used to obtain the rock core.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by Recent alluvial deposits, Pliocene age sediments of the Waccamaw Formation and Tertiary age limestone and soils of the Castle Hayne Formation. Topography at the site is nearly flat to gentle sloping. Elevations at the site range from -15± feet along the Intracoastal Waterway dredged channel bed to 23± feet along the existing SR 1105 roadway. Elevations at the proposed End Bent 2 location range from 30± to 50± feet. During this investigation, water levels within the boreholes were measured at elevations of $5\pm$ and $6\pm$ feet, while the surface

MAILING ADDRESS:

NC DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT 1589 MAIL SERVICE CENTER RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088 FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION: CENTURY CENTER COMPLEX ENTRANCE B-2 1020 BIRCH RIDGE DRIVE RALEIGH NC

Sheet 3

of the Intracoastal Waterway has a tidal range from 2.7 above sea level to -1.5 feet below sea level.

Soil Description

Subsurface conditions at the site are relatively uniform. Surficial Recent soils generally consist of 20± to 27± feet of very loose to medium dense sand (A-3). Soils belonging to the Pliocene age Waccamaw Formation underlie the Recent deposits at elevations ranging from 1± to -4± feet. Soils of the Waccamaw Formation consist of 20± to 30± feet of very loose to very dense sand (A-1-b, A-2-4, A-3) with shell fragments and calcareous cemented sand layers. The Waccamaw deposits are underlain at elevations ranging from -23± to -35± feet by the Tertiary age Castle Hayne Formation. Soils within the Castle Hayne formation consists of alternating layers of medium dense to very dense sands (A-1-b, A-2-4, A-3) with calcareous sandstone and limestone. An 8± to 15± foot hard sandy clay layer was encountered in borings B2-A and B-3A at an elevation of -45± feet.

Based on the proposed design, the existing grade at End Bent 1 will be raised 35± feet at the proposed bridge site. Approximately 25 feet of embankment material will be placed at End Bent 2. The existing roadway at End Bent 1 was constructed on natural ground, which consists of very loose to medium dense sand (A-3). The proposed end bent slopes will be constructed on natural ground at End Bent 1 and on artificial fill at End Bent 2. Additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

The Geotechnical foundation report is based on the Bridge Survey and Hydraulic Design Report dated January 11, 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

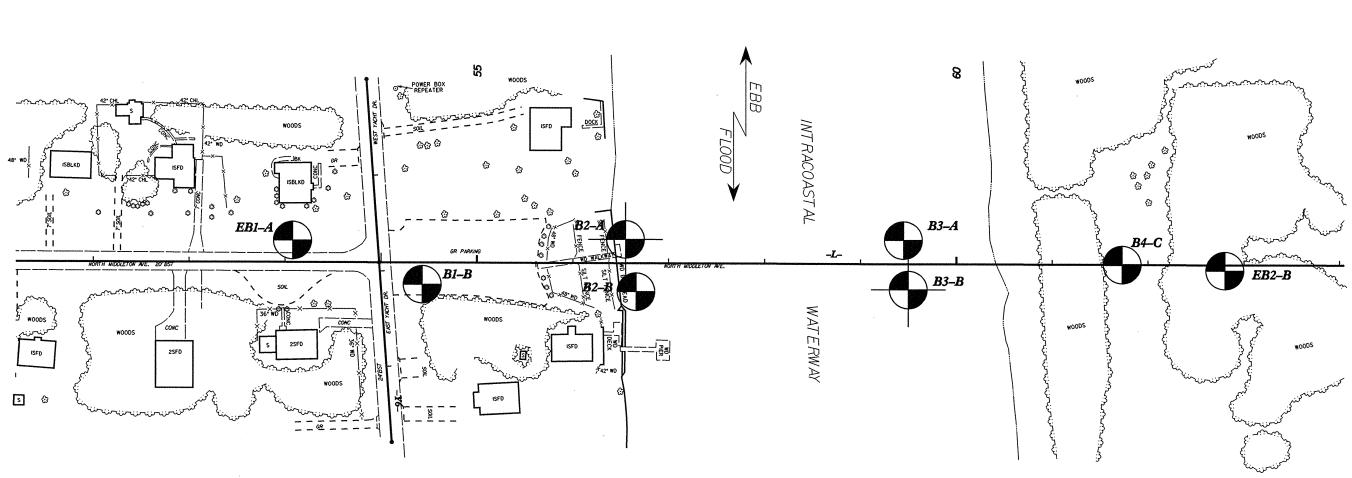
Prepared By:

Fred M. Wescott III

Project Engineering Geologist

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TEST SITE PLAN



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North Carolina department of transportation | North Carolina department of transportation | GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

