CONTRACT: C203038

ID: B-4712

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 37912.1.1 (B-4712) F.A. PROJ. BRZ-1316(6)

COUNTY BLADEN

PROJECT DESCRIPTION BRIDGE NO. 188 AND NO. 189 ON SR 1316 OVER THE CAPE FEAR RIVER

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO	TOTAL SHEETS
N.C.	B-4712	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37912.1.1	BRZ-1316(6)	P.E.
37912.2.1	BRZ-1316(6)	R/W & UTILITIES
37912.3.1	BRZ-1316(18)	CONST.

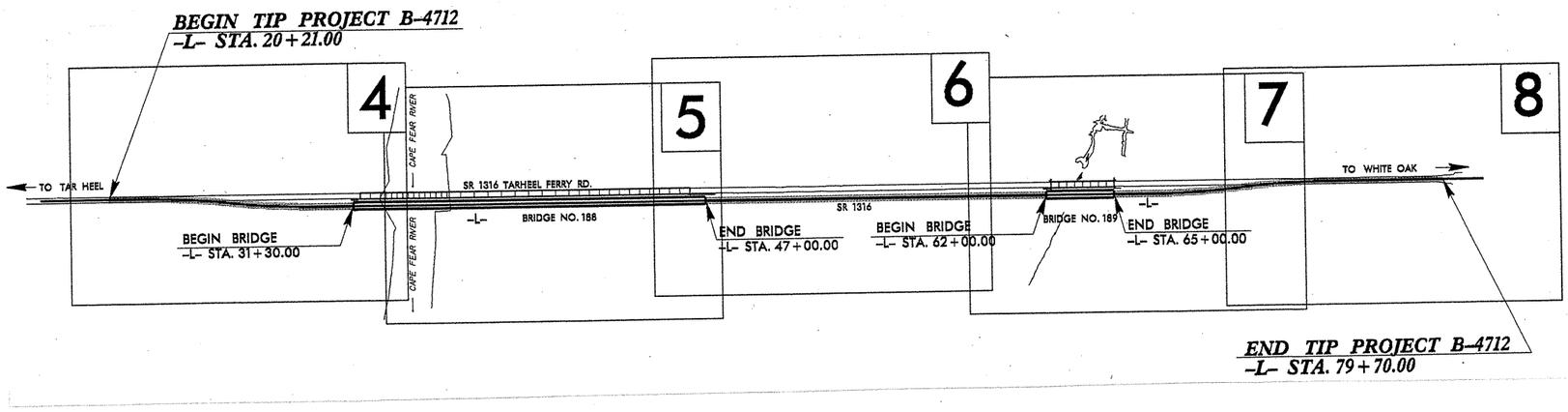
CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

NAD 83/95



PERSONNEL

J.P. DELOATCH

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S&ME PERSONNEL

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE May 2012

NORTH CAROLINA LICENSED SEAL 2007 GEOLOGIST JOSEPH L. STONE 5/30/12

DRAWN BY: C.P. TURNER, J.L. STONE

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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.

PROJECT REFERENCE NO.	SHEET NO.
B-4712	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	
												GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

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

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / DPT / DMT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45B
- [X] CME-550X
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF 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)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

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 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. *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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
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.
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.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

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

CALCAREOUS (CALC.) - SOILS THAT 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 (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - 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 THAT 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, THAT 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 BPF) 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 PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

ELEVATION: FT.

NOTES:

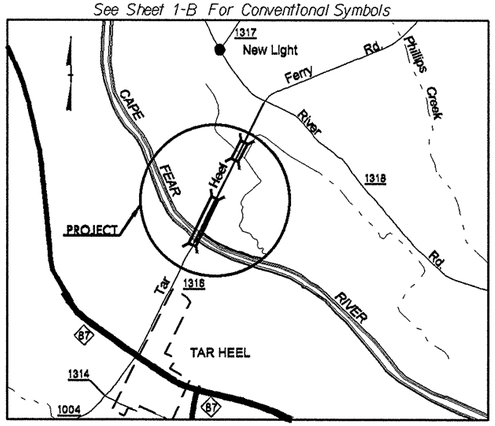
REVISED 09/23/09

09/08/99

TIP PROJECT: B-4712

CONTRACT:

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
BLADEN COUNTY

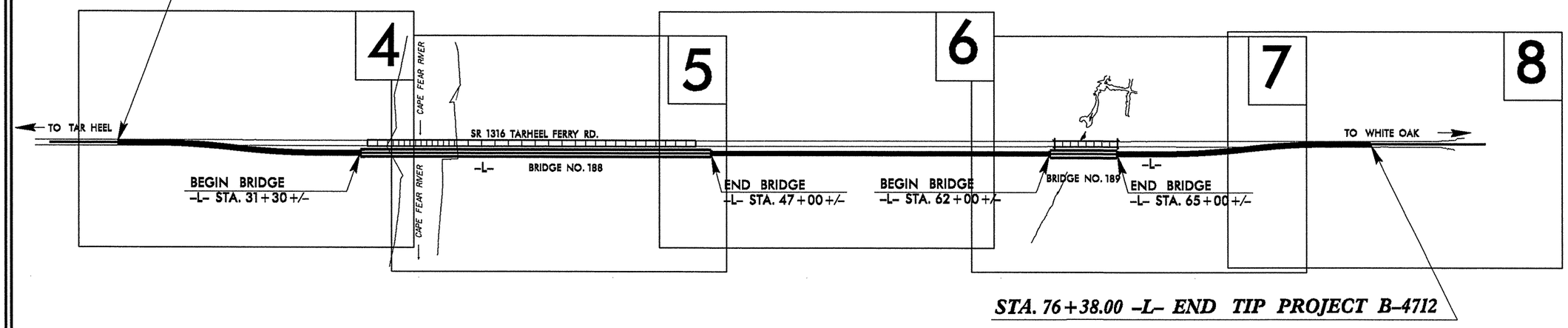
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4712	2A	13
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
37912.1.1	BRZ-1316(6)	P.E.	

