

CONTRACT: ID: R-2245

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34407.1.1 (R-2245)	1	13
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34407.1.1	STP-1105(6)	P.E.	
		CONST.	

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 ON-PLACED 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.

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

INVESTIGATED BY FMW PERSONNEL RLE

CHECKED BY DNA MLM

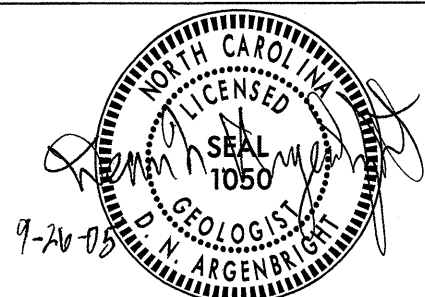
SUBMITTED BY DNA DRP

DATE SEPTEMBER 2005

DRAWN BY: C.D. CZAJKA

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

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



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2245	34407.1.1	2	13

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	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 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: <i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	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. 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. COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SILT-CLAY OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE GROUND WATER ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. ▽ PW STATIC WATER LEVEL AFTER 24 HOURS. ▽ PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA ○ SPRING OR SEEPAGE MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT DPT DMT VST TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED FRAGS - FRAGMENTS MED - MEDIUM PMT - PRESSUREMETER TEST SD - SAND, SANDY SL - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL ? - UNIT WEIGHT γd - DRY UNIT WEIGHT w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST	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 DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP) WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. IF TESTED, WOULD YIELD SPT REFUSAL. 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. IF TESTED, YIELDS SPT N VALUES > 100 BPF. 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. IF TESTED, YIELDS SPT N VALUES < 100 BPF. 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. ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. 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. SOFT CAN BE GROOVED 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. 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 FINGER NAIL. 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 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. 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. 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 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
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 % PASSING #10, #40, #200 LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS A SUBGRADE	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. 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ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP) WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. IF TESTED, WOULD YIELD SPT REFUSAL. 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. IF TESTED, YIELDS SPT N VALUES > 100 BPF. 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. IF TESTED, YIELDS SPT N VALUES < 100 BPF. 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. ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. 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. SOFT CAN BE GROOVED 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. 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 FINGER NAIL. 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. 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SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT	ABBREVIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST		



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

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

LYNDO TIPPETT
SECRETARY

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.

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± 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± to -14.1± 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.

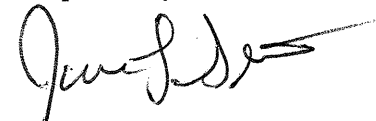
Based on the proposed design the existing grade will be raised approximately 1± foot. The existing roadway embankment is composed of approximately 16± feet of very loose to medium dense fine to coarse sand (A-3). The proposed end bent slopes will be mainly constructed within the existing embankment. 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_u), Young's Modulus (E) and Poisson's Ratio (ν):

<u>Sample</u>	<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:

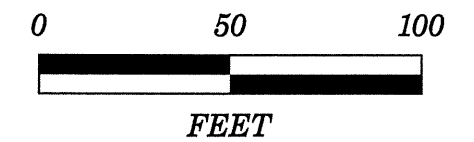
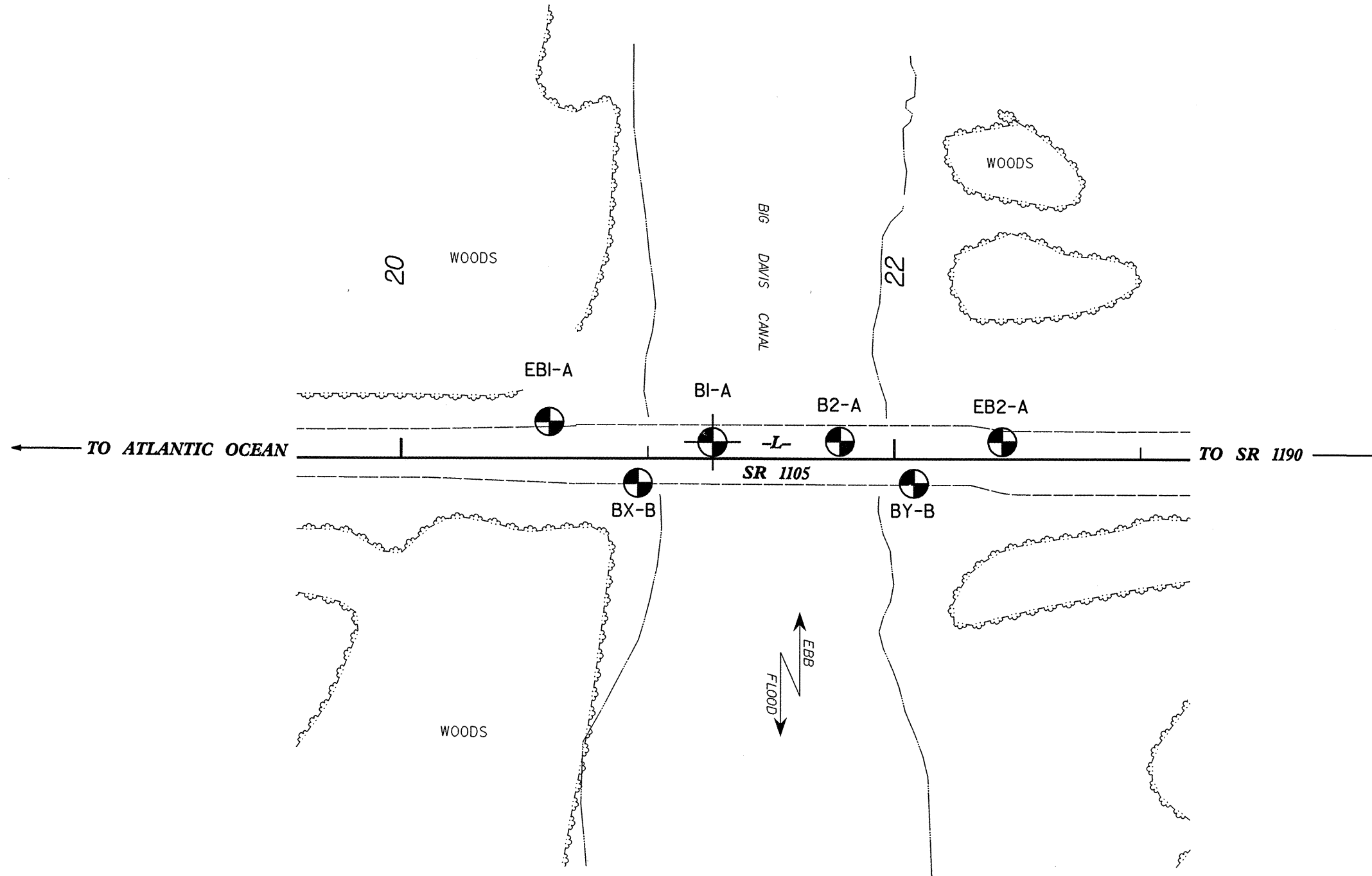
A handwritten signature in black ink, appearing to read 'Joseph L. Stone', with a stylized flourish at the end.