	INSWICK GEOLOGIST J. L. STONE	PROJECT NO. 34407.1.1 ID. R-2245 COUNT	TY BRUNSWICK GEOLOGIST J. L. STONE
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INT			/ER INTRACOASTAL WATERWAY GROUND WATER
	FSET 25'LT ALIGNMENT -L- 0 HR. N		OFFSET 25'LT ALIGNMENT -L- 0 HR. N/A
COLLAR ELEVATION -0.4' NORTHING	EASTING 24 HR. N		EASTING 24 HR. N/A
	METHOD ROT - MUD HAMMER TYPE MANU		DRILL METHOD ROT - MUD HAMMER TYPE MANUAL
DEPTUIDI OW COLINTIDENT DI OWE DED FOOT	SURFACE WATER DEPTH 0.0-3.0' DEPTH TO ROCK 2		
(FT.) 0.5/0.5/0.5/(FT.) 0 25 50 75	SAMPLE O SOIL AND ROCK DESCRIPTION	ELEV. DEPTH BLOW COUNT PEN. BLOWS PER (FT.) 0.510.510.51(FT.) 0 25 50	FOOT SAMPLE O SOIL AND ROCK 75 100 NUMBER MOI. G DESCRIPTION
-5.0	BLUE GRAY SAND WITH SHELLS, SATURATED (WACCAMAW FORMATION)	-92.0	GRAY CALCAREOUS SAND SS-44 WITH CEMENTED LAYERS, SATURATED
-25.0	GRAY SAND, SATURATE CASTLE HAYNE FORMATI VERY CLOSE TO CLOSE VER SOFT TO SOFT CALCAREOL SANDSTONE TO SANDY LIMES	ON) -II2.0 -	GRAY VERY CLOSE TO CLOSE FRACTURED VERY SOFT TO SOFT CALCAREOUS SANDSTONE TO SANDY LIMESTONE
-40.0 	RS-I RS-2 AVG. REC = 57% AVG. RQD = 22%	-122.0 - BORING TERMIN ELEVATION - HE SANDSTONE JO	ATED AT HFEET +N LIMESTONE
-50.0 - 52.0 9 16 37 1 	GRAY SANDY CLAY WITH SHELL FRAGMENTS, MOIS	-l32.0 -	
-60.0	SS-4I	-142.0 -	
-65.0 	SS-41 SS-42 GRAY CALCAREOUS SAND CEMENTED LAYERS, SATURA		
-75.0 	 	-I57.0 -	