LOCATION: BRIDGE NO. 188 AND NO. 189 OVER THE CAPE FEAR RIVER ON SR 1316

TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND STRUCTURES

NAD 83/95

STA. 20+21.00 -L- BEGIN TIP PROJECT B-4712



STA. 76+38.00 -L- END TIP PROJECT B-4712

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

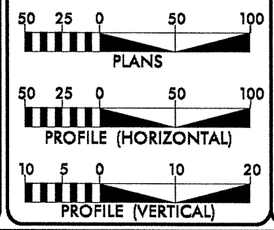
THIS PROJECT WAS DESIGNED USING THE SUB REGIONAL TIER GUIDELINES FOR BRIDGE PROJECTS.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD_____.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2013 = 4788
ADT 2033 = 8096
DHV = 11 %
D = 55 %
T = 13 % *
V = 60 MPH
* TTST =10% DUAL =3%
FUNC CLASS =
RURAL COLLECTOR

SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4712	=	0.710 MILES
LENGTH STRUCTURES TIP PROJECT B-4712	=	0.354 MILES
TOTAL LENGTH TIP PROJECT B-4712	=	1.064 MILES

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 17, 2012

LETTING DATE:
FEBRUARY 19, 2013

GARY LOVERING, PE
PROJECT ENGINEER

RICK DECOLA, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.

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cpturner AT GEO255461

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

May 30, 2012

STATE PROJECT: 37912.1.1 (B-4712)
F.A. PROJECT: BRZ-1316(6)
COUNTY: Bladen
DESCRIPTION: Bridge No. 188 and No. 189 on SR 1316 over the Cape Fear River

SUBJECT: Geotechnical Inventory

Project Description

This project area lies along SR 1346 in northwestern Bladen County, at the existing Cape Fear River crossing. Proposed construction begins approximately 1, 100 feet south of the existing bridge over the Cape Fear River and extends northward approximately 1.1 miles. This geotechnical investigation was confined to the areas of proposed construction.

Fieldwork for this project was conducted in June of 2011. Standard Penetration Test borings were advanced with a CME 45-B and CME 550-X drill machines with automatic hammers. Hand auger and power auger borings were also completed. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

The following alignment, totaling 1.1± miles was investigated. Subsurface profiles and selected cross sections of this alignment are included in this report.

Line	Station(±)
-L-	20+21 to 73+38

Areas of Special Geotechnical Interest

1) The entire project was found to contain cohesive soils which have the potential to cause embankment stability and/or long term settlement problems:

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

TELEPHONE: 919-707-6850
FAX: 919-250-4237
Website: www.ncdot.org./doh

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

2) The following sections contain organic soils, which have the potential for embankment stability and/or subgrade problems during construction.

Line	Station(±)
-L-	64+35 to 65+40

2) The following sections were found to exhibit seasonal high ground water.

Line	Station(±)
-L-	20+21 to 25+50
-L-	30+50 to 50+00
-L-	60+50 to 70+00

Physiography and Geology

This project corridor is located within the Coastal Plain Physiographic Province. Topography along the project is nearly flat to gently sloping. Natural ground elevations ranged from 4± foot above sea level along the bed of the Cape Fear River to 114± feet above sea level along the upland section at the southern end of the project.

Surficial soils in this area are generally classified as undivided coastal plain sediments and alluvial sediments; all are underlain by the Black Creek Formation.

Ground Water

Ground water data was collected from December 2009 through January 2010, during a time of above normal precipitation. Ground water elevations ranged from 39± to 108± feet above sea level.

Soils

Soils within this project area have been divided into four categories, undivided coastal plain soils, alluvial soils, formational soils, and roadway embankment soils.

Soils classified as undivided coastal plain are comprised of 4± to 11± feet of soft to stiff sandy and silty clay (A-6, A-7-6), 10± feet of stiff sandy silt (A-4) and 3± to 14± feet of loose to dense sand (A-2-4). Laboratory analysis of the cohesive components of this unit returned natural moisture contests ranging from 26.2% to 58.2%. These undivided coastal plain sediments were encountered along the upland sections at the beginning of the project.

Alluvial soils were encountered on the northern approach within the floodplain of the Cape Fear River. They are comprised of 3± to15± feet of very loose to medium dense sand (A-2-4, A-3, A-1-b), 6± to 7± feet of medium stiff to very stiff sandy silt (A-4), 4± to 6± feet of soft to stiff sandy silty clay (A-6, A7-6) and 2± feet of very loose sand with little organic matter. Laboratory analysis of this organic soil returned an organic content of 4.7%. Laboratory analysis of the cohesive components of the alluvial soils unit returned a natural moisture contest of 23.8%.

Soils that are described as formational have been identified as belonging to the Black Creek Formation and the Cape Fear Formation.

Where encountered, the Black Creek soils are composed of 5± to 28± feet of medium dense to dense sand and clayey sand (A-2-6, A-2-4, A-3, and A-1-b), and 5± to 25± feet of medium stiff to very stiff sandy and silty clay (A-6, A-7-6). Laboratory analysis of a cohesive component of the Black Creek Formation unit returned a natural moisture contest of 48.9%.

The Cape Fear Formation was encountered underlying the Black Creek in a deep foundation boring completed at end bent two of Bridge No. 188. It was found to be composed of 4 or more feet of hard silty clay (A-7-6).