Joseph L Stone, L.G.
Engineering Geologist

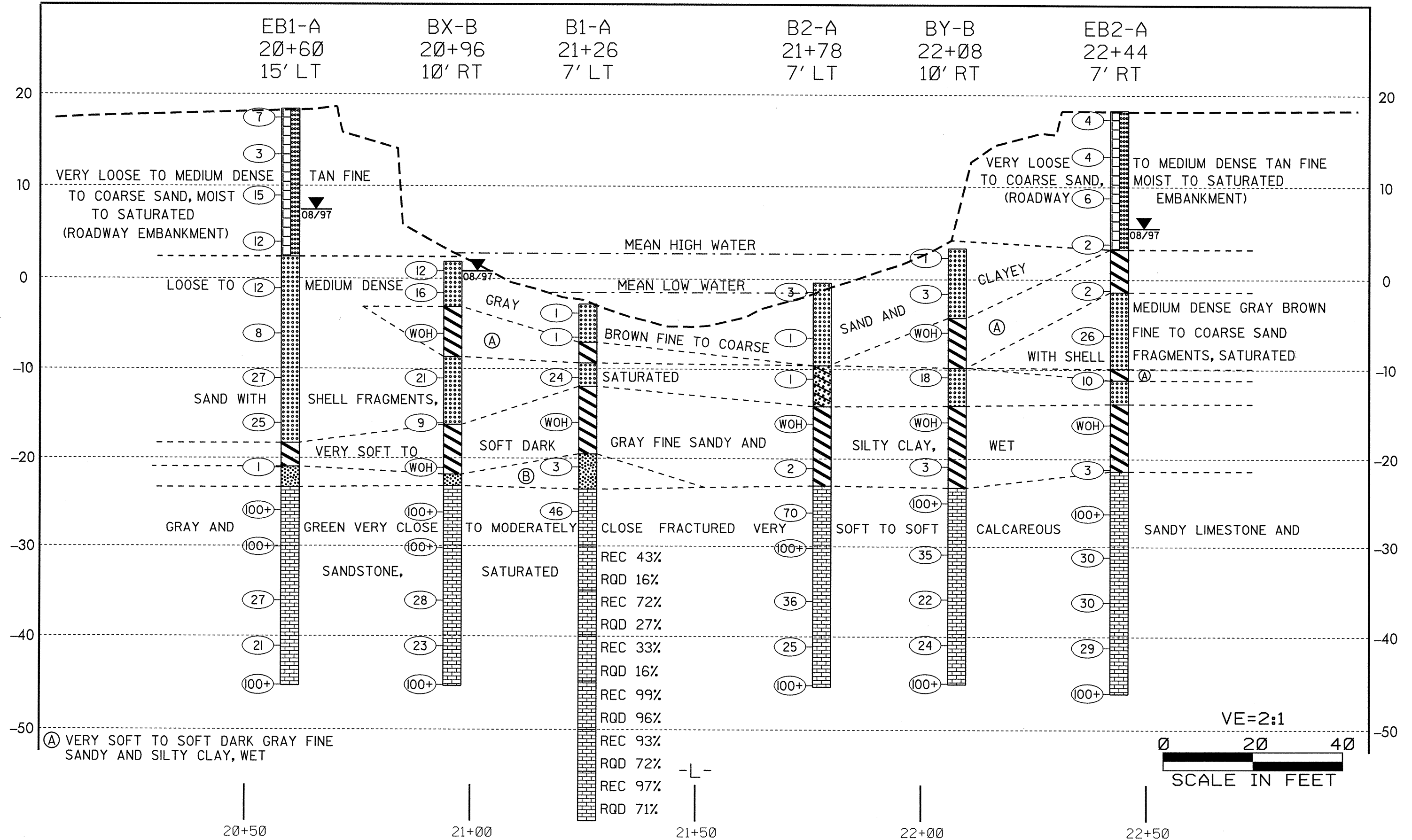
PROJECT REFERENCE NO.	SHEET NO.
34407.1.1	4



TEST SITE PLAN



PROFILE THROUGH BORINGS PROJECTED ALONG -L-



Ⓐ VERY SOFT TO SOFT DARK GRAY FINE SANDY AND SILTY CLAY, WET

Ⓑ VERY LOOSE GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED

REC 43%
RQD 16%
REC 72%
RQD 27%
REC 33%
RQD 16%
REC 99%
RQD 96%
REC 93%
RQD 72%
REC 97%
RQD 71%

VE=2:1
0 20 40
SCALE IN FEET

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 34407.1.I		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST R.L. EDWARDS							
SITE DESCRIPTION BRIDGE NO. 206 ON SR 1105 OVER BIG DAVIS CANAL							GROUND WATER						
BORING NO. EBI-A		BORING LOCATION 20+60		OFFSET 15' LT		ALIGNMENT -L-							
COLLAR ELEVATION 18.4'		NORTHING		EASTING		0 HR. N.M. 24 HR. 11.1'							
TOTAL DEPTH 63.8'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 8/26/97		COMPLETION DATE 8/26/97		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
18.4	0.0	1	3	4	1.0								
15.0	4.0	2	1	2	1.0	X 3						SS-9	TAN FINE TO COARSE SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
10.0	8.5	6	8	7	1.0	X 15							
5.0	13.5	6	6	6	1.0	X 12						SS-10	
0.0	18.5	5	7	5	1.0	X 12						SS-11	
-5.0	23.5	6	5	3	1.0	X 8							GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-10.0	28.5	7	11	16	1.0	X 27						SS-12	
-15.0	33.5	10	11	14	1.0	X 25							
-20.0	38.5	WOH	WOH	1	1.0	X 1						SS-13	DARK GRAY SILTY CLAY, WET GRAY BROWN FINE TO COARSE SAND, SATURATED
-25.0	43.5	17	83		0.8					100+ X		SS-14	
-30.0	48.5	50			0.1					100+ X			GRAY GREEN VERY CLOSE TO MODERATELY CLOSE FRACTURED VERY SOFT TO SOFT SANDY LIMESTONE AND SANDSTONE, SATURATED
-35.0	53.5	25	12	15	1.0	X 27						SS-15	
-40.0	58.5	12	9	12	1.0	X 21							
-45.0	63.5	50			0.1					100+ X			
BORING TERMINATED AT ELEVATION -45.4 FEET IN SANDY LIMESTONE.													

PROJECT NO. 34407.1.I		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST R.L. EDWARDS							
SITE DESCRIPTION BRIDGE NO. 206 ON SR 1105 OVER BIG DAVIS CANAL							GROUND WATER						
BORING NO. BX-B		BORING LOCATION 20+96		OFFSET 10' RT		ALIGNMENT -L-							
COLLAR ELEVATION 1.8'		NORTHING		EASTING		0 HR. N.M. 24 HR. 1.0'							
TOTAL DEPTH 47.1'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC							
START DATE 8/27/97		COMPLETION DATE 8/27/97		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A							
ELEV.	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
1.8	0.0	2	5	7	1.0	X 12							
0.0	2.4	3	6	10	1.0	X 16						SS-16	GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-5.0	6.9	WOH	WOH	WOH	1.0	X 0						SS-17	DARK GRAY SILTY FINE SANDY CLAY, WET
-10.0	11.9	9	10	11	1.0	X 21						SS-18	GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-15.0	16.9	6	7	2	1.0	X 9							
-20.0	21.9	WOH	WOH	WOH	1.0	X 0						SS-19	DARK GRAY SILTY CLAY, WET
-25.0	26.9	32	63	37	0.6					100+ X		SS-20	GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-30.0	31.9	50			0.1					100+ X			GRAY GREEN VERY CLOSE TO MODERATELY CLOSE FRACTURED VERY SOFT TO SOFT SANDY LIMESTONE AND CALCAREOUS SANDSTONE, SATURATED
-35.0	36.9	7	13	15	1.0	X 28						SS-21	
-40.0	41.9	10	9	14	1.0	X 23							
-45.0	46.9	50			0.1					100+ X			
BORING TERMINATED AT ELEVATION -45.3 FEET IN SANDY LIMESTONE.													