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Sheet 10

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL UNIT CORE BORING REPORT

	CT NO.: 3		dge No. 2).: R-2245		UNTY: Brunswick BORING NO.: B2-A stal Waterway
COLLA DRILL	AR ELEV. ER: M. M L DEPTH:	: -0.4 losely : 46.8	uge 110. 2	CORE GEOL	SIZE: NW OGIST: L. L RUN: 19	D-4 Stone	EQUIPMENT: CME -45C PERSONNEL: J. Walker DATE: 7-06-05
ELEV. (FT.)	DEPTH (FT.)	DRILL RATE MN/FT	RUN (FT.)	RQD ft.	REC ft. (%)	SAMP NO.	FIELD CLASSIFICATION AND REMARKS
-28.2	27.8	0:36 0:18 0:35 0:45	4.0	0.0 (0%)	0.4 (10%)		Dark Gray, very close to closely fractured, very soft to soft, calcareous cemented sandstone with small solution cavities.
-32.2	31.8	0:24 1:24 0:45 1:19 1:06	5.0	0.8 (16%)	1.3 (26%)		Dark Gray, very close to closely fractured very soft to soft, calcareous cemented sandstone with small solution cavities
-37.2	36.8	0:40 1:28 1:14 1:12 1:22	5.0	2.7 (54%)	4.6 (92%)	RS-1	Gray very close to closely fractured, very soft to soft, calcareous cemented sandstone with small solution cavities and shells.
-42.2 -47.2	41.8	0:56 1:46 1:47 1:32 1:45	5.0	3.5 (70%)	5.0 (100%)	RS-2	Gray, very close to closely fractured, very soft to soft, calcareous cemented sandstone to sandy limestone with small solution cavities and shell fragments.
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 3440	7.1.1	ID.	R-2245	COUNTY	BRUNSV	VICK	GEOL	LOGIST J. L. STONE	PROJECT	NO. 34	4407.	.1.1	ID.	R-2245	COUNTY	BRUNSV	WICK	GEOLO	GIST J.L.STON	SHEET OF 19
	·	NO. 22	9 ON S	SR 1105 OVER	RINTRAC	OASTAL	WATERW	WAY GROUND WATER	SITE DE	CRIPTION	BR	IDGE N	0. 22	9 ON S	R IIO5 OVER	INTRAC	OASTAL			GROUND WATER
BORING NO. B2-B		NG LOC		56+66	OFFSET	30′ RT		SNMENT -L- 0 HR. N/A	BORING	NO. B2	?-B	BORIN	G LOC.	ATION	56+66	OFFSET	' 30' RT	ALIGN	MENT -L-	0 HR. N/A
COLLAR ELEVATION			ORTHING			EASTIN		24 HR. N/A	d	ELEVATI		0.6′		ORTHING			EASTING			24 HR. N/A
TOTAL DEPTH 119.7			INE CME		DRILL METI				d	DEPTH				INE CME-			HOD ROT			YPE MANUAL
START DATE 06/2				OATE 06/30/			T	H 0.0-5.1 DEPTH TO ROCK 33.0'	START	DATE 06					ATE 06/30/0		RFACE WATI	ER DEPTH	0.0-5.1' DEPTH T	O ROCK 33.0'
ELEV. (FT.) ₀ .	.OW COUN .5 <u>10.510.</u>			OWS PER F	75 IOC	SAMPLE NUMBER	MOI. G	SOIL AND ROCK DESCRIPTION	ELEV.	4		V COUNT 0.510.5			OWS PER FOO		SAMPLE NUMBER	MOI.	SOIL ANI DESCRI	ROCK PTION
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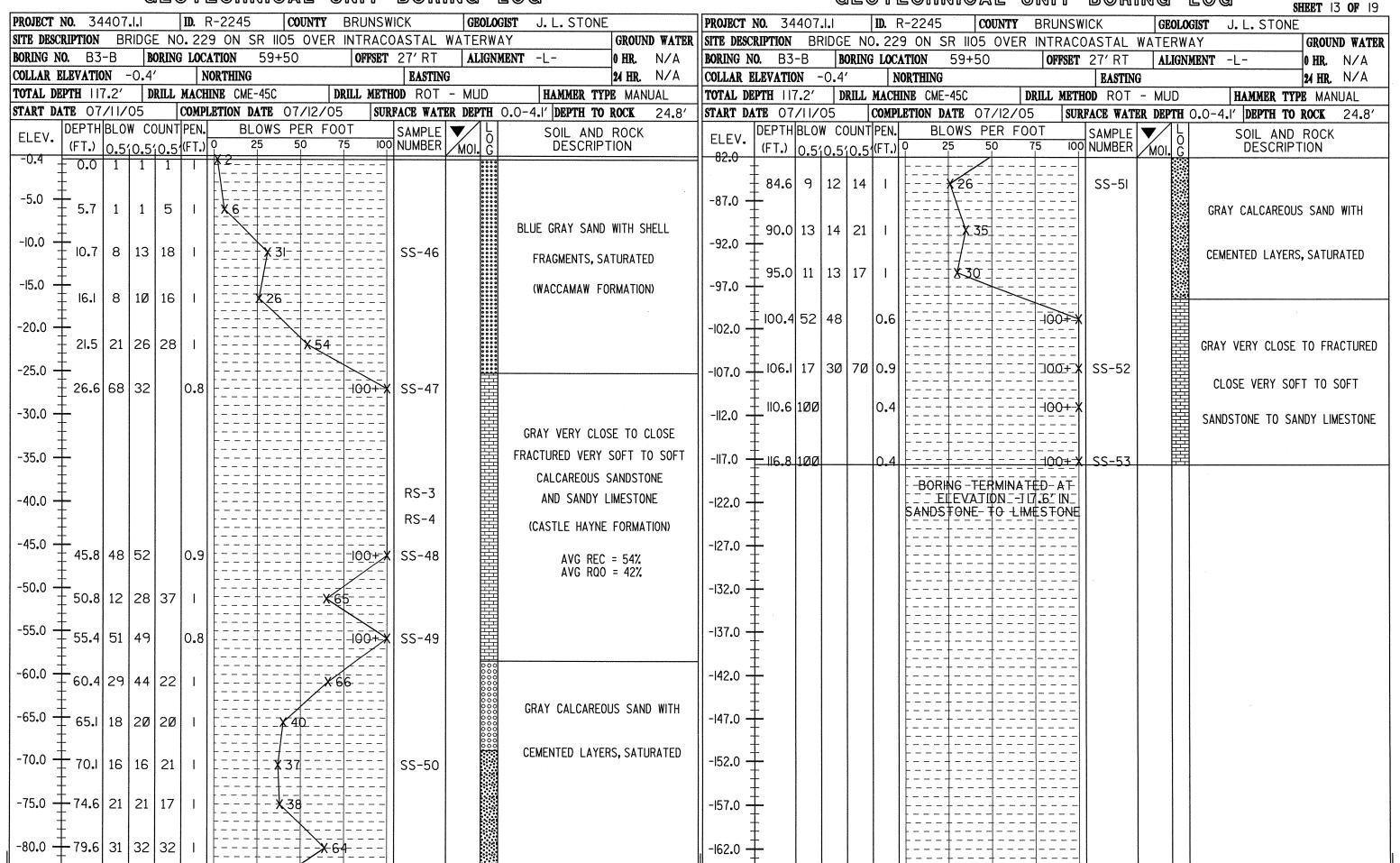