Soils identified as roadway embankment are comprised of 1± to 32± feet of loose to dense sand (A-2-4) and soft to medium stiff sandy silty clay (A-6, A-7-6). These soils were encountered along the existing NC 11 embankment.

Undisturbed Samples

Undisturbed thin wall Shelby tube samples were collected at the following locations and submitted for testing.

Sample	Station	Depth	Test
ST-1	31+30 7'LT	10.0-11.8	Consolidation
ST-1A	59+00 30'RT	9.5-11.5	Consolidation
ST-2	31+30 7'LT	20.0-21.7	Consolidation
ST-2A	26+50 25'RT	10.0-12.0	Consolidation
ST-3	47+00 37'RT	15.0-16.2	Consolidation

Respectfully Submitted,

Joseph L. Stone, L.G.
Project Engineering Geologist

Volumes in Cubic Yards

PROJECT: B-4712 COUNTY: Bladen DATE: 2/15/2012 COMPILED BY: TLS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +25%		ROCK	SUITABLE	UNSUIT.	TOTAL
TEMP. PAVEMENT AREAS															
-L- LT. 28+94	31+40	16				16	9		9	11	0		5	0	5
-L- LT. 46+12	49+28	21				21	2		2	3	0		19	0	19
-L- LT. 59+78	62+20	17				17	6		6	8	0		10	0	10
-L- LT. 65+01	67+36	13				13	118		118	148	135		0	0	0
1	**SUBTOTAL**	67				67	135		135	169	135		33	0	33
-L- RT.															
-L-20+21.00	31+30.00 (BEG BRG)	2,203				2,203	19,178		19,178	23,973	21,770		0	0	0
-L-47+00.00 (END BRG)	62+00.00 (BEG BRG)	63				63	52,156		52,156	65,195	65,132		0	0	0
-L-65+00.00 (END BRG)	79+70.00	203				203	14,376		14,376	17,970	17,767		0	0	0
2	**SUBTOTAL**	2,469				2,469	85,710		85,710	107,138	104,669		0	0	0
-L- LT.															
-L-26+50.00	31+30.00 (BEG BRG)	148				148	0		0	0	0		148	0	148
-L-47+00.00 (END BRG)	60+00.00	411				411	9		9	11	0		400	0	400
3	**SUBTOTAL**	559				559	9		9	11	0		548	0	548
-L- LT.															
-L-20+21.00	32+00.00	8,624				8,624	34		34	43	0		8,582	0	8,582
-L-46+00.00 (BEG BRG)	62+00.00	13,611				13,611	0		0	0	0		13,611	0	13,611
4	**SUBTOTAL**	22,235				22,235	34		34	43	0		22,193	0	22,193
-L- LT															
-L-65+00.00	79+70.00	5,255				5,255	120		120	150	0		5,105	0	5,105
5	**SUBTOTAL**	5,255				5,255	120		120	150	0		5,105	0	5,105
PROJECT SUBTOTAL		30,585				30,585	86,008		86,008	107,885	104,803		27,878	0	27,878
MATERIAL FOR SHOULDER CONSTRUCTION							1,449		1,449	1,811	1,811		0	0	0
SUITABLE WASTE AVAILABLE IN LIEU OF BORROW		0					0		0	0	-33		-33	0	-33
ADDITIONAL UNDERCUT		0					0		0	0	0		0	0	0
PROJECT SUBTOTAL		30,585				30,585	87,457		87,457	109,696	106,581		27,845	0	27,845
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											5,329				
GRAND TOTAL		30,585				30,585	87,457	0	87,457	109,696	111,910		27,845	0	27,845
SAY		**30,700**									**112,000**				

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PROJECT REFERENCE NO.	SHEET NO.
B-4712	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/95

REVISIONS 8/17/99

TAR HEEL BAPTIST CHURCH
DB 460 PG 448
PB A-183 PG 1837

S 53°57'52" W
463.09'

TAR HEEL BAPTIST CHURCH
DB 440 PG 530
PB A-183 PG 1837

20

25

30

CUSTOM PROPERTIES
OF WHITEVILLE LLC
DB 621PG 188
PB A-183 PG 1837

PT Sta. 29+39.70

PLASTIC POLES

BST PARKING

60' CONC

GRASS

72" CONC

GRASS

60' CONC

2SBK
TAR HEEL BAPTIST CHURCH

BST PARKING

PLASTIC POLES

BL- 2

EXISTING R/W

N 83°23'32" W
852.33'
220.73'

EIP

BL- 3

WOODS

EXISTING R/W

WOODS

BL- 4

+73.89
198.11'

S 49°39'24" E
864.28'

+13.18
116.39'

F/O SPLICE BOX

F/O PED

9.50' CONC

T FO

30' INC.