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

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

PROJECT NO. 33407.1.1	ID. R-2245	COUNTY BRUNSWICK	GEOLOGIST R.L. EDWARDS
SITE DESCRIPTION BRIDGE NO 206 ON SR 1105 OVER BIG DAVIS CANAL			GROUND WATER
BORING NO. BI-A	BORING LOCATION 21+26	OFFSET 7' LT	ALIGNMENT -L-
COLLAR ELEVATION -2.8'	NORTHING 0.00	EASTING 0.00	0 HR. N.M. 24 HR. N.M.
TOTAL DEPTH 57.3'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 9/3/97	COMPLETION DATE 9/10/97	SURFACE WATER DEPTH 2.0'	DEPTH TO ROCK

PROJECT NO.: 34407.1.1	I.D. NO.: R-2245	COUNTY: Brunswick	BORING NO.: B1-A
SITE DESCRIPTION: Bridge No. 206 on SR 1105 over Big Davis Canal			EQUIPMENT: CME-45B
COLLAR ELEV.: -2.0	CORE SIZE: NWD-4	PERSONNEL: DRP, MDC	
DRILLER: MLM	GEOLOGIST: EAW, RLE	DATE: 9-10-97	
TOTAL DEPTH: 57.2'	TOTAL RUN: 30'		

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
-2.8	0.0	WOH	WOH	1	1.0							GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SAT.
-5.0	2.7	1	Ø	Ø	1.0							DARK GRAY SILTY CLAY, WET.
-10.0	7.2	8	1Ø	14	1.0			24				GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SAT.
-15.0	12.2	WOH	WOH	WOH	1.0							DARK GRAY SILTY CLAY, WET.
-20.0	17.2	WOH	WOH	3	1.0			3				GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SAT.
-25.0	22.2	32	26	2Ø	1.0			46				GRAY GREEN SANDY LIMESTONE AND CALCAREOUS SANDSTONE, SAT
-30.0												REC 43% RQD 16% SANDY L.S./CALC. S.S.
-35.0												REC. 72% RQD 27% CALCAREOUS S.S.
-40.0												REC. 33% RQD 16% CALCAREOUS S.S.
-45.0												REC. 99% RQD 96% CALCAREOUS S.S.
-50.0												REC. 93% RQD 72% CALCAREOUS S.S.
-55.0												REC. 97% RQD 71% CALCAREOUS S.S.
-60.0												BORING TERMINATED AT ELEVATION -60.1 FEET IN CALCAREOUS SANDSTONE.

ELEV. (FT.)	DEPTH (FT.)	DRILL RATE MN/FT	RUN (FT.)	RQD %	REC %	SAMP NO.	FIELD CLASSIFICATION AND REMARKS
-30.0	27.2	1:40					LIGHT GRAY RETURN TO 28.2', DARK GRAY GREEN RETURN TO 32.2', VERY CLOSE TO MOD. CLOSE FRACT. GRAY BROWN SANDY LIMESTONE CALCAREOUS SANDSTONE
		0:45				RS-1 (27.5-28.1)	
		0:30	5.0	16	43		
		0:30					
-35.0	32.2	0:30					DARK GRAY GREEN RETURN VERY CLOSE TO MOD. CLOSE FRACT. GRAY BROWN CALCAREOUS SANDSTONE
		0:45				RS-2 (43.9-44.6)	
		0:30	5.0	27	72		
		0:20					
-40.0	37.2	0:15					DARK GRAY GREEN RETURN TO 39.0' LOST RETURN AT 39.0' VERY CLOSE TO MOD. CLOSE FRACT. GRAY BROWN CALCAREOUS SANDSTONE
		0:15				RS-3 (47.7-48.2)	
		0:30	5.0	16	33		
		0:45					
-45.0	42.2	0:45					LIGHT GRAY RETURN TO 43.3' LOST RETURN AT 43.3' VERY CLOSE TO MOD. CLOSE FRACT. SANDY FOSSIL. LIMESTONE/DARK GRAY CALCAREOUS SANDSTONE W/ SOLUTION VOID AT 43.3'
		1:05				RS-4 (56.4-56.9)	
		0:55	5.0	96	99		
		0:35					
-50.0	47.2	0:40					LIGHT GRAY RETURN SOUND GRAY SANDY FOSSILIFEROUS LIMESTONE TO 49.2' /TAN VERY CLOSE TO MOD. CLOSE FRACT. FOSSIL. SANDY LIMESTONE
		1:10				RS-4 (56.4-56.9)	
		1:05	5.0	72	93		
		0:40					
-55.0	52.2	0:50					DARK GRAY RETURN VERY CLOSE TO MOD. CLOSE FRACT. CLAYEY FOSSILIFEROUS CALCAREOUS SANDSTONE
		0:35				RS-4 (56.4-56.9)	
		0:40	5.0	71	97		
		0:30					
-60.0	57.3	0:30					

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 34407.1.1	ID. R-2245	COUNTY BRUNSWICK	GEOLOGIST R.L. EDWARDS
SITE DESCRIPTION BRIDGE NO. 206 ON SR 1105 OVER BIG DAVIS CANAL			GROUND WATER
BORING NO. B2-A	BORING LOCATION 21+78	OFFSET 7' LT	ALIGNMENT -L-
COLLAR ELEVATION -0.4'		NORTHING	EASTING
TOTAL DEPTH 45.0'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 9/3/97	COMPLETION DATE 9/3/97	SURFACE WATER DEPTH 2.0'	DEPTH TO ROCK N/A

PROJECT NO. 34407.1.1	ID. R-2245	COUNTY BRUNSWICK	GEOLOGIST R.L. EDWARDS
SITE DESCRIPTION BRIDGE NO. 206 ON SR 1105 OVER BIG DAVIS CANAL			GROUND WATER
BORING NO. BY-B	BORING LOCATION 22+08	OFFSET 10' RT	ALIGNMENT -L-
COLLAR ELEVATION 3.3'		NORTHING	EASTING
TOTAL DEPTH 48.4'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 8/28/97	COMPLETION DATE 8/28/97	SURFACE WATER DEPTH N/A	DEPTH TO ROCK

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
-0.4	0.0	WOH	1	2	1.0	X 3						
-5.0	5.1	4	Ø	1	1.0	X 1				SS-28		GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-10.0	9.7	1	Ø	Ø	1.0	X 1				SS-29		DARK GRAY CLAYEY FINE SAND, SATURATED
-15.0	14.7	WOH	WOH	WOH	1.0	X 0				SS-30		DARK GRAY SILTY CLAY, WET
-20.0	19.7	WOH	1	1	1.0	X 2				SS-31		DARK GRAY SILTY CLAY, WET
-25.0	24.7	28	33	37	1.0			X 70		SS-32		GRAY GREEN VERY CLOSE TO MODERATELY CLOSE FRACTURED VERY SOFT TO SOFT SANDY LIMESTONE AND CALCAREOUS SANDSTONE, SATURATED
-30.0	29.7	5Ø			0.1			100+ X				
-35.0	34.7	11	1Ø	26	1.0	X 36				SS-33		
-40.0	39.7	14	13	12	1.0	X 25						
-45.0	44.7	5Ø			0.1			100+ X				
BORING TERMINATED AT ELEVATION -45.4 FEET IN SANDY LIMESTONE.												

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
3.3	0.0	WOH	WOH	1	1.0	X 1						
0.0	3.9	2	1	2	1.0	X 3				SS-23		BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-5.0	8.2	WOH	WOH	WOH	1.0	X 0						DARK GRAY FINE SANDY AND SILTY CLAY, WET
-10.0	13.2	WOH	7	11	1.0	X 18				SS-24		GRAY BROWN FINE TO COARSE SAND WITH SHELL FRAGMENTS, SATURATED
-15.0	18.2	WOH	WOH	WOH	1.0	X 0				SS-25		DARK GRAY SILTY CLAY, WET
-20.0	23.2	WOH	1	2	0.9	X 3						
-25.0	28.2	5Ø			0.1			100+ X				
-30.0	33.2	37	21	14	1.0	X 35				SS-26		GRAY GREEN VERY CLOSE TO MODERATELY CLOSE FRACTURED VERY SOFT TO SOFT SANDY LIMESTONE AND CALCAREOUS SANDSTONE, SATURATED
-35.0	38.2	21	16	6	1.0	X 22						
-40.0	43.2	1Ø	12	12	1.0	X 24				SS-27		
-45.0	48.2	5Ø			0.1			100+ X				
BORING TERMINATED AT ELEVATION -45.1 FEET IN SANDY LIMESTONE.												