North Carolina department of transportation — north carolina department of transportation GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 34407.I.I ID. R-2245 COUNTY BRUNSWICK GEOLOGIST J. L. STONE	SHEET 12 OF 19
PROJECT NO. 34407.1.1 ID. R-2245 COUNTY BRUNSWICK GEOLOGIST J. L. STONE SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAY GROUND N	PROJECT NO. 34407.I.I ID. R-2245 COUNTY BRUNSWICK GEOLOGIST J. L. STONE WATER SITE DESCRIPTION BRIDGE NO. 229 ON SR IIO5 OVER INTRACOASTAL WATERWAY GROUND WATER
	WATERSITE DESCRIPTIONBRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAYGROUND WATERN/ABORING NO. B3-ABORING LOCATION 59+45OFFSET 25'LTALIGNMENT -L-0 HR. N/A
	N/A COLLAR BLEVATION -0.8' NORTHING EASTING 24 HR. N/A
TOTAL DEPTH 117.3' DRILL MACHINE CME-45C DRILL METHOD ROT - MUD HAMMER TYPE MANUA	
START DATE 07/07/05 COMPLETION DATE 07/07/05 SURFACE WATER DEPTH 0.0-3.7' DEPTH TO ROCK 28	28.0' START DATE 07/07/05 COMPLETION DATE 07/07/05 SURFACE WATER DEPTH 0.0-3.7' DEPTH TO ROCK 28.0'
ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT SAMPLE VO SOIL AND ROCK	ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOOT SAMPLE VO SOIL AND ROCK
[(F1.) 0.510.510.51(FT.) 25 50 75 100 NUMBER MOI.] G DESCRIPTION	82 0 (F.) Q.51Q.51Q.51(F.) 23 30 13 100 NUMBER MOI. G DESCRIPTION
-0.8 <u>0.0 2 4 4 1 X8</u>	
-5.0 +	-87.0
\$ 1.4 WOH 1 6 1 X7-1	-87.0 + 86.5 8 10 12 1 x 22 + SS-60 GRAY CALCAREOUS SAND WITH
-IO.O TOO.O TOO SHELL FRAGMENTS, SATURATION	TED
10.4 10 15 15 1 30 (WACCAMAW FORMATION)	-92.0 + 91.5 9 12 15
-5.0	-97.0 + 96.5 9 11 15 1 +26
-20.0 + 20.4 7 8 8 1 + SS-55	-l02.0 士 101.5 8 92 0.8 - 100+ SS-61
EDAY CAND CATUDATED	
-25.0 + 25.0 44 22 27 1	-107.0 + 106.5 18 56 44 0.8
$\begin{vmatrix} -30.0 & + \\ + & 30.0 \end{vmatrix}$ 18 $\begin{vmatrix} 60 & 40 & 0.9 \end{vmatrix}$ $\begin{vmatrix} -2 & -1 & -1 & -1 & -1 & -1 & -1 & -1 &$	-II2.0 + III.5 100 0.4 +
VERY CLOSE TO CLOSE FRACT	SANDY LIMESTONE
SANDSTONE AND SANDY	
-40.0 + 10 0 10 0 10 0 10 0 10 0	LOO - +
40.4 2Ø 52 48 0.9	
	""
-45.0 	
GRAY SANDY CLAY WITH	
-50.0 +	H - 32.0 +
The state of the s	
-55.0 + 56.1 13 13 13 13 13 13 13 13 13 13 13 13 13	- 37.0 +
56.I 13 42 24 I F	
-60.0 	$ -142.0 + -1 - 1 - 1$
+ 61.3 19 33 40 1 + + + +	
-65.0 	- 47.0 +
-70.0 + GRAY CALCAREOUS SAND WI	WITH -152.0 +
71.5 11 14 16 1 [+ x 30 + SS-59 CEMENTED LAYERS, SAUTRAT	
-75.0	
1 76.5 15 11 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-I57.0 +
-80.0 +	-162.0 +