4' PC

N 26°57'37.0" E

SR 1316 TARHEEL FERRY RD 24' BST

50' LT. & RT. TAPER

WOODS

CONC

GRAU 350

25:1 TAPER

PC Sta. 21+61.33

PRC Sta. 25+50.51

+99

150'

STA. 20+21.00 -L- BEGIN TIP PROJECT B-4712

EXISTING R/W

+61.33
149.24

+50.51
150

+39.70
150

+39.70
150
157

PDE

+85.00
150
157

+12.82
150

+31.57
105.91'

MATCHLINE 33+00.00 SEE SHEET 5

ISBKD

S

-L-

PI Sta 23+56.13
Δ = 6° 33' 30.4" (RT)
D = 1° 41' 06.6"
L = 389.19'
T = 194.81'
R = 3,400.00'
SE = SEE PLANS

PI Sta 27+45.32
Δ = 6° 33' 30.4" (LT)
D = 1° 41' 06.6"
L = 389.19'
T = 194.81'
R = 3,400.00'
SE = SEE PLANS

WILLIAM L. TRUMAN
AND WIFE JANICE
DB 326 PG 858

S 55°54'59" E
240.69'

N 26°41'30" E
1424.96'

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PROJECT REFERENCE NO.	SHEET NO.
B-4712	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/95

REVISIONS

8/17/99

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jgarner

MATCHLINE 33+00.00 SEE SHEET 4

MATCHLINE 46+00.00 SEE SHEET 6

35 40 45

STATE OF NORTH CAROLINA
DB 172 PG 167

BARBARA T. MERRITT AND
HUSBAND DANNY
DB 482 PG 661,663

CAPE FEAR RIVER

WOODS

GR

BL-5

BL-6

25' CONC BOAT RAMP

+13.61
121.20'

+14.71
121.20'

EIP

S 53°25'58" E
423.18'

N 53°25'58" W
344.02'

N 53°25'58" W
276.62'

EXISTING R/W

16' RAMP

7' SOIL

WILDLIFE LANDING DR 12' GR

BRIDGE NO. 188

CONC

N 26°57'37.0" E

-L-

125'

+35.63
30.98'

+30.85
125

S 58°36'12" E
228.05'

REECE KIPLING LANCASTER AND
ROBERT NEIL CAISON
DB 603 PG 325,327
PB A-183 PG 1837

BENJAMIN GRAY YOUNG
AND WIFE RUBY
DB 308 PG 823-826

BEGIN BRIDGE
-L- STA. 31+30 +/-

END BRIDGE
-L- STA. 47+00 +/-

TYPE-III

BEGIN APPROACH SLAB
-L- STA. 31+19 +/-

END APPROACH SLAB
-L- STA. 47+11 +/-

RELATIONSHIP OF BRIDGE NO. 188 TO PROPOSED PAVEMENT

PROJECT REFERENCE NO.	SHEET NO.
B-4712	6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99

N 25°04'20" E
292.65'

NAD 83/95

BARBARA T. MERRITT AND
HUSBAND DANNY
DB 482 PG 661,663

50

55

BL-7

BL-8

BL-9

WOODS

3 STR WIRE

WILDLIFE LANDING DR 12' GR

CONC

GRAU 350

SR 1316 TARHEEL FERRY RD 24' BST

N 26° 57' 37.0" E

EXISTING R/W

125'

PDE

+00.00
134
134

+40.00
134
134

+00.00
100
125

MATCHLINE 46+00.00 SEE SHEET 5

MATCHLINE 59+00.00 SEE SHEET 7

BENJAMIN GRAY YOUNG
AND WIFE RUBY
DB 306 PG 823-826

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jstone AT GEPCO444

PROJECT REFERENCE NO.	SHEET NO.
B-4712	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99

BARBARA T. MERRITT AND
HUSBAND DANNY
DB 482 PG 661,663

NAD 83/95

DANNY MERRIT and wife
BARBARA MERRITT
DB 348 PG 584

60 65 70

MATCHLINE 59+00.00 SEE SHEET 6

MATCHLINE 72+00.00 SEE SHEET 8

BL- 10

GPS- B-4712-3

PRC Sta. 70+78.88

3 STR WIRE

WILDLIFE LANDING DR 12' GR

EXISTING R/W

0.30'

+69.18
123.09'

+04.46
105.17'

GWENDOLYN
COUNCIL LEWIS
DB 608 PG 097

CONC DECK

GRASS

HTR

24" CABLE

15' SOIL DR

S 11°23'16" W
160.21'

N 66°50'34" W
393.00'

N 66°50'34" W
152.30'

EIP

CONC

BST

BRIDGE NO. 189

GRAU 350

25:1 TAPER

N 26°57'37.0" E

-L-

13' SOIL

WOODS LINE

SR 1316 FARMELL FERRY RD 24' BST

30' INC.

+89.70
75
100

PC Sta. 66+89.70

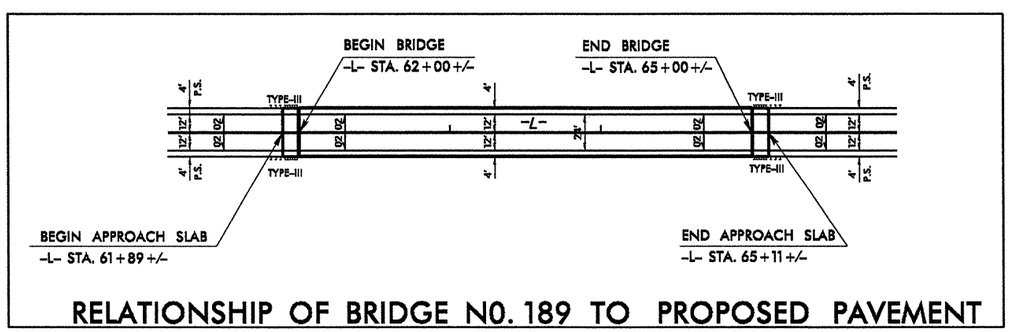
+78.88
75

WOODS

-L-

PI Sta 68+84.50	PI Sta 72+73.69
Δ = 6° 33' 30.4" (LT)	Δ = 6° 33' 30.4" (RT)
D = 1° 41' 06.6"	D = 1° 41' 06.6"
L = 389.19'	L = 389.19'
T = 194.81'	T = 194.81'
R = 3,400.00'	R = 3,400.00'
SE = SEE PLANS	SE = SEE PLANS