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	30.1	56	20	A75(12)	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	NP	A3(0)	4.0-5.5		
	SS-10	100	91	5	35.4	60.0	2.5	2.0	12	NP	A3(0)	13.5-15.0		
	SS-11	100	99	4	15.6	81.4	0.0	3.0	13	NP	A3(0)	18.5-20.0		
	SS-12	100	86	3	42.6	54.8	0.6	2.0	13	NP	A3(0)	28.5-30.0		
	SS-13	100	99	86	2.6	13.7	23.5	60.2	62	29	A75(29)	38.5-40.0		
	SS-14	47	24	12	60.6	18.3	11.0	10.0	22	NP	A1a(0)	43.5-45.0		
	SS-15	87	53	20	61.8	17.5	14.7	6.0	17	NP	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	2.0	12	NP	A3(0)	2.4-3.9		
	SS-18	98	96	61	3.8	40.6	27.5	28.1	54	16	A75(10)	6.9-8.4		
	SS-19	100	99	3	40.5	56.9	0.6	2.0	22	NP	A3(0)	11.9-13.4		
	SS-20	100	99	93	1.2	6.4	26.1	66.3	77	49	A76(53)	21.9-23.4		
	SS-21	33	14	6	68.1	14.9	7.0	10.0	21	NP	A1a(0)	26.9-28.4		
	SS-22	90	55	26	59.0	18.1	16.9	6.0	19	NP	A24(0)	36.9-38.4		
BY-B	SS-23	100	90	4	39.0	57.1	1.9	2.0	20	NP	A3(0)	1.0-1.5		
	SS-24	100	92	5	43.3	52.4	2.3	2.0	21	NP	A3(0)	13.2-14.7		
	SS-25	100	99	97	1.6	1.4	26.7	70.3	74	41	A75(48)	18.2-19.7		
	SS-26	65	31	15	64.7	14.3	15.1	6.0	20	NP	A1b(0)	33.2-34.7		
	SS-27	88	58	24	59.2	15.5	17.3	8.0	20	NP	A24(0)	43.2-44.7		
B2-A	SS-28	91	83	8	30.8	61.7	3.4	4.0	20	NP	A3(0)	5.1-6.6		
	SS-29	100	99	27	13.5	63.1	9.4	14.1	32	13	A26(0)	9.7-11.2		
	SS-30	100	99	93	2.2	4.8	26.7	66.3	72	40	A75(44)	14.7-16.2		
	SS-31	100	99	93	1.4	6.8	23.5	68.3	69	38	A75(42)	19.7-21.2		
	SS-32	60	23	11	71.3	14.1	6.6	8.0	21	NP	A1b(0)	24.7-26.2		
	SS-33	89	61	27	52.0	20.1	21.9	6.0	23	NP	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	2.0	20	NP	A3(0)	7.2-8.7		
	SS-36	100	100	98	1.0	1.8	24.9	72.3	70	41	A76(48)	12.2-13.7		
	SS-37	66	41	19	52.0	20.5	13.5	14.1	19	NP	A1b(0)	22.2-23.7		

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

field inspection
 Information obtained from: microfilm (Reel: Pos:)
 other:

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 observed

CHANNEL BED: none observed

CHANNEL BANKS: none observed

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

DESIGN INFORMATION CONT.

STREAM IS: DEGRADING AGGRADING X EQUILIBRIUM (12)

OTHER OBSERVATIONS AND COMMENTS: Bridge lies within tidal zone


CHANNEL MIGRATION TENDENCY (13): unlikely

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):

It is unlikely that overtopping scour will extend below an elevation of -9.8 feet at B1-A and B2-A

An elevation of -9.8 feet generally corresponds with the base of recent sediments and is 4.6 feet

higher than the theoretical scour elevation provided by the Hydraulics Unit.

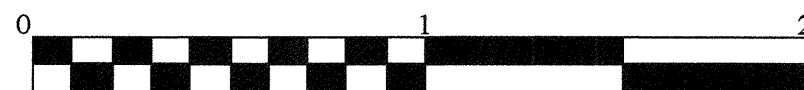
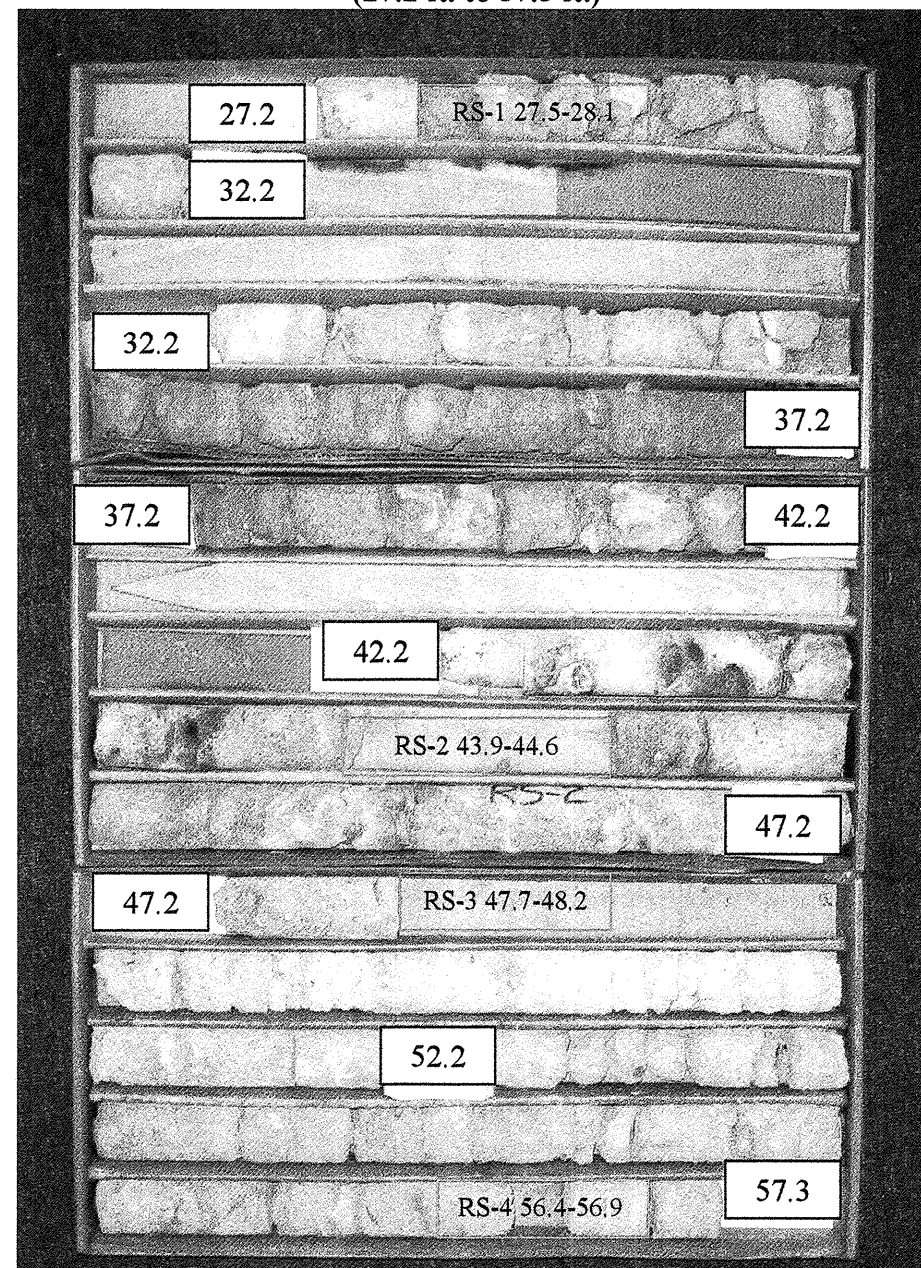
REPORTED BY:  DATE: 09-22-05

INSTRUCTIONS

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) 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 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

CONTRACT: ID: R-2245

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL 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 1004 (BEACH DR.) TO NC 211
(SECOND BRIDGE TO OAK ISLAND)
 SITE DESCRIPTION NEW BRIDGE NO. 229
ON SR 1105 OVER INTRACOASTAL
WATERWAY AT -L- STA. 58+00

CONTENTS:

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	STRUCTURE INVENROTY REPORT
4	SITE PLAN
5	PROFILE
6-7	CROSS SECTIONS
8-15	BORE LOG & CORE REPORTS
16	SOIL TEST RESULTS
17	SCOUR REPORT
18	CORE PHOTOGRAPHS
19	SITE PHOTOGRAPH

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

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 ON-PLACED 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.