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG



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Sheet 14

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL UNIT CORE BORING REPORT

1	ECT NO.: 3		3 NT 0		I.D. NO.: 1		COUNTY: Brunswick BORING NO.: B3-B
	AR ELEV.		dge No. 2		1105 over SIZE: NV		stal Waterway EQUIPMENT: CME-45C
	ER: M. M				GIST: L.		PERSONNEL: J. Walker
	L DEPTH:	•			L RUN: 15		DATE: 7-12-05
ELEV. (FT.)	DEPTH (FT.)	DRILL RATE MN/FT	RUN (FT.)	RQD ft. (%)	REC ft. (%)	SAMP NO.	FIELD CLASSIFICATION AND REMARKS
-27.8	27.4	0:22		1	(1.2)		Gray, very close to closely fractured, very
		0:16		0.0	0.2		soft to soft, calcareous cemented sandstone
		0:26	5.0				with small solution cavities and phosphate.
		0:22		(0%)	(4%)	-	with small solution outlies and phospilate.
		0:26	1	(0,0)	(.,0)		
-32.8	32.4	0:40	1				Gray, very close to closely fractured, very
		0:53	1	2.8	2.9		soft to soft, calcareous cemented sandstone
		1:06	5.0		2.0		to sandy limestone, with small solution
		1:10	1	(56%)	(58%)		cavities and shell molds.
		1:11		(2070)	(5070)		cavities and shell motus.
-37.8	37.4	0:38					Gray, very close to closely fractured, very
0,10	0,	0:40	1	4.8	5.0		soft to soft, calcareous cemented sandstone
		0:46	5.0	7.0	5.0	RS-3	to sandy limestone, with shells, shell molds
		0:44	3.0	(96%)	(100%)	105-5	and small solution cavities.
-42.8	42.4	0:44	1	(2070)	(10070)	RS-4	and sman solution cavities.
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North Carolina department of transportation — north carolina department of transportation GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 34407.1.1 ID. R-2245 COUNTY	BRUNSWICK Geologist J. L. S	STONE PROJECT	T NO. 34407.I.I ID	R-2245 COUNTY BRUNS	WICK GEOLOGIST	J. L. STONE
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER				229 ON SR 1105 OVER INTRAC		GROUND WATER
BORING NO. B4-C BORING LOCATION 61+73	OFFSET CL ALIGNMENT -L-		NO. EB2-B BORING L	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	r 6' RT ALIGNMENT	-L- 0 HR. N/A
COLLAR ELEVATION 37.4' NORTHING	EASTING		R ELEVATION 38.9'	NORTHING	EASTING	24 HR. 34.0′
					THOD HS AUGERS/RM	HAMMER TYPE AUTOMATIC
START DATE 06/16/05 COMPLETION DATE 06/16/05	_				RFACE WATER DEPTH	DEPTH TO ROCK
ELEV. DEPTH BLOW COUNT PEN. BLOWS PER FOO (FT.) 0.5(0.5(0.5(FT.)) 0 25 50 7		AND ROCK SCRIPTION ELEV	/. DEPTH BLOW COUNT PE (FT.) 0.510.510.516	<u> </u>	SAMPLE NUMBER MOI. G	SOIL AND ROCK DESCRIPTION
37.4		38.9	1 0.0 WOH 1 2	X 3 	│	
35.0 = 3.5 2 4 4	SS-I3 TAN S. FR. (AF SS-I4 SS-I5 TAN BF TO SS-I6 SS-I7	SAND WITH SHELL 35.0	3.5 2 2 5		SS-20 SS-21 SS-21	TAN SAND WITH SHELL
30.0 + 8.5 1 3 4 1 + 7 - 1	FR.	AGMENTS, DRY 30.0	± 8.5 3 5 6	- - - - - - - - -	X X X X X X X X X X	FRAGMENTS, DRY (ARTIFICIAL FILL)
25.0 = 13.6 2 3 6 1 - 2	 SS-14	RTIFICIAL FILL) 25.0	13.4 3 5 5		SS-2I	
20.0 + 18.6 5 8 13 1 121		20.0	18.4 3 4 5		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
15.0	SS-I5 TAN BF	ROWN SAND, MOIST	± 23.4 5 8 14 ±	1 22	SS-22	TAN BROWN SAND, MOIST TO SATURATED
10.0		O SATURATED 10.0	28.4 5 7 10		0000	
5.0 + 33.6 6 8 9 1 - 4	 SS-I6	5.0	33.4 5 6 8	1 - 14	SS-23 T	
0.0	 SS-17	0.0	38.4 6 13 14		SS-24	
-5.0 - 43.6 14 14 14 1 		AY SAND WITH SHELL	43.4 8 8 13			BLUE GRAY SAND WITH SHELL
-l0.0 + 48.6 2Ø 19 18 X 37	 SS-18 FRAGI	MENTS, SATURATED -10.0 CAMAW FORMATION)	+ 48.4 11 19 16 ±			FRAGMENTS, SATURATED
-l5.0 ± 53.6 3 5 6 1 - X H	BLUE GRAGI	-15.0	53.4 6 10 11		SS-25	(WACCAMAW FORMATION)
-20.0 + 58.6 11 12 21 I X-33	 SS-19	-20.0	58.4 5 5 11	1		
-25.0 —	 D-AT	-25.0	‡	BORING TERMINATED AT- ELEVATION -21.0' -IN MEDIUM DENSE SAND-		
-30.0 +		-30.0	‡			
-35.0 +		-35.0	‡			
-40.0 +		-40.0	+			

PROJ. NO. - 34407.1.1 ID NO. - R-2245 COUNTY - BRUNSWICK

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			S	OIL TE	ES T	^{r}R	ESU	ULT	S						
SAMPLE			DEPTH	AASHTO				% BY V	VEIGHT		% PAS	SING (S	SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	23 LT	53+08	2.1-3.6	A-3(0)	23	NP	56.1	42.9	1.0	0.0	100	78	1	-	
SS-2	23 LT	53+08	13.3-14.8	A-3(0)	23	NP	26.3	73.3	0.4	0.0	100	95	1	-	-
SS-3	23 LT	53+08	23.3-24.8	A-3(0)	19	NP	34.9	64.5	0.6	0.0	100	87	1	-	-
SS-4	23 LT	53+08	28.3-29.8	A-3(0)	31	NP	28.9	63.1	1.9	6.1	97	79	10	- 1	-
SS-5	23 LT	53+08	38.3-39.8	A-2-4(0)	27	NP	18.4	72.9	2.6	6.1	100	93	13	- 1	-
SS-6	23 LT	53+08	48.1-49.6	A-2-4(0)	19	NP	53.9	29.5	10.5	6.1	96	76	18	-	