BENJAMIN GRAY YOUNG
AND WIFE RUBY
DB 306 PG 823-826



RELATIONSHIP OF BRIDGE NO. 189 TO PROPOSED PAVEMENT

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jstone

PROJECT REFERENCE NO.	SHEET NO.
B-4712	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99

NAD 83/95

DANNY MERRIT and wife
BARBARA MERRITT
DB 348 PG 584

ALFONZA TUTT and wife
LAURA C. TUTT
DB 308 PG 581

JESSIE CAMPBELL JR
DB 409 PG 864

MARSHALL B PITTS SR.
and wife
CAROL W. PITTS
DB 278 PG 927

MARSHALL B PITTS SR.
DB 339 PG 693

BENJAMIN GRAY YOUNG
AND WIFE RUBY
DB 306 PG 823-826

75

80

B-4712-4

BL-11

POT Sta. 81+53.21

SR 1308 RIVER RD TO FAYETTEVILLE

MATCHLINE 72+00.00 SEE SHEET 7

SR 1316 TARHEEL FERRY RD 24' BST

SR 1318 RIVER RD

TO WHITE OAK

PI Sta 72+73.69
Δ = 6° 33' 30.4" (RT)
D = 1° 41' 06.6"
L = 389.19'
T = 194.81'
R = 3,400.00'
SE = SEE PLANS

PT Sta. 74+68.07

STA. 76+38.00 -L- END TIP PROJECT B-4712

5/14/99

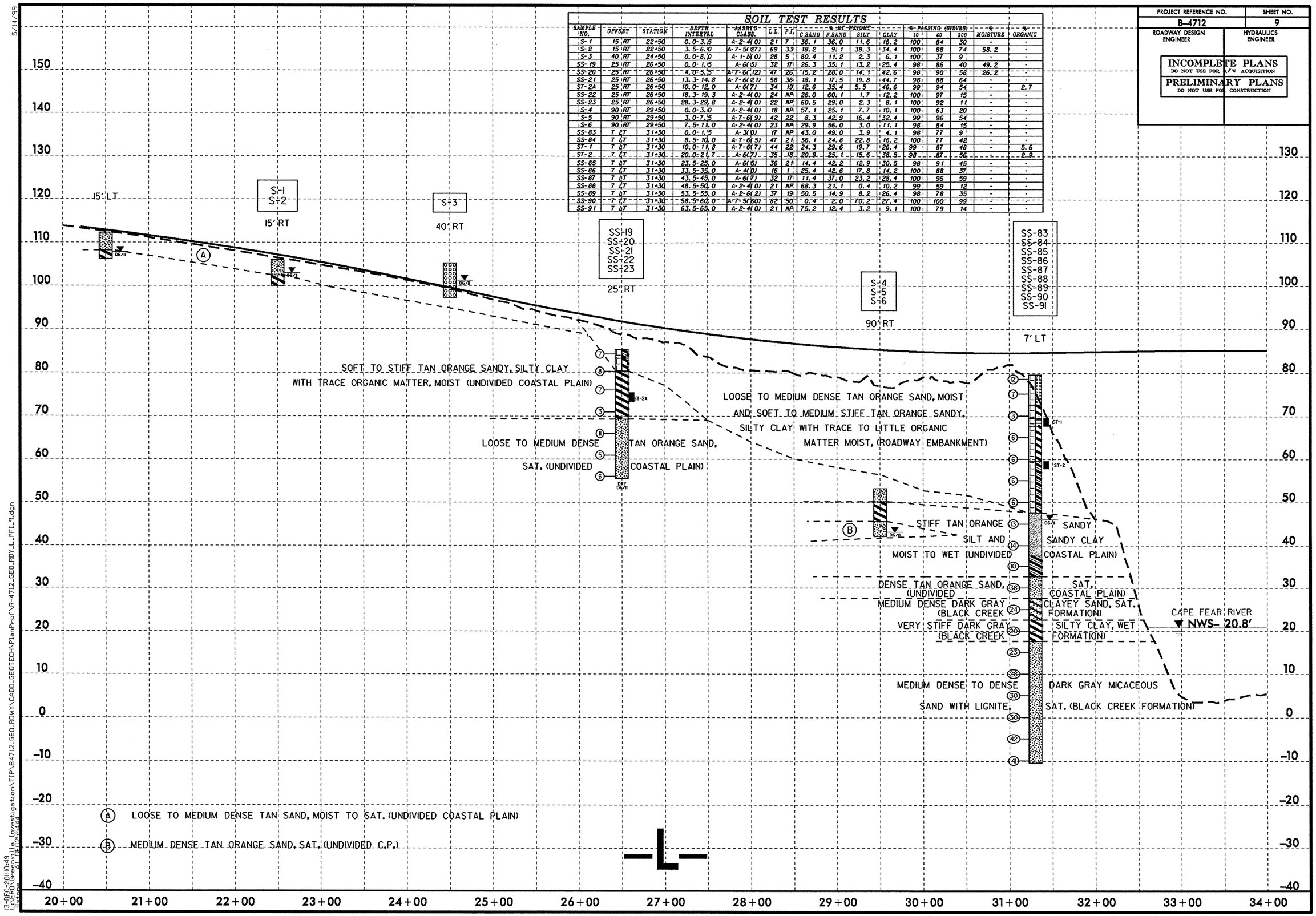
PROJECT REFERENCE NO.	SHEET NO.
B-4712	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-1	15' RT	22+50	0.0-3.5	A-2-4(0)	21	7	36.1	36.0	11.6	16.2	100	84	30	-	-
S-2	15' RT	22+50	3.5-6.0	A-7-5(27)	69	33	18.2	9.1	38.3	34.4	100	88	74	58.2	-
S-3	40' RT	24+50	0.0-8.0	A-1-b(0)	28	5	80.4	11.2	2.3	6.1	100	37	9	-	-
SS-19	25' RT	26+50	0.0-1.5	A-6(3)	32	17	26.3	35.1	13.2	25.4	98	86	40	49.2	-
SS-20	25' RT	26+50	4.0-5.5	A-7-6(12)	47	26	15.2	26.0	14.1	42.6	98	90	58	26.2	-
SS-21	25' RT	26+50	13.3-14.8	A-7-6(21)	58	36	18.1	17.5	19.8	44.7	98	88	64	-	-
ST-2A	25' RT	26+50	10.0-12.0	A-6(7)	34	19	12.6	35.4	5.5	46.6	99	94	54	-	2.7
SS-22	25' RT	26+50	18.3-19.3	A-2-4(0)	24	NP	26.0	60.1	1.7	12.2	100	97	15	-	-
SS-23	25' RT	26+50	28.3-29.8	A-2-4(0)	22	NP	60.5	29.0	2.3	8.1	100	92	11	-	-
S-4	90' RT	29+50	0.0-3.0	A-2-4(0)	18	NP	57.1	25.1	7.7	10.1	100	63	20	-	-
S-5	90' RT	29+50	3.0-7.5	A-7-6(9)	42	22	8.3	42.9	16.4	32.4	99	96	54	-	-
S-6	90' RT	29+50	7.5-11.0	A-2-4(0)	23	NP	29.9	56.0	3.0	11.1	98	84	15	-	-
SS-83	7' LT	31+30	0.0-1.5	A-3(0)	17	NP	43.0	49.0	3.9	4.1	98	77	9	-	-
SS-84	7' LT	31+30	8.5-10.0	A-7-6(5)	47	21	36.1	24.8	22.8	16.2	100	77	42	-	-
ST-1	7' LT	31+30	10.0-11.8	A-7-6(17)	44	22	24.3	29.6	19.7	26.4	99	87	48	-	5.6
ST-2	7' LT	31+30	20.0-21.7	A-6(7)	35	18	20.9	25.1	15.6	38.5	98	87	56	-	2.9
SS-85	7' LT	31+30	23.5-25.0	A-6(5)	36	21	14.4	42.2	12.9	30.5	98	91	45	-	-
SS-86	7' LT	31+30	33.5-35.0	A-4(0)	16	1	25.4	42.6	17.8	14.2	100	88	37	-	-
SS-87	7' LT	31+30	43.5-45.0	A-6(7)	32	17	11.4	37.0	23.2	28.4	100	96	59	-	-
SS-88	7' LT	31+30	48.5-50.0	A-2-4(0)	21	NP	68.3	21.1	0.4	10.2	99	59	12	-	-
SS-89	7' LT	31+30	53.5-55.0	A-2-6(2)	37	19	50.5	14.9	8.2	26.4	98	78	35	-	-
SS-90	7' LT	31+30	58.5-60.0	A-7-5(60)	82	50	0.4	2.0	70.2	27.4	100	100	98	-	-
SS-91	7' LT	31+30	63.5-65.0	A-2-4(0)	21	NP	75.2	12.4	3.2	9.1	100	79	14	-	-



5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-4712	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Ⓐ VERY STIFF TAN SILTY CLAY, MOIST (ALLUVIAL)

Ⓑ LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-99	37' RT	47+00	0.0-1.5	A-6(12)	37	16	4.5	19.1	35.8	40.6	100	99	80	-	-
SS-100	37' RT	47+00	3.5-5.0	A-1-b(0)	21	NP	58.1	28.0	2.7	11.2	61	48	9	-	-
SS-101	37' RT	47+00	8.5-10.0	A-1-a(0)	20	2	80.3	9.9	1.6	8.1	47	17	5	-	-
SS-102	37' RT	47+00	13.5-15.0	A-7-5(51)	79	46	1.8	7.1	38.5	52.6	100	99	93	-	-
ST-3	37' RT	47+00	15.0-16.2	A-7-6(33)	59	35	8.3	7.7	33.4	50.6	100	94	86	-	9.0
SS-103	37' RT	47+00	38.5-40.0	A-2-4(0)	22	NP	53.6	31.4	4.9	10.1	98	65	16	-	-
SS-104	37' RT	47+00	58.5-60.0	A-7-6(41)	71	42	3.4	12.3	35.7	48.5	100	99	86	-	-

SS-99
SS-100
SS-101
SS-102
SS-103
SS-104
37' RT

CAPE FEAR RIVER
▼ NWS- 20.8'

Ⓐ Ⓑ

16 18 11 14 16 18 17 16 25 28 34 29 27 24 24 39

06/1 ▼ GRAY SAND, MOIST TO SAT. ALLUVIAL

ST-3

STIFF TO VERY STIFF DARK GRAY MICACEOUS SILTY CLAY, WITH LITTLE ORGANICS, WET (BLACK CREEK FORMATION)

MEDIUM DENSE TO DENSE DARK GRAY SAND WITH LIGNITE, SAT. (BLACK CREEK FORMATION)

VERY STIFF DARK GRAY MICACEOUS SILTY CLAY, WET (BLACK CREEK FORMATION)

HARD LIGHT GRAY SILTY CLAY, WET (CAPE FEAR FORMATION)

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40

34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 47+00 48+00

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5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-4712	11

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
SS-24	30 RT	49+00	0.0- 1.5	A-4(1)	25	8	17.5	41.2	19.0	22.3	100	91	46	-	-
SS-25	30 RT	49+00	8.2- 9.7	A-3(0)	21	NP	64.4	26.6	0.9	8.1	72	53	7	-	-
SS-26	30 RT	49+00	13.2- 14.7	A-2-4(0)	27	6	49.0	29.4	8.3	13.2	85	63	20	-	-
SS-27	30 RT	49+00	23.2- 24.7	A-6(3)	34	15	16.6	40.3	13.6	29.4	93	89	43	-	-
SS-28	30 RT	49+00	28.2- 29.7	A-1-b(0)	26	6	29.8	10.8	1.3	8.1	94	34	10	-	-
SS-15	35 RT	51+00	0.0- 1.5	A-4(0)	24	3	4.9	41.8	35.0	18.3	100	98	64	-	-
SS-16	35 RT	51+00	8.6- 10.1	A-3(0)	23	NP	24.1	19.9	2.9	3.0	99	66	7	-	-
SS-17	35 RT	51+00	23.6- 25.1	A-1-b(0)	29	6	27.9	11.8	3.2	7.1	98	41	11	-	-
SS-18	35 RT	51+00	28.6- 30.1	A-7-6(54)	75	50	2.2	5.9	33.0	58.9	100	99	94	-	-
SS-10	35 RT	53+00	0.0- 1.5	A-4(0)	23	2	13.9	45.1	34.8	16.2	100	99	61	-	-
SS-11	35 RT	53+00	4.0- 5.5	A-4(3)	26	9	4.3	45.9	27.5	22.3	100	99	59	-	-
SS-12	35 RT	53+00	8.2- 9.7	A-2-4(0)	22	NP	56.4	30.6	4.9	8.1	98	78	15	-	-
SS-13	35 RT	53+00	18.2- 19.7	A-7-6(29)	57	37	14.7	22.7	23.9	48.7	100	99	77	-	-
SS-14	35 RT	53+00	23.2- 24.7	A-2-6(0)	34	13	75.5	8.8	6.5	9.1	100	43	18	-	-
S-13	45 RT	55+00	0.0- 4.0	A-4(0)	24	5	19.2	34.8	29.8	16.2	100	93	52	-	-
S-14	45 RT	55+00	4.0- 8.0	A-7-6(26)	49	30	9.1	9.1	33.2	48.6	100	95	85	23.8	-
S-15	45 RT	55+00	8.0- 11.0	A-7-6(03)	19	1	71.1	14.9	5.0	9.1	94	49	14	-	-
S-7	30 RT	57+00	0.0- 14.5	A-2-4(0)	21	NP	81.0	7.4	2.5	9.1	100	51	12	-	-
S-8	30 RT	57+00	14.5- 15.5	A-7-6(54)	82	57	17.1	9.7	24.5	58.7	100	96	86	-	-
S-9	30 RT	59+00	11.5- 14.5	A-6(15)	39	22	16.6	14.4	34.6	34.4	100	94	75	-	-
ST-1A	30 RT	59+00	9.5- 11.5	A-6(5)	30	16	31.3	20.4	28.2	20.2	100	89	53	-	2.7
S-10	30 RT	59+00	14.5- 15.5	A-1-b(0)	19	NP	77.4	12.7	4.9	5.1	89	40	10	-	-
SS-1	15 RT	61+00	0.0- 1.5	A-6(5)	32	13	34.6	10.6	26.7	28.0	100	79	57	-	-
SS-2	15 RT	61+00	8.3- 9.8	A-2-4(0)	21	4	60.7	18.5	10.8	10.0	100	69	24	-	-
SS-3	15 RT	61+00	18.3- 19.8	A-2-4(0)	27	5	38.4	36.7	7.8	17.0	100	78	26	-	-
SS-4	15 RT	61+00	23.3- 24.8	A-7-6(39)	63	42	2.8	14.2	20.9	62.1	100	99	86	-	-
SS-5	15 RT	61+00	28.3- 29.8	A-2-4(0)	31	9	75.3	10.5	6.2	8.0	100	45	16	-	-

Ⓐ SOFT TO STIFF GRAY SANDY AND SILTY CLAY WITH TRACE ORGANICS, MOIST TO WET (ALLUVIAL)

Ⓑ MEDIUM STIFF TO STIFF DARK GRAY MICACEOUS SANDY SILTY CLAY, WET (BLACK CREEK FORMATION)

Ⓒ LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

SS-24, SS-25, SS-26, SS-27, SS-28 — 30' RT
SS-15, SS-16, SS-17, SS-18 — 35' RT
SS-10, SS-11, SS-12, SS-13, SS-14 — 35' RT
S-13, S-14, S-15 — 45' RT
S-7, S-8 — 30' RT
S-9, S-10 — 30' RT
SS-1, SS-2, SS-3, SS-4, SS-5 — 15' RT

LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

VERY LOOSE TO MEDIUM DENSE

MEDIUM STIFF TO

LOOSE TO DENSE TAN SAND, MOIST TO SAT. (ALLUVIAL)

GRAY SAND, MOIST TO SAT. AND MEDIUM STIFF TO STIFF GRAY SANDY SILT, MOIST TO WET (ALLUVIAL)

STIFF DARK GRAY MICACEOUS SANDY, SILTY CLAY, WET (BLACK CREEK FORMATION)

MEDIUM DENSE TO DENSE DARK GRAY SAND WITH LIGNITE, SAT. (BLACK CREEK FORMATION)

VERY STIFF DARK GRAY SILTY AND SANDY MICACEOUS CLAY WITH LIGNITE, WET (BLACK CREEK FORMATION)

HARD LIGHT GRAY SILTY CLAY, WET (CAPE FEAR FORMATION)

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40

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PROJECT REFERENCE NO.	SHEET NO.
B-4712	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
SS-32	11 RT	62+10	0.0- 1.5	A-4(0)	19	3	42.4	24.2	17.2	16.2	100	84	36	-	-
SS-33	11 RT	62+10	8.6- 10.1	A-1-b(0)	18	NP	89.8	5.9	0.2	4.1	87	18	4	-	-
SS-34	11 RT	62+10	13.6- 15.1	A-7-5(44)	75	35	1.8	1.4	44.0	52.8	100	99	97	48.9	-
SS-35	11 RT	62+10	18.6-20.1	A-1-b(0)	25	5	80.4	8.5	1.9	9.1	98	49	12	-	-
SS-36	11 RT	62+10	33.6- 35.1	A-3(0)	20	NP	74.3	16.6	2.9	6.1	100	88	10	-	-
SS-37	11 RT	62+10	53.6- 55.1	A-2-4(0)	25	NP	42.4	41.9	5.5	10.2	98	80	17	-	-
SS-38	11 RT	62+10	63.6- 65.1	A-7-6(42)	62	42	6.9	3.7	38.7	50.8	100	96	92	-	-
SS-24	5 RT	65+00	0.0- 1.5	A-4(1)	25	10	36.6	22.0	19.0	22.4	100	83	45	-	-
SS-25	5 RT	65+00	3.8- 5.3	A-2-6(0)	33	12	70.6	7.9	7.2	14.2	99	58	22	-	4.7
SS-26	5 RT	65+00	8.8- 10.3	A-7-6(31)	58	32	4.3	11.8	51.4	32.6	100	97	88	-	-
SS-27	5 RT	65+00	13.8- 15.3	A-2-6(1)	37	17	66.2	13.7	10.8	19.3	99	62	32	-	-
SS-28	5 RT	65+00	18.8- 20.3	A-7-6(30)	62	37	13.4	11.2	26.6	48.8	100	95	78	-	-
SS-29	5 RT	65+00	28.8- 30.3	A-2-4(0)	21	NP	68.5	22.6	4.9	4.1	100	93	11	-	-
SS-30	5 RT	65+00	43.8- 45.3	A-1-b(0)	18	NP	85.5	10.7	1.8	2.0	99	30	5	-	-
SS-31	5 RT	65+00	58.8- 60.3	A-7-6(41)	68	39	2.4	8.7	25.7	63.1	100	99	91	-	-
S-11	25 RT	67+00	0.0- 11.0	A-3(0)	19	NP	86.4	9.7	2.8	1.0	100	59	4	-	-
S-12	25 RT	67+00	16.0- 18.0	A-2-4(0)	23	NP	60.9	27.9	5.1	6.1	99	82	13	-	-
SS-6	35 RT	69+00	0.0- 1.5	A-2-4(0)	19	NP	66.8	20.8	8.4	4.0	100	77	15	-	-
SS-7	35 RT	69+00	8.3- 9.8	A-2-4(0)	20	NP	74.7	13.0	8.3	4.0	84	51	11	-	-
SS-8	35 RT	69+00	13.3- 14.8	A-7-5(49)	75	43	1.8	5.8	32.3	60.1	100	99	95	-	-
SS-9	35 RT	69+00	18.3- 19.8	A-1-b(0)	23	3	80.6	10.3	5.1	4.0	99	31	10	-	-
S-17	50 RT	71+00	0.0- 10.5	A-3(0)	22	NP	53.4	38.3	3.2	5.1	100	88	10	-	-
S-18	50 RT	71+00	10.5- 15.5	A-7-6(15)	49	27	31.9	6.3	17.4	44.4	99	76	63	-	-
S-16	45 RT	73+00	0.0- 6.0	A-3(0)	18	NP	80.2	14.3	1.4	4.0	100	67	6	-	-

Ⓐ LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

Ⓑ VERY LOOSE TO LOOSE BROWN SAND WITH LITTLE ORGANIC MATTER, SAT. (ALLUVIAL)

SS-32, SS-33, SS-34, SS-35, SS-36, SS-37, SS-38 — 11' RT

SS-24, SS-25, SS-26, SS-27, SS-28, SS-29, SS-30, SS-31 — 5' RT

S-11, S-12 — 25' RT

SS-6, SS-7, SS-8, SS-9 — 35' RT

S-17, S-18 — 50' RT

S-16 — 45' RT

15' LT

LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

LOOSE TO MEDIUM DENSE TAN SAND, MOIST TO VERY STIFF TO SAT. TAN SANDY SILT, AND MEDIUM STIFF MOIST TO WET (ALLUVIAL)

MEDIUM STIFF TO STIFF DARK GRAY MICACEOUS SILTY, SANDY CLAY, WET (BLACK CREEK FORMATION)

MEDIUM DENSE DARK GRAY MICACEOUS SAND WITH LIGNITE, SAT. (BLACK CREEK FORMATION)

MEDIUM DENSE TO DENSE DARK GRAY SAND WITH LIGNITE, SAT. (BLACK CREEK FORMATION)

VERY STIFF SILTY MICACEOUS CLAY WITH LIGNITE, WET (BLACK CREEK FORMATION)

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40

62+00 63+00 64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00

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PROJECT REFERENCE NO.	SHEET NO.
B-4712	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40

LOOSE TO DENSE TAN ORANGE SAND, MOIST AND STIFF TAN SANDY SILT, MOIST (ROADWAY EMBANKMENT)

LOOSE TO MEDIUM DENSE TAN SAND, MOIST TO SAT. (ALLUVIAL)

76+00 77+00 78+00 79+00 80+00 81+00

5/14/99

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