STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2502B	1	24
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34438.1.1		P.E.	
		CONST.	

ID: R-2502B

PROJECT: 34438.1.1

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34438.1.1 I.D. NO. R-2502B

F.A. PROJECT

COUNTY RICHMOND/MOORE

PROJECT DESCRIPTION US 1 NORTH OF SR 1528 JUST NORTH OF HOFFMAN TO THE DIVIDED FACILITY NORTH OF THE RICHMOND COUNTY LINE.

SITE DESCRIPTION BRIDGE NO. 42 ON US 1 OVER DROWNING CREEK.

STAS. 432+07 -L- TO 436+47 -L-

CONTENTS:

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE 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 J.P. ROGERS PERSONNEL R.W. TODD

CHECKED BY C.B. LITTLE M.L. SMITH

SUBMITTED BY C.B. LITTLE C.E. BURRIS

DATE 12/2005

DRAWN BY: JP ROGERS/JK McCLURE

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

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

NORTH CAROLINA LICENSED SEAL 21930 GEOLOGIST CLINTON B. LITTLE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEE
R-2502B	34438.1.1	2	24

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION 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 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	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	2.0	0.42	0.25	0.075	0.053

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

GRAIN 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, YEL-BRN, 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 ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 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 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
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT / DPT PMT / VST — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS

S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

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
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N XWL
- [ ] -H_____

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

ROCK DESCRIPTION

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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD 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 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 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 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 TOT 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 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, 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 WI A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATIO WITH 60 BLOWS.

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

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-36 @ 432+98.05 -L-, 6.02' RT.

ELEVATION: 281.92'

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MIKE F. EASLEY
GOVERNOR

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

LYNDO TIPPETT
SECRETARY

December 14, 2005

STATE PROJECT: 34438.1.1
I.D. : R-2502B
COUNTY: Richmond/Moore
PROJECT DESCRIPTION: US 1 North of SR 1528 just North of Hoffman to the Divided Facility North of the Richmond County Line.

SITE DESCRIPTION: Bridge No. 042 over Drowning Creek on US 1
Stations 432+07 –L- to 436+47 –L-

SUBJECT: Geotechnical Report - Bridge Foundation Investigation

SITE DESCRIPTION AND GEOLOGY

The site is located at the Richmond County/Moore County line between the towns of Hoffman and Pinebluff. The scope of the bridgework on this project will be to upgrade the existing two-lane structure to a four-lane structure with median separation. The content of this report applies to both the Northbound and Southbound structures.

The proposed replacement structure will be a concrete deck on 63" reinforced concrete deck girders with one span of 100.0', one span of 120.0', one span of 120.0', and one span of 100.0'. The skew is 90 degrees to line -L-. The Northbound lane of the new structure will be in the same location as the existing structure with the Southbound lane being just upstream of the existing structure. The benchmark (BL #36, elev. 281.92') used to survey our collar elevations is located at 432+98.05 –L-, 6.02' right.

The Geotechnical Unit performed a total of 5 Standard Penetration Test (SPT) borings and 3 SPT/core borings at this site. All borings were advanced with water using either a tri-cone bit or NX wireline (core). One boring on each of the interior bents was cored.

According to the NC Geologic Map, the geology in the area of our investigation is classified as a Triassic formation (Chatham group) within the Coastal Plain region. Ground surface elevations within the project corridor range between 274.00' and 284.00'. The predominant rock types encountered in our core borings were Coastal Plain, red/brown to gray, sandstone and mudstone. Metamorphosed Granitic rock was also encountered at or below elevation 234.00' in the borings performed on the interior bents.

Two rock core samples were submitted to the rock lab where they were tested for Unit Weight, Compressive Strength, and Young's Modulus. The results from these tests can be obtained from either John Rogers in the Harrisburg Field Office or from Chris Chen in the Central (Headquarters) Office.

FOUNDATION SUMMARY

End Bent One (EB1)

Roadway fill soils at this location are estimated to be approximately five feet thick. Approximately 20.0' of alluvial soils were encountered on this bent. These soils consist of loose to medium dense, clayey, coarse sand (A-2-7). Coastal Plain Sedimentary rock (gray/brown, very soft, sandstone) was encountered on this bent near elevation 257.00'. Please refer to the appropriate attached borelog(s) for this bent to view SPT penetration data.