B1-B

			Se	OIL TE	ES T	\overline{R}	ESU	ULT	S						
SAMPLE			DEPTH	AASHTO				% BY V	VEIGHT		% PAS	SING (S	SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-7	23 RT	54+43	7.3-8.8	A-3(0)	19	NP	31.0	68.6	0.4	0.0	100	98	1	-	-
SS-8	23 RT	54+43	18.3-19.8	A-3(0)	22	NP	31.2	68.8	0.0	0.0	100	95	0	- 1	
SS-9	23 RT	54+43	28.3-29.8	A-3(0)	30	NP	19.7	74.8	1.4	4.1	100	85	6		
SS-10	23 RT	54+43	33.3-34.8	A-2-4(0)	28	NP	32.5	55.6	1.8	10.1	92	68	14	. 1	
SS-11	23 RT	54+43	43.3-44.8	A-1-b(0)	23	NP	75.8	15.4	2.8	6.1	86	44	9	- 1	-
SS-12	23 RT	54+43	58.3-59.8	A-3(0)	23	NP	58.3	32.3	1.3	8.1	93	64	9	•	-

R2-A

D2=/1							,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								
			S	OIL TE	ES I	^{r}R	ESU	ULT	S						
SAMPLE			DEPTH	AASHTO	Ī			% BY V	VEIGHT		% PAS	SING (SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-38	25 LT	56+55	11.2-12.7	A-2-4(0)	29	NP	1.8	89.8	4.4	4.1	100	99	13	•	
SS-39	25 LT	56+55	26.2-27.7	A-3(0)	19	NP	42.2	48.1	5.7	4.1	91	86	10	- 1	
SS-40	25 LT	56+55	46.8-48.3	A-6(4)	31	14	34.2	17.2	20.2	28.4	98	82	49	1 - 1	
SS-41	25 LT	56+55	57.0-58.5	A-1-b(0)	19	NP	64.7	16.2	11.0	8.1	57	30	12	1 - 1	-
SS-42	25 LT	56+55	67.0-68.5	A-2-4(0)	19	NP	60.7	20.9	10.3	8.1	100	77	20	i - 1	-
SS-43	25 LT	56+55	77.0-78.5	A-2-4(0)	18	NP	55.0	25.6	11.2	8.1	100	81	22	T - 1	-
SS-45	25 LT	56+55	112.0-112.8	A-4(0)	18	NP	8.5	43.0	28.3	20.3	100	96	58	!	=

B2-B

			S	OIL TE	ES I	^{r}R	ESU	ULT	S						
SAMPLE			DEPTH	AASHTO		% BY V	VEIGHT		% PAS	SING (S	SIEVES)	%	%		
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-26	30 RT	56+66	6.0-7.5	A-1-b(0)	25	NP	50.1	44.6	2.3	3.0	88	48	6	-	*
SS-27	30 RT	56+66	15.8-17.3	A-2-4(0)	29	NP	24.7	65.9	5.4	4.1	100	88	14	. 1	-
SS-28	30 RT	56+66	25.0-26.5	A-2-4(0)	21	NP	46.6	39.3	12.1	2.0	88	75	14	- 1	*
SS-29	30 RT	56+66	34.6-36.0	A-2-4(0)	20	NP	49.2	23.7	14.9	12.2	96	68	31	- 1	-
SS-30	30 RT	56+66	43.8-45.1	A-4(2)	26	9	33.2	15.2	23.2	28.4	98	82	53	- 1	-
SS-31	30 RT	56+66	55.7-57.2	A-1-b(0)	23	NP	64.7	16.1	12.1	7.1	90	47	20	- 1	
SS-32	30 RT	56+66	65.8-67.3	A-2-4(0)	19	NP	60.4	20.3	13.3	6.1	100	77	21	-	-
SS-33	30 RT	56+66	75.7-77.2	A-2-4(0)	20	NP	54.8	23.4	12.7	9.1	100	80	24	· -	•
SS-34	30 RT	56+66	86.0-87.5	A-2-4(0)	18	NP	37.1	34.7	18.1	10.1	100	94	29	-	-
SS-35	30 RT	56+66	95.5-97.0	A-2-4(0)	20	NP	27.2	39.1	21.6	12.2	100	93	35	-	##
SS-36	30 RT	56+66	104.9-105.8	A-2-4(0)	18	NP	21.1	45.6	19.1	14.2	90	82	32	-	*
SS-37	30 RT	56+66	114.3-114.7	A-4(0)	20	NP	3.9	56.1	21.8	18.2	100	98	58	!	•

				SOIL 7	TES	ST	RES	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% 1	PASSING (S	SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-54	25 LT	59+45	5.4-6.9	A-3(0)	27	NP	6.1	91.1	2.8	0.0	100	96	3	-	•
SS-55	25 LT	59+45	20.4-21.9	A-2-4(0)	19	NP	62.6	29.3	4.1	4.0	100	82	12	-	-
SS-56	25 LT	59+45	30.0-31.5	A-2-4(0)	22	NP	8.5	80.7	5.8	5.1	100	99	17	-	-
SS-57	25 LT	59+45	45.7-47.2	A-6(2)	28	11	36.0	17.8	15.8	30.4	97	80	46	-	
SS-58	25 LT	59+45	61.3-62.8	A-2-4(0)	22	NP	62.3	18.0	9.5	10.1	99	58	22	-	-
SS-59	25 LT	59+45	71.5-73.0	A-2-4(0)	18	NP	59.0	21.1	9.8	10.1	100	78	22	-	•
SS-60	25 LT	59+45	86.5-88.0	A-2-4(0)	17	NP	34.8	38.1	13.0	14.2	100	95	28	-	-
SS-61	25 LT	59+45	101.5-102.3	A-2-4(0)	19	NP	17.6	49.0	13.2	20.2	100	97	35	-	-
SS-62	25 LT	59+45	111.5-111.9	A-4(0)	18	NP	12.1	44.5	19.0	24.3	100	90	55		-
SS-63	25 LT	59+45	35.0-36.5	A-4(0)	20	NP	42.3	23.5	14.0	20.2	100	81	39	-	-

B3-B	a Barriera de Caracteria d														
				SOIL 7	TES	ST	RES	SUL	TS						
SAMPLE			DEPTH	AASHTO			T	% BY W	EIGHT		%	PASSING (S	SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-46	27 RT	59+50	10.7-12.2	A-3(0)	28	NP	3.3	91.0	2.6	3.0	98	97	9	-	•
SS-47	27 RT	59+50	26.6-27.4	A-1-b(0)	19	NP	33.4	40.7	13.8	12.1	59	50	17	-	-
SS-48	27 RT	59+50	45.8-46.7	A-2-4(0)	22	3	48.0	19.2	10.5	22.3	92	64	32	-	•
SS-49	27 RT	59+50	55.4-56.2	A-1-b(0)	21	NP	65.4	15.4	7.1	12.1	85	43	18	-	-
SS-50	27 RT	59+50	70.1-71.6	A-2-4(0)	18	NP	61.5	17.8	8.5	12.1	100	68	23	-	-
SS-51	27 RT	59+50	84.6-86.1	A-2-4(0)	18	NP	37.4	36.6	11.7	14.2	100	94	27	70	-
SS-52	27 RT	59+50	106.1-107.5	A-4(0)	17	NP	13.6	47.2	19.0	20.2	100	95	41		
SS-53	27 RT	59+50	116.8-117.2	A-4(0)	20	2	2.4	41.1	28.1	28.3	100	99	68	-	-

B4-C															
				SOIL 2	TES	ST	RES	SUL	TS						
SAMPLE			DEPTH	AASHTO	T		T	% BY WI	EIGHT		%	PASSING (S	SIEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-13	CL	61+73	3.5-5.0	A-3(0)	23	NP	20.6	77.0	1.4	1.0	100	97	3	-	•
SS-14	CL	61+73	13.6-14.9	A-3(0)	24	NP	16.6	80.1	3.2	0.0	100	98	4	-	
SS-15	CL	61+73	23.6-25.1	A-3(0)	21	NP	21.1	77.5	1.4	0.0	100	99	2	-	*
SS-16	CL	61+73	33.6-35.1	A-3(0)	23	NP	36.0	61.3	0.7	2.0	100	85	3	-	
SS-17	CL	61+73	38.6-40.1	A-3(0)	25	NP	12.2	83.7	0.0	4.0	100	95	5	-	
SS-18	CL	61+73	48.6-50.1	A-2-4(0)	27	NP	5.4	87.4	2.1	5.1	100	98	14	•	
SS-19	CL	61+73	58.6-60.1	A-2-4(0)	20	NP	46.9	38.3	10.8	4.1	100	91	16	-	•

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<u>EB2-B</u>															
				SOIL 7	TES	ST	RES	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		%	PASSING (SIEVES)	%	%.
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-20	6 RT	62+80	3.5-5.0	A-3(0)	22	NP	48.1	51.7	0.2	0.0	100	79	1	-	-
SS-21	6 RT	62+80	13.4-14.9	A-3(0)	25	NP	24.4	73.1	2.4	0.0	100	96	3	-	-
SS-22	6 RT	62+80	23.4-24.9	A-3(0)	21	NP	19.5	79.7	0.8	0.0	100	98	1	-	
SS-23	6 RT	62+80	33.4-34.9	A-3(0)	22	NP	26.7	69.9	1.4	2.0	100	91	4	-	-
SS-24	6 RT	62+80	38.4-39.9	A-3(0)	30	NP	42.1	53.8	0.1	4.1	96	67	5	-	-
SS-25	6 RT	62+80	53.4-54.9	A-2-4(0)	27	NP	19.1	71.4	4.5	5.1	100	91	19	-	-