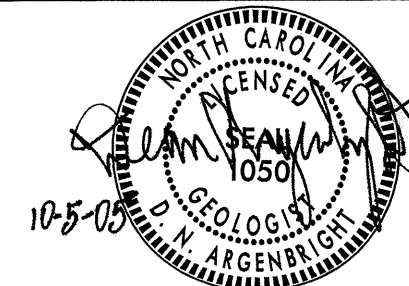
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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.

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

DRAWN BY: W. D. FIELDS

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

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



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2245	34407.1.1	2	19

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																																																																																					
<p>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 T205, ASTM D585). 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:</p> <p align="center"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p>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)</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.)- SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER- A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS- APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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.</p> <p>CALCAREOUS (CALC.)- SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM- ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE- A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP- THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH)- THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT- A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE- A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT- ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.)- LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.)- A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT- FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE- A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS- A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.)- IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER- WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL- SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP.)- RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE- POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>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.</p> <p>STRATA CORE RECOVERY (SREC.)- TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>TOPSOIL (T.S.)- SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																					
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (>35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (>85% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A</td><td>A-3</td><td>A-2</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-2</td><td>A-3</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-2</td><td>A-3</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td><td></td><td></td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>% PASSING</td> <td>50</td><td>30</td><td>10</td><td>5</td><td>5</td><td>5</td><td>5</td> <td>10</td><td>10</td><td>10</td><td>10</td> <td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td> <td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>50</td><td>30</td><td>10</td><td>5</td><td>5</td><td>5</td><td>5</td> <td>10</td><td>10</td><td>10</td><td>10</td> <td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td> <td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> <td>4</td><td>3</td><td>2</td><td>1</td> <td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>0</td> <td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>0</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td>0</td><td>0</td><td>0</td><td>0</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">FINE SAND</td><td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td><td colspan="2">SILTY SOILS</td><td colspan="2">CLAYEY SOILS</td><td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td><td colspan="3">HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GEN. RATING AS A SUBGRADE</td> <td colspan="7">EXCELLENT TO GOOD</td><td colspan="7">FAIR TO POOR</td><td>POOR</td><td>UNSATURABLE</td> </tr> </table> <p align="center">P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (>35% PASSING #200)							SILT-CLAY MATERIALS (>85% PASSING #200)							ORGANIC MATERIALS			GROUP CLASS.	A	A-3	A-2	A-4	A-5	A-6	A-7	A-4	A-5	A-6	A-7	A-2	A-3	A-4	A-5	A-6	A-7	A-2	A-3	A-4	A-5	A-6	A-7	SYMBOL																								% PASSING	50	30	10	5	5	5	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	LIQUID LIMIT	50	30	10	5	5	5	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	PLASTIC INDEX	6	5	4	3	2	1	0	4	3	2	1	4	3	2	1	0	0	4	3	2	1	0	0	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	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. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							POOR	UNSATURABLE	<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>		<p>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 ROCK 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>		<p>ROCK HARDNESS</p> <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 PEICES 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>	
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<p>PLASTICITY</p> <table border="1"> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>		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	<p>INDURATION</p> <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; BREAKS 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>																																																																																																																																																																																										
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<p>COLOR</p> <p>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.</p>		<p>BENCH MARK: *202 RRS SET IN 12" OAK, 212.74' LT OF -L- STA. 54+37.88, EL = 22.35' & *204 RRS SET IN 12" OAK, 595.94' RT OF -L- STA. 61+60.20, EL = 29.92' ELEVATION:</p> <p>NOTES:</p>																																																																																																																																																																																																									



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 5, 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: 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 Intracoastal 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± and 6± feet, while the surface

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

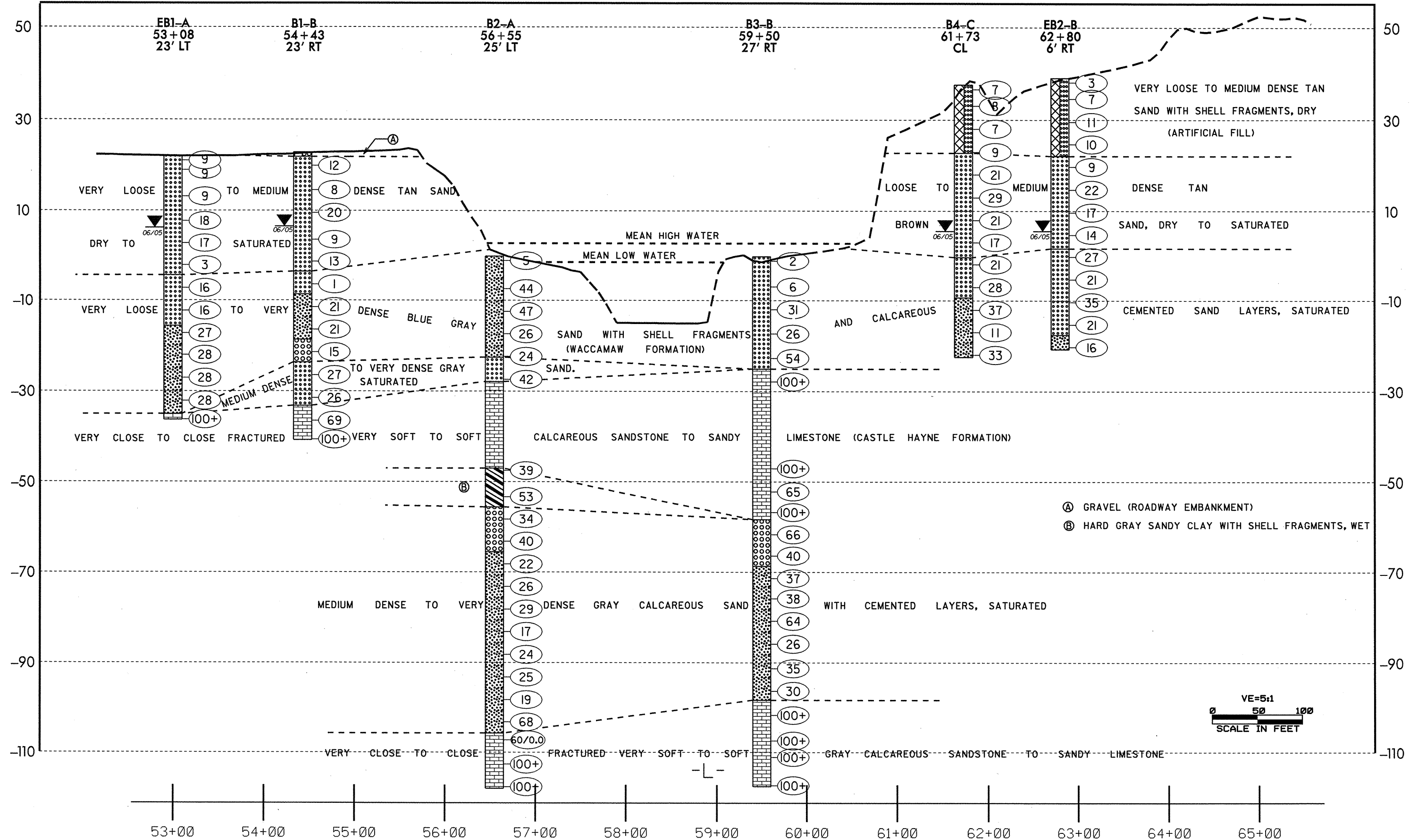
MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