At the time of our investigation, the twenty-four hour groundwater level was near elevation 272.00' across the bent.

Interior Bent One (B1)

Alluvial soils encountered are approximately 19.0' to 27.0' thick and consist of loose to medium dense, coarse sand with gravel (A-1-a). Coastal Plain soils encountered in the boring at B1-A, SBL are approximately 5' thick and consist of dense, clayey, coarse sand (A-2-7). Roadway fill soils were not encountered at this location.

Coastal Plain Sedimentary rock was encountered between elevation 251.00' – 255.00' across this bent. Rock core retrieved from the boring at B1-A, SBL consisted of gray/brown, and very soft sandstone with RQD's between 50% and 96%. In addition, metamorphosed granitic rock was encountered at this bent at or below elevation 233.50'. The twenty-four hour groundwater level was between elevation 271.00' – 274.00' along this bent. Please refer to the appropriate corelog and cross-section for a detailed, run-by run analysis of the core retrieved at this location.

Interior Bent Two (B2)

Alluvial soils encountered are 18.00' to 19.00' thick and consist of loose, clayey coarse sand (A-2-6). Coastal Plain residual soils encountered at this bent are approximately 3.00'- 5.00' thick and consist of hard, sandy clay (A-7). Roadway fill soils were not encountered at this location.

Coastal Plain Sedimentary rock was encountered between elevation 251.00' – 253.00' across this bent. Rock core retrieved from the boring at B2-B consisted of very soft mudstone and sandstone with RQD's between 79% and 83%. In addition, metamorphosed granitic rock and residual soil was encountered at this bent at or below elevation 232.00'. The twenty-four hour groundwater level along this bent was between elevation 270.50' – 272.00'. Please refer to the appropriate corelog and cross-section for a detailed, run-by run analysis of the core retrieved at this location.

Interior Bent Three (B3)

Alluvial soils encountered on this bent are 15.00' to 22.50' thick and consist of loose to very dense, coarse sand (A-1-b) with gravel. Coastal Plain soils encountered in the boring at B3-B are approximately 3.50'- 15.00' thick and consist of stiff, silty clay (A-7) and very dense, clayey coarse sand (A-2-7). Roadway fill soils were not encountered at this location.

Coastal Plain Sedimentary rock was encountered between elevation 231.50' – 256.00' across this bent. Rock core retrieved from the boring performed at B3-A consisted of very soft sandstone and sandy mudstone. RQD's are between 52% and 77%. In addition, metamorphosed granitic rock was encountered at this bent at or below

elevation 234.00'. The groundwater level at this location was between elevations 268.50' and 271.50'. Please refer to the appropriate corelog and cross-section for a detailed, run-by run analysis of the core retrieved at this location.

End Bent Two (EB2)