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 34407.1.1 ID: R-2245 COUNTY: Brunswick
DESCRIPTION(1): New Bridge No. 229 on SR 1105 over Intracoastal Waterway
INFORMATION ON EXISTING BRIDGE Information obtained from:
BR. NO.: 229 BR. LENGTH: N/A NO. BENTS: N/A NO. BENTS IN: CHANNEL: N/A FLOODPLAIN: N/A
FOUNDATION TYPE: N/A
EVIDENCE OF SCOUR(2):
ABUTMENTS OR END BENT SLOPES: N/A
INTERIOR BENTS: N/A
CHANNEL BED: N/A
CHANNEL BANKS: N/A
EXISTING SCOUR PROTECTION:
TYPE(3): N/A
EXTENT(4): N/A
EFFECTIVENESS(5): N/A
OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): N/A
DESIGN INFORMATION
CHANNEL BED MATERIAL(7): Blue gray sand with shell fragments (SS-38, SS-46, SS-54)
CHANNEL BANK MATERIAL(8): Tan sand (SS-7, SS-15)
CHANNEL BANK COVER(9): Wooded
FLOOD PLAIN WIDTH(10): N/A
FLOOD PLAIN COVER(11): N/A

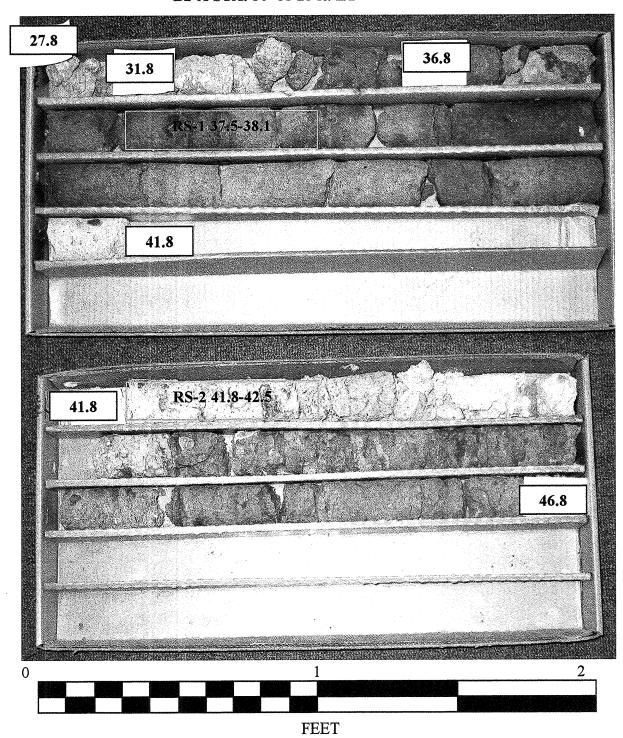
DESIGN INFORMATION CONT. STREAM IS:XDEGRADING AGGRADING EQUILIBRIUM (12) OTHER OBSERVATIONS AND COMMENTS:
CHANNEL MIGRATION TENDENCY (13): N/A
GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):
Geotechnical analysis agrees with the Hydraulic Unit's estimate of scour potential to an elevation
of -17+/- feet.
REPORTED BY: ful Majswit T4 DATE: 11-9-05

INSTRUCTIONS

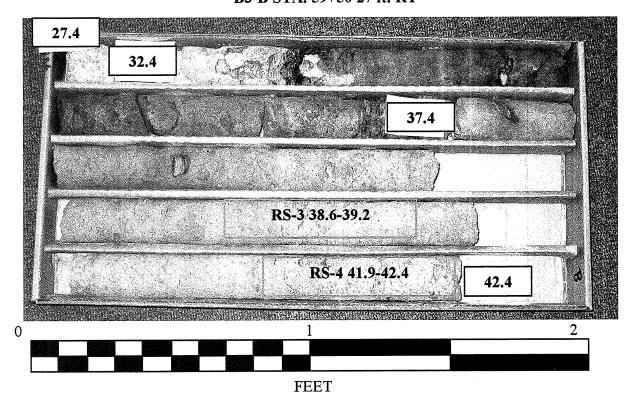
- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED.
- NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- 3) NOTE ANY EXISTING SCOUR PROTECTION (RIR RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
- (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- 10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY, CORE RECOVERY PERCENTAGE, PERCENTAGE RQD, DIFFERENTIAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OTHER TESTS DEEMED APPROPRIATE, AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

CORE PHOTOGRAPHS

B2-A STA. 56+55 25 ft. LT



B3-B STA. 59+50 27 ft. RT



34407.1.1 R-2245
Brunswick Co.
Bridge No. 229 on SR 1105 over Intracoastal Waterway



View looking North towards End Bent 2