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

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

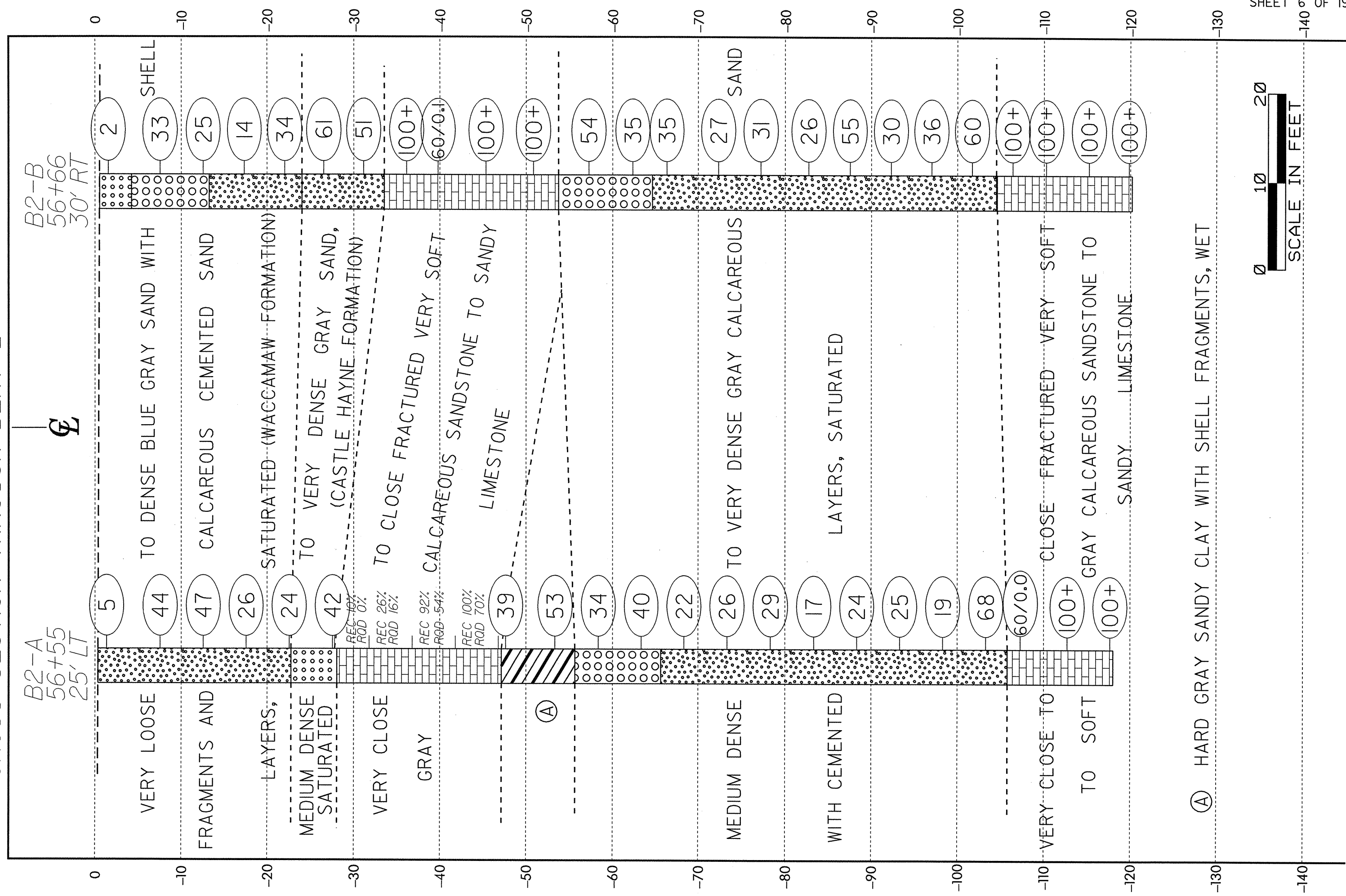
LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

PROFILE THROUGH BORINGS PROJECTED ALONG -L-



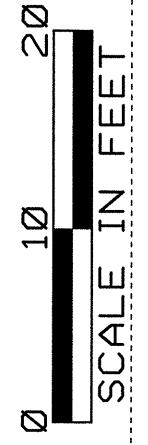
CROSS SECTION THROUGH BENT 2

BRIDGE #229, 34407.1.1 (R-2245)



B2-A
56+55
25' LT

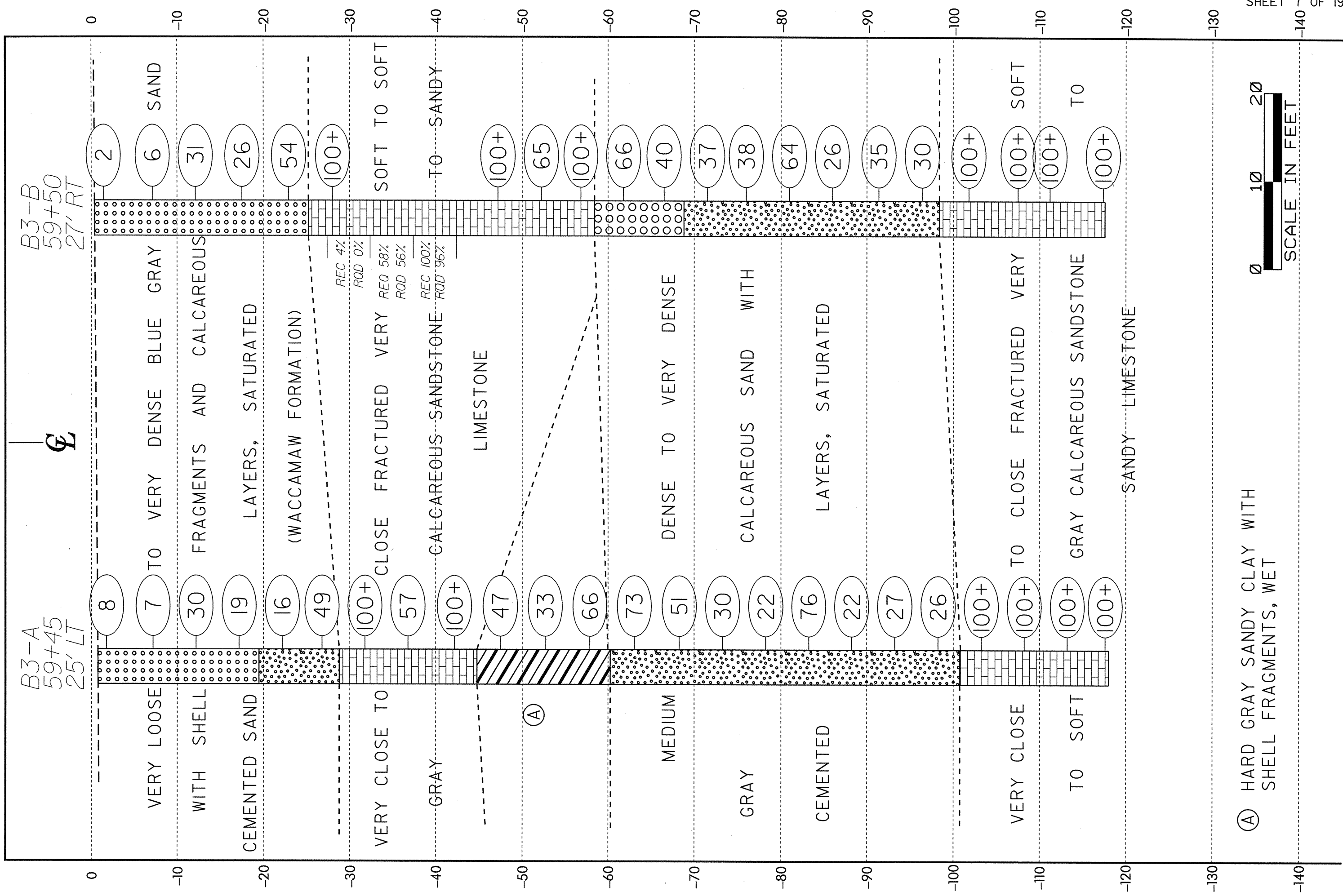
B2-B
56+66
30' RT



(A) HARD GRAY SANDY CLAY WITH SHELL FRAGMENTS, WET

CROSS SECTION THROUGH BENT 3

BRIDGE NO. 229, 34407.1.1 (R-2245)



B3-A
59+45
25' LT

B3-B
59+50
27' RT

(A) HARD GRAY SANDY CLAY WITH SHELL FRAGMENTS, WET



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 9 OF 19

PROJECT NO. 34407.1.I		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST J. L. STONE							
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAY							GROUND WATER						
BORING NO. B2-A		BORING LOCATION 56+55		OFFSET 25' LT	ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEVATION -0.4'		NORTHING		EASTING		24 HR. N/A							
TOTAL DEPTH 117.7'		DRILL MACHINE CME-45C		DRILL METHOD ROT - MUD		HAMMER TYPE MANUAL							
START DATE 07/06/05		COMPLETION DATE 07/06/05		SURFACE WATER DEPTH 0.0-3.0'		DEPTH TO ROCK 27.8'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
-0.4	0.0	2	2	3	1	X5							
-5.0	6.2	10	24	20	1	X44							
-10.0	11.2	12	20	27	1	X47				SS-38			
-15.0	16.2	8	10	16	1	X26							
-20.0	21.2	7	11	13	1	X24							
-25.0	26.2	13	22	20	1	X42				SS-39			
-30.0													
-35.0													
-40.0										RS-1			
-45.0										RS-2			
-45.0	46.8	5	15	24	1	X39							
-50.0	52.0	9	16	37	1	X53				SS-40			
-55.0	57.0	40	15	19	1	X34							
-60.0	62.0	15	19	21	1	X40							
-65.0	67.0	9	10	12	1	X22				SS-41			
-70.0	72.0	13	12	14	1	X26							
-75.0	77.0	13	13	16	1	X29				SS-42			
-80.0										SS-43			

PROJECT NO. 34407.1.I		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST J. L. STONE							
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAY							GROUND WATER						
BORING NO. B2-A		BORING LOCATION 56+55		OFFSET 25' LT	ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEVATION -0.4'		NORTHING		EASTING		24 HR. N/A							
TOTAL DEPTH 117.7'		DRILL MACHINE CME-45C		DRILL METHOD ROT - MUD		HAMMER TYPE MANUAL							
START DATE 07/06/05		COMPLETION DATE 07/06/05		SURFACE WATER DEPTH 0.0-3.0'		DEPTH TO ROCK 27.8'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75				100
82.0	82.0	6	9	8	1	X17							
-87.0	87.0	22	12	12	1	X24							
-92.0	92.0	8	11	14	1	X25				SS-44			
-97.0	97.0	7	8	11	1	X19							
-102.0	102.0	14	23	45	1				X68				
-107.0	107.0	60			0.0				100+X				
-112.0	112.0	62	38		0.8				100+X	SS-45			
-117.0	117.0	55	45		0.7				100+X				
-122.0													
-127.0													
-132.0													
-137.0													
-142.0													
-147.0													
-152.0													
-157.0													
-162.0													

BORING TERMINATED AT
 ELEVATION -118.1 FEET IN
 SANDSTONE TO LIMESTONE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

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 WATER
BORING NO. B3-A		BORING LOCATION 59+45		OFFSET 25' LT	ALIGNMENT -L-		0 HR. N/A
COLLAR ELEVATION -0.8'		NORTHING		EASTING		24 HR. N/A	
TOTAL DEPTH 117.3'		DRILL MACHINE CME-45C		DRILL METHOD ROT - MUD		HAMMER TYPE MANUAL	
START DATE 07/07/05		COMPLETION DATE 07/07/05		SURFACE WATER DEPTH 0.0-3.7'		DEPTH TO ROCK 28.0'	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 0.5' 0.5'		0 25 50 75 100			
-0.8	0.0	2	4	4			
-5.0	5.4	1	6	1	SS-54		BLUE GRAY SAND WITH SHELL FRAGMENTS, SATURATED (WACCAMAW FORMATION)
-10.0	10.4	10	15	15			
-15.0	15.4	6	8	11			
-20.0	20.4	7	8	8	SS-55		GRAY SAND, SATURATED
-25.0	25.0	44	22	27			
-30.0	30.0	18	60	40	SS-56		VERY CLOSE TO CLOSE FRACTURED VERY SOFT TO SOFT CALCAREOUS SANDSTONE AND SANDY LIMESTONE (CASTLE HAYNE FORMATION)
-35.0	35.0	33	28	29	SS-63		
-40.0	40.4	20	52	48			
-45.0	45.7	17	20	27	SS-57		GRAY SANDY CLAY WITH SHELL FRAGMENTS, MOIST
-50.0	50.9	12	12	21			
-55.0	56.1	13	42	24			
-60.0	61.3	19	33	40	SS-58		
-65.0	66.5	12	20	31			
-70.0	71.5	11	14	16	SS-59		GRAY CALCAREOUS SAND WITH CEMENTED LAYERS, SAUTRATED
-75.0	76.5	15	11	11			

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 WATER
BORING NO. B3-A		BORING LOCATION 59+45		OFFSET 25' LT	ALIGNMENT -L-		0 HR. N/A
COLLAR ELEVATION -0.8'		NORTHING		EASTING		24 HR. N/A	
TOTAL DEPTH 117.3'		DRILL MACHINE CME-45C		DRILL METHOD ROT - MUD		HAMMER TYPE MANUAL	
START DATE 07/07/05		COMPLETION DATE 07/07/05		SURFACE WATER DEPTH 0.0-3.7'		DEPTH TO ROCK 28.0'	
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 0.5' 0.5'		0 25 50 75 100			
-82.0	81.5	14	25	51			
-87.0	86.5	8	10	12	SS-60		GRAY CALCAREOUS SAND WITH CEMENTED LAYERS, SAUTRATED
-92.0	91.5	9	12	15			
-97.0	96.5	9	11	15			
-102.0	101.5	8	92		SS-61		GRAY VERY CLOSE TO CLOSE FRACTURED VERY SOFT TO SOFT CALCAREOUS SANDSTONE TO SANDY LIMESTONE
-107.0	106.5	18	56	44			
-112.0	111.5	100			SS-62		
-117.0	116.5	38	34	66			
-122.0							BORING TERMINATED AT ELEVATION -118.1 FEET IN SANDSTONE TO LIMESTONE
-127.0							
-132.0							
-137.0							
-142.0							
-147.0							
-152.0							
-157.0							
-162.0							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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 GEOTECHNICAL UNIT BORING LOG

SHEET 13 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 WATER
BORING NO. B3-B	BORING LOCATION 59+50	OFFSET 27' RT	ALIGNMENT -L-
COLLAR ELEVATION -0.4'			NORTHING
TOTAL DEPTH 117.2'			DRILL MACHINE CME-45C
START DATE 07/11/05		COMPLETION DATE 07/12/05	SURFACE WATER DEPTH 0.0-4.1'

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 WATER
BORING NO. B3-B	BORING LOCATION 59+50	OFFSET 27' RT	ALIGNMENT -L-
COLLAR ELEVATION -0.4'			NORTHING
TOTAL DEPTH 117.2'			DRILL MACHINE CME-45C
START DATE 07/11/05		COMPLETION DATE 07/12/05	SURFACE WATER DEPTH 0.0-4.1'

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
-0.4	0.0	1	1	1	1							
-5.0	5.7	1	1	5	1							
-10.0	10.7	8	13	18	1							
-15.0	16.1	8	10	16	1							
-20.0	21.5	21	26	28	1							
-25.0	26.6	68	32		0.8					100+		
-30.0												
-35.0												
-40.0												
-45.0	45.8	48	52		0.9					100+		
-50.0	50.8	12	28	37	1							
-55.0	55.4	51	49		0.8					100+		
-60.0	60.4	29	44	22	1							
-65.0	65.1	18	20	20	1							
-70.0	70.1	16	16	21	1							
-75.0	74.6	21	21	17	1							
-80.0	79.6	31	32	32	1							

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	0.5'	0.5'		0	25	50	75			
-82.0												
-87.0	84.6	9	12	14	1							
-92.0	90.0	13	14	21	1							
-97.0	95.0	11	13	17	1							
-102.0	100.4	52	48		0.6					100+		
-107.0	106.1	17	30	70	0.9					100+		
-112.0	110.6	100			0.4					100+		
-117.0	116.8	100			0.4					100+		
-122.0												
-127.0												
-132.0												
-137.0												
-142.0												
-147.0												
-152.0												
-157.0												
-162.0												

BORING TERMINATED AT ELEVATION -117.6' IN SANDSTONE TO LIMESTONE

AVG REC = 54%
 AVG RQO = 42%

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

SHEET 15 OF 19

PROJECT NO. 34407.1.1		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST J. L. STONE		GROUND WATER	
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAY								0 HR. N/A	
BORING NO. B4-C		BORING LOCATION 61+73		OFFSET CL		ALIGNMENT -L-		24 HR. 32.0'	
COLLAR ELEVATION 37.4'		NORTHING		EASTING					
TOTAL DEPTH 60.1'		DRILL MACHINE CME-750		DRILL METHOD HS AUGERS/RM		HAMMER TYPE AUTOMATIC			
START DATE 06/16/05		COMPLETION DATE 06/16/05		SURFACE WATER DEPTH		DEPTH TO ROCK			
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION		
		0.5' 1.0' 1.5'		0 25 50 75 100					
37.4	0.0	1	2	5					
35.0	3.5	2	4	4	SS-13		TAN SAND WITH SHELL		
30.0	8.5	1	3	4			FRAGMENTS, DRY (ARTIFICIAL FILL)		
25.0	13.6	2	3	6	SS-14				
20.0	18.6	5	8	13					
15.0	23.6	5	11	18	SS-15		TAN BROWN SAND, MOIST TO SATURATED		
10.0	28.6	6	10	11					
5.0	33.6	6	8	9	SS-16				
0.0	38.6	3	5	16	SS-17				
-5.0	43.6	14	14	14					
-10.0	48.6	20	19	18	SS-18		BLUE GRAY SAND WITH SHELL FRAGMENTS, SATURATED (WACCAMAW FORMATION)		
-15.0	53.6	3	5	6					
-20.0	58.6	11	12	21	SS-19				
-25.0								BORING TERMINATED AT ELEVATION -22.7' IN DENSE SAND	

PROJECT NO. 34407.1.1		ID. R-2245		COUNTY BRUNSWICK		GEOLOGIST J. L. STONE		GROUND WATER	
SITE DESCRIPTION BRIDGE NO. 229 ON SR 1105 OVER INTRACOASTAL WATERWAY								0 HR. N/A	
BORING NO. EB2-B		BORING LOCATION 62+80		OFFSET 6' RT		ALIGNMENT -L-		24 HR. 34.0'	
COLLAR ELEVATION 38.9'		NORTHING		EASTING					
TOTAL DEPTH 59.9'		DRILL MACHINE CME-750		DRILL METHOD HS AUGERS/RM		HAMMER TYPE AUTOMATIC			
START DATE 06/16/05		COMPLETION DATE 06/16/05		SURFACE WATER DEPTH		DEPTH TO ROCK			
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION		
		0.5' 1.0' 1.5'		0 25 50 75 100					
38.9	0.0	1	2	1					
35.0	3.5	2	2	5	SS-20		TAN SAND WITH SHELL		
30.0	8.5	3	5	6			FRAGMENTS, DRY (ARTIFICIAL FILL)		
25.0	13.4	3	5	5	SS-21				
20.0	18.4	3	4	5					
15.0	23.4	5	8	14	SS-22		TAN BROWN SAND, MOIST TO SATURATED		
10.0	28.4	5	7	10					
5.0	33.4	5	6	8	SS-23				
0.0	38.4	6	13	14	SS-24				
-5.0	43.4	8	8	13					
-10.0	48.4	11	19	16					
-15.0	53.4	6	10	11	SS-25		BLUE GRAY SAND WITH SHELL FRAGMENTS, SATURATED (WACCAMAW FORMATION)		
-20.0	58.4	5	5	11					
-25.0								BORING TERMINATED AT ELEVATION -21.0' IN MEDIUM DENSE SAND	

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-
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	-	-
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

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-
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	-	-
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	-	-
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	-	-

B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-
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	-	-

B3-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-
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 TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
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: field inspection
 microfilm (Reel: _____ Pos: _____)
 other: _____

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: X DEGRADING _____ 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: Fred M. Wood 24 DATE: 11-9-05

INSTRUCTIONS

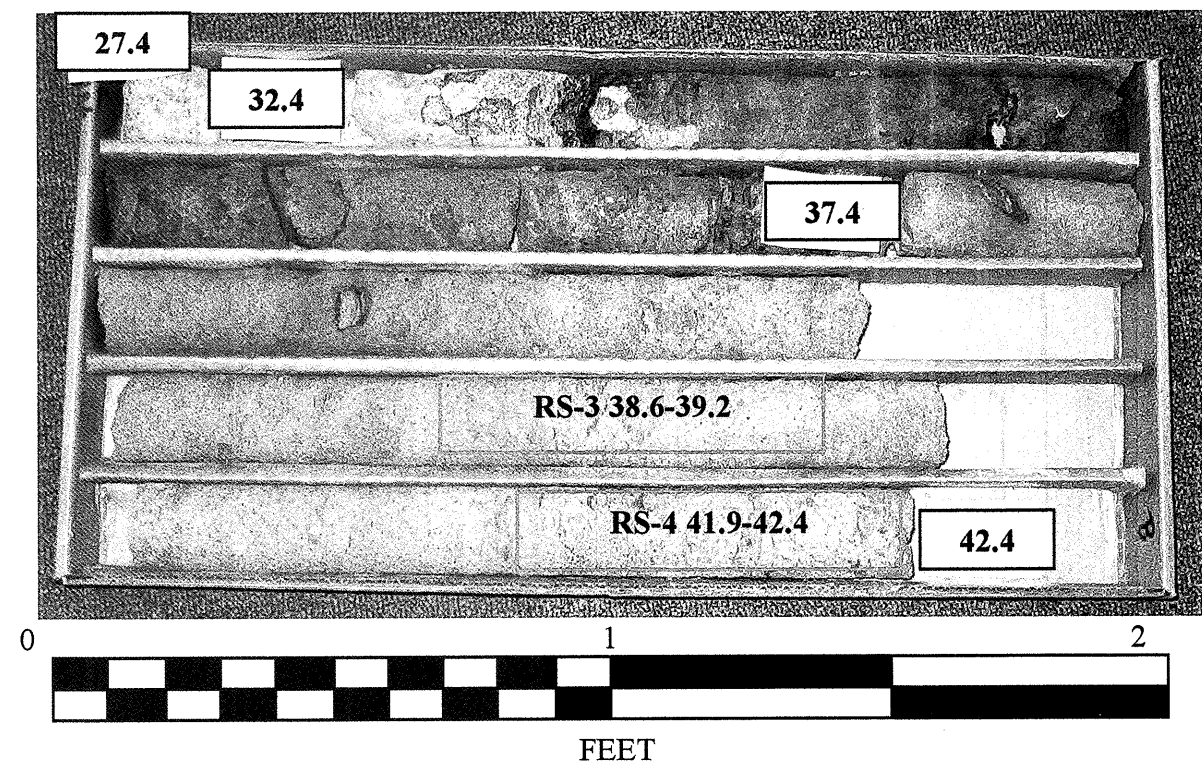
- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) 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