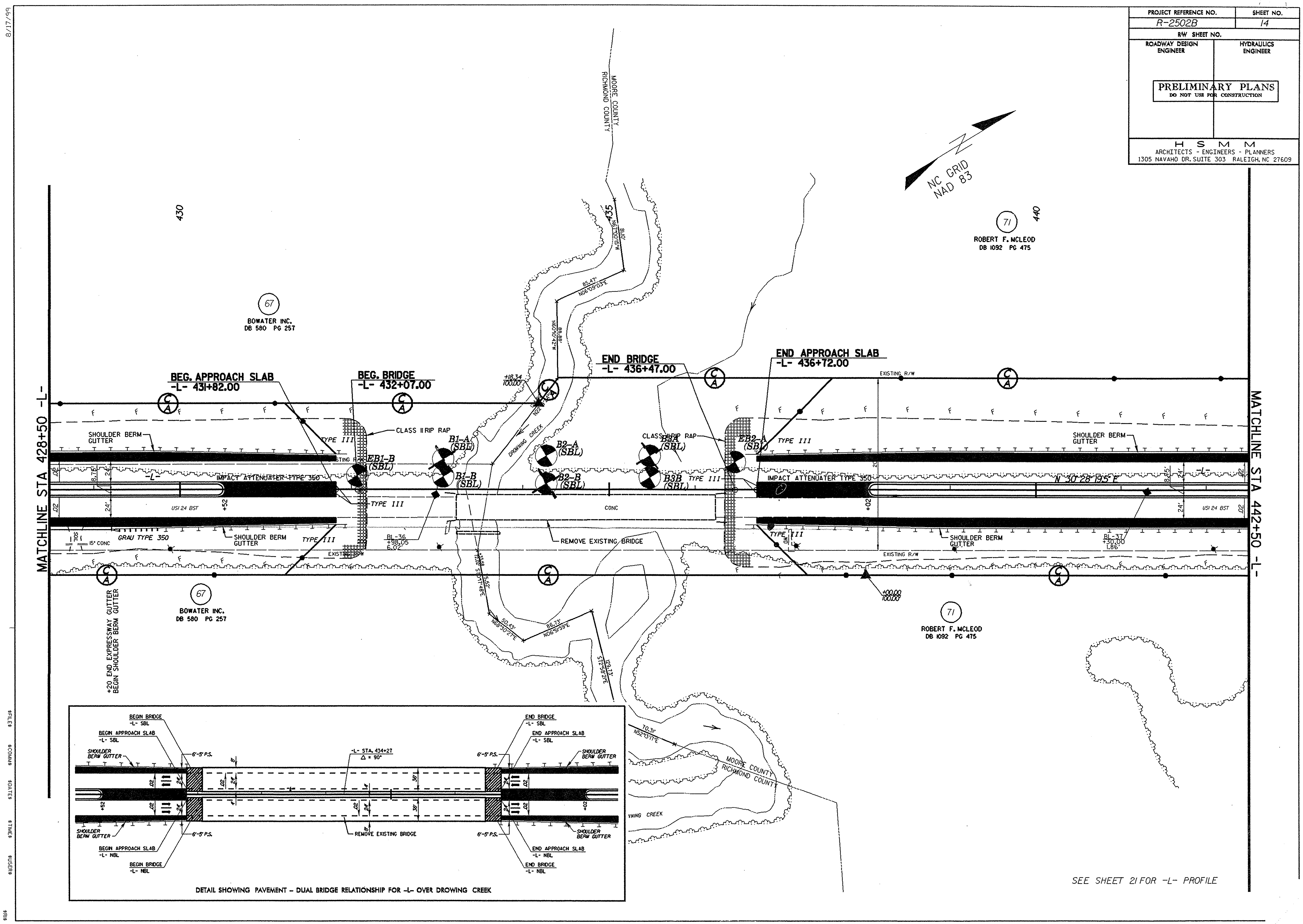
Roadway fill soils at this location are estimated to be approximately 6.50' to 7.00' thick. Approximately 23.00' to 25.00' of alluvial soils were encountered on this bent. These soils consist of loose to medium dense, clayey sand (A-1-b, A-2-6, and A-2-7). Coastal Plain Sedimentary rock (gray/brown, very soft, sandstone) was encountered on this bent near elevation 251.00'. Please refer to the appropriate attached borelog(s) for this bent to view SPT penetration data. A Shelby Tube (ST-1) was taken for Erosion Function Apparatus (EFA) testing at the boring performed at EB2-A.

At the time of our investigation, the twenty-four hour groundwater level was near elevation 271.00' in the boring at EB2-A.

Respectfully submitted,

J. P. Rogers
Project Engineering Geologist
Geotechnical Engineering Unit - Harrisburg Field Office

cc: Tim Johnson, PE
Division 08 Engineer


PROJECT REFERENCE NO.
R-2502B
SHEET NO.
14
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609
NC GRID
NAD 83
MOORE COUNTY
RICHMOND COUNTY
430
435
440
67
BOWATER INC.
DB 580 PG 257
71
ROBERT F. MCLEOD
DB 1092 PG 475
BEG. APPROACH SLAB
-L- 431+82.00
BEG. BRIDGE
-L- 432+07.00
END BRIDGE
-L- 436+47.00
END APPROACH SLAB
-L- 436+72.00
EXISTING R/W
CLASS II RIP RAP
SHOULDER BERM GUTTER
TYPE III
IMPACT ATTENUATER TYPE 350
GRAU TYPE 350
15" CONC
REMOVE EXISTING BRIDGE
DROWING CREEK
CONC
B1-A (SBL)
B1-B (SBL)
B2-A (SBL)
B2-B (SBL)
B3A (SBL)
B3B (SBL)
EB1-B (SBL)
EB2-A (SBL)
N 30°28'19.5" E
BL-36 +98.05 6.02'
BL-37 +30.00 1.86'
+00.00 100.00'
MATCHLINE STA 428+50 -L-
MATCHLINE STA 442+50 -L-
+20 END EXPRESSWAY GUTTER
BEGIN SHOULDER BERM GUTTER
DETAIL SHOWING PAVEMENT - DUAL BRIDGE RELATIONSHIP FOR -L- OVER DROWING CREEK
BEGIN BRIDGE -L- SBL
BEGIN APPROACH SLAB -L- SBL
BEGIN APPROACH SLAB -L- NBL
BEGIN BRIDGE -L- NBL
END BRIDGE -L- SBL
END APPROACH SLAB -L- SBL
END APPROACH SLAB -L- NBL
END BRIDGE -L- NBL
6'-5" P.S.
-L- STA. 434+27
Δ = 90°
SEE SHEET 21 FOR -L- PROFILE
8/17/99

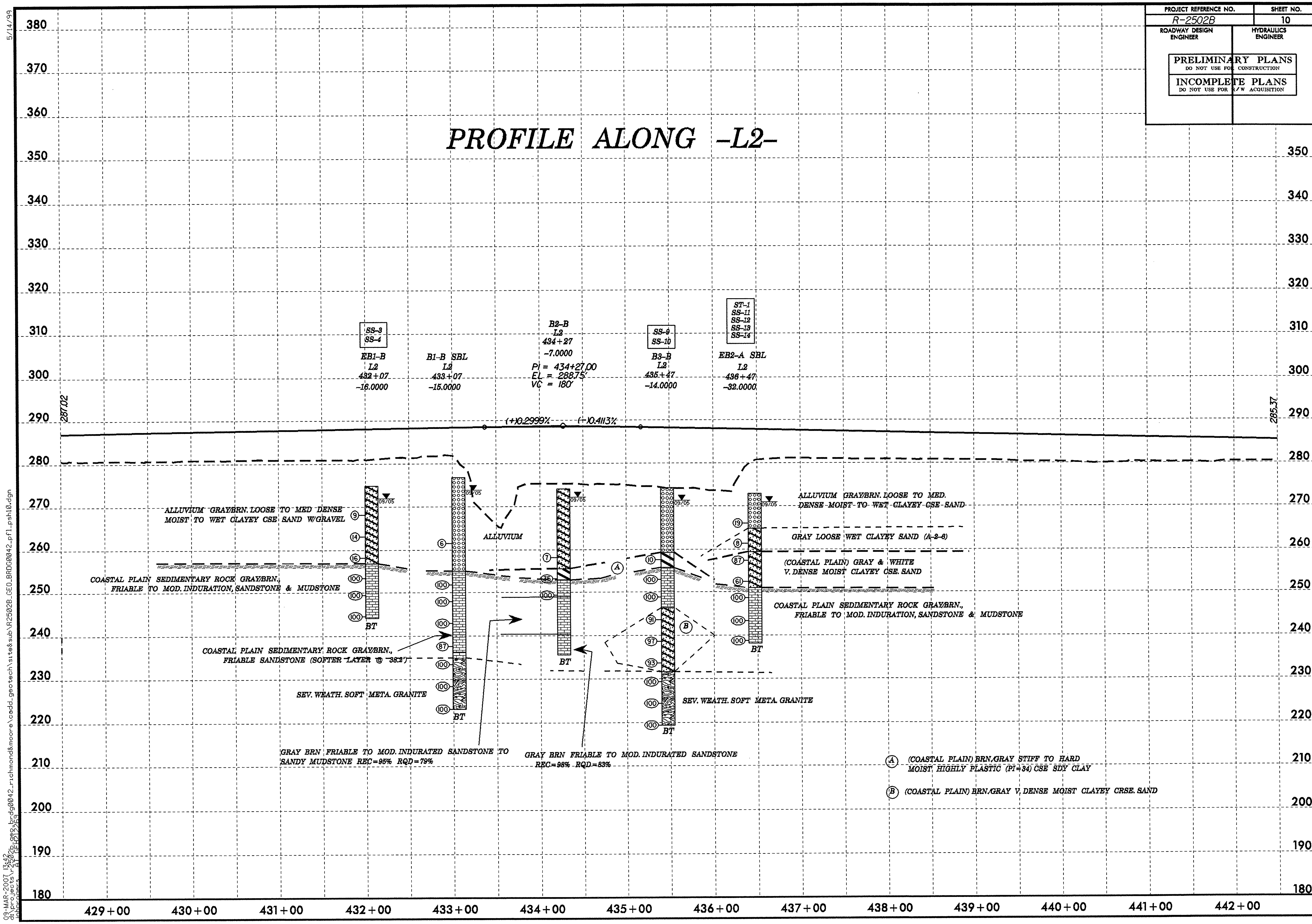
5/24

PROJECT REFERENCE NO.	SHEET NO.
R-2502B	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PROFILE ALONG -L2-



SS-3
SS-4
EB1-B
L2
432+07
-16.0000
B1-B SBL
L2
433+07
-15.0000
B2-B
L2
434+27
-7.0000
PI = 434+27.00
EL = 288.75'
VC = 180'
SS-9
SS-10
B3-B
L2
435+47
-14.0000
ST-1
SS-11
SS-12
SS-13
SS-14
EB2-A SBL
L2
436+47
-32.0000
287.02
285.37
(+)0.2999%
(-)0.4113%
ALLUVIUM GRAY/BRN. LOOSE TO MED DENSE MOIST TO WET CLAYEY CSE SAND W/GRAVEL
ALLUVIUM
COASTAL PLAIN SEDIMENTARY ROCK GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE & MUDSTONE
COASTAL PLAIN SEDIMENTARY ROCK GRAY/BRN., FRIABLE SANDSTONE (SOFTER LAYER @ 38.2')
SEV. WEATH. SOFT META. GRANITE
GRAY BRN FRIABLE TO MOD. INDURATED SANDSTONE TO SANDY MUDSTONE REC=95% RQD=79%
GRAY BRN FRIABLE TO MOD. INDURATED SANDSTONE REC=98% RQD=83%
ALLUVIUM GRAY/BRN. LOOSE TO MED. DENSE MOIST TO WET CLAYEY CSE SAND
GRAY LOOSE WET CLAYEY SAND (A-2-6)
(COASTAL PLAIN) GRAY & WHITE V. DENSE MOIST CLAYEY CSE. SAND
COASTAL PLAIN SEDIMENTARY ROCK GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE & MUDSTONE
SEV. WEATH. SOFT META. GRANITE
(A) (COASTAL PLAIN) BRN/GRAY STIFF TO HARD MOIST, HIGHLY PLASTIC (PI=34) CSE SDY CLAY
(B) (COASTAL PLAIN) BRN/GRAY V. DENSE MOIST CLAYEY CRSE. SAND
BT
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
429+00
430+00
431+00
432+00
433+00
434+00
435+00
436+00
437+00
438+00
439+00
440+00
441+00
442+00

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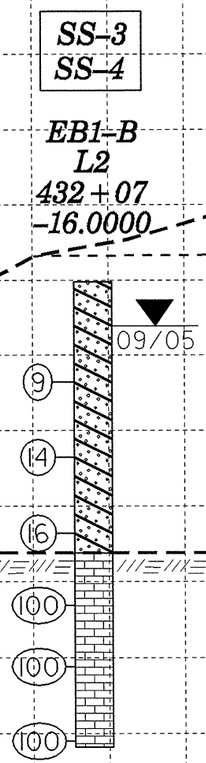
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2502B	4

SECTION THROUGH END BENT ONE

SS-3
SS-4

EB1-B
L2
432+07
-16.0000



ROADWAY FILL

ALLUVIUM

GRAY LOOSE TO MED DENSE
MOIST TO WET CLAYEY CSE SAND

COASTAL PLAIN SEDIMENTARY ROCK
GRAY/BRN. FRIABLE SANDSTONE

432+07.00

-L2-

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NT GEN22264

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2502B	5

SECTION THROUGH BENT ONE

SS-1
SS-2

B1-A
L2
433+07
-35.0000

B1-B SBL
L2
433+07
-15.0000

09/05

09/05

ALLUVIUM

GRAY LOOSE TO MED DENSE MOIST TO WET CSE.SAND & GRAVEL

COASTAL PLAIN (GRAY DENSE CLAYEY CSE SAND)

COAST. PLAIN SED. ROCK (FRIABLE SANDSTONE)

GRAY/BRN. FRIABLE TO MOD. INDURATED, SANDSTONE. REC=100% RQD =71%

GRAY/BRN. FRIABLE TO MOD. INDURATED, SANDSTONE. REC=100% RQD =71%

GRAY/BRN., FRIABLE TO MOD. INDURATED, SANDSTONE TO META. GRANITIC ROCK REC=58% RQD=50%

14 24 49 100 100

BT

ALLUVIUM

GRAY LOOSE MOIST TO WET CSE SAND W/GRAVEL

6 100 100 100 87 100 100 100

COASTAL PLAIN SEDIMENTARY ROCK
(SOFTER LAYER @ 38.2')
GRAY/BRN., FRIABLE, SANDSTONE

RESIDUAL

SEV. WEATH. SOFT META. GRANITIC ROCK

BT

433+07.00
-L2-

290 285 280 275 270 265 260 255 250 245 240 235 230 225 220

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2502B	6

SECTION THROUGH BENT TWO

SS-5
SS-6
SS-7

B2-A
L2
434+27
-39.0000

B2-B
L2
434+27
-7.0000

09/05

09/05

ALLUVIUM

GRAY LOOSE MOIST TO SAT. CLAYEY CSE SAND

GRAY W/BRN STREAK HARD MOIST SANDY CLAY

COASTAL PLAIN SEDIMENTARY ROCK
GRAY FRIABLE SANDSTONE & MUDSTONE

(COASTAL PLAIN)
OLIVE GRAY HARD MOIST SANDY SILT

SEV. WEATH. SOFT META. GRANITIC ROCK

8 47 100 100 100 71 94 100 100 BT

ALLUVIUM

GRAY LOOSE MOIST TO WET CLAYEY CSE SAND

7 35 100 BT

COASTAL PLAIN GRAY HARD MOIST CSE SDY CLAY

COASTAL PLAIN SEDIMENTARY ROCK
GRAY FRIABLE SANDSTONE & MUDSTONE

GRAY/BRN FRIABLE TO MOD. INDURATED SANDSTONE
TO SANDY MUDSTONE REC=95% RQD=79%

GRAY/BRN FRIABLE TO MOD. INDURATED
SANDSTONE REC=98% RQD=83%

434+27.00

-L2-

290 285 280 275 270 265 260 255 250 245 240 235 230 225 220 215

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2502B	7

SECTION THROUGH BENT THREE

SS-8
RS-1
RS-2

B3A-SBL
L2
435+47
-39.0000

SS-9
SS-10

B3-B
L2
435+47
-14.0000

09/05

09/05

ALLUVIUM
BRN LOOSE MOIST TO WET SAND (A-1-B)

ALLUVIUM GRAY LOOSE TO V. DENSE
MOIST TO WET SAND W/GRAVEL @ 17.9 (A-1-B)

(COASTAL PLAIN) BRN & GRAY STIFF HIGH PLASTIC
(PI=34) MOIST SANDY SILTY CLAY

COASTAL PLAIN SEDIMENTARY ROCK
GRAY FRIABLE SANDSTONE

COASTAL PLAIN SEDIMENTARY ROCK
GRAY FRIABLE SANDSTONE

GRAY/BRN FRIABLE TO MOD. INDURATED
V. SOFT SANDSTONE REC=94% RQD =77%

GREEN FRIABLE TO MOD. INDURATED
SANDY MUDSTONE TO META. GRANITIC ROCK
REC=90% RQD= 52%

(COASTAL PLAIN) GRAY & BRN V. DENSE
MOIST CLAYEY CSE. SAND

GREEN MOD. SEV. WEATH. & MED.
HARD META. GRANITIC ROCK
REC=98% RQD=69%

GREEN MOD. SEV. WEATH. & MED.
HARD META. GRANITIC ROCK
REC=89% RQD= 68%

SEV. WEATH. SOFT META. GRANITIC ROCK

BT

435+47.00

-L2-

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2502B	8

SECTION THROUGH END BENT TWO

ST-1
SS-11
SS-12
SS-13
SS-14

EB2-A SBL
L2
436+47
-32.0000

ROADWAY FILL

ALLUVIUM

09/05

GRAY MED DENSE
WET CLAYEY SAND

19

GRAY LOOSE WET CLAYEY SAND

8

(COASTAL PLAIN)
GRAY/WHITE V. DENSE MOIST CLAYEY CSE. SAND

87

61

100

COASTAL PLAIN SEDIMENTARY ROCK
GRAY/BRN. FRIABLE SANDSTONE

100

100 BT

436+47.00

-L2-

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11/24

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR 42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO EB1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 432+07.000	**OFFSET** 16.00ft LT	**24 HR** 3.00ft
COLLAR ELEV 274.90ft	**TOTAL DEPTH** 30.80ft	**START DATE** 9/26/05	**COMPLETION DATE** 09/26/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB1-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	▼ / MOI	LOG	SOIL AND ROCK DESCRIPTION
274.90						Ground Surface				
270.00	5.70	2	4	5	1.0	9	SS-3	M		(ALLUVIUM) GRAY LOOSE TO MED DENSE MOIST CLAYEY CSE SAND (A-2-7)
	10.70	2	5	9	1.0	14				
260.00	15.70	3	5	11	1.0	16				
	20.70	23	50	50	0.8	100	SS-4	M		COASTAL PLAIN SEDIMENTARY ROCK (GRAY & BRN FRIABLE SANDSTONE)
250.00	24.70	35	65		0.8	100				
	29.70	16	50	50	0.7	100				
244.10						TERMINATED BORING AT ELEVATION 244.10 IN COASTAL PLAIN SEDIMENTARY ROCK (GRAY & BROWN FRIABLE SANDSTONE)				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B1-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 433+07.000	**OFFSET** 35.00ft LT	**24 HR** 2.50ft
COLLAR ELEV 273.60ft	**TOTAL DEPTH** 43.10ft	**START DATE** 9/22/05	**COMPLETION DATE** 09/22/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/NXWL		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** 17.40ft		**Log B1-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
273.60						Ground Surface				
270.00										ALLUVIUM GRAY LOOSE TO MED DENSE CSE. SAND & GRAVEL (A-1-A)
	8.60	12	11	3	1.0	14	SS-1	W		
260.00	13.60	11	12	12	1.0	24				
	18.60	20	24	25	1.0	49	SS-2	M		COASTAL PLAIN GRAY DENSE MED. PLASTIC (PI=25) CLAYEY CSE SAND (A-2-7)
250.00	22.60	5	39	61	0.7	100				COASTAL PLAIN SEDIMENTARY ROCK (GRAY/BRN. FRIABLE SANDSTONE)
	27.60	35	65		1.0	100	RUN-1			GRAY/BRN. FRIABLE TO MOD. INDURATION, SANDSTONE REC=100% RQD =71%
240.00							RUN-2			GRAY/BRN. FRIABLE TO MOD. INDURATION, SANDSTONE REC=100% RQD= 96%
							RUN-3			38.3-42.0 GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE REC=58% RQD=50%
230.50						TERMINATED BORING AT ELEVATION 230.50' IN META. GRANITIC ROCK				META. GRANITIC ROCK

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

PROJECT NO: 34438.1.1 **PROJECT ID:** R-2502B **COUNTY:** RICH./MOORE **GEOLOGIST:** R.W. TODD
SITE DESCRIPTION: BR #42 ON US 1 OVER DROWING CREEK. **DRILLER:** M.L. SMITH
BORING NO: B1A-SBL **BORING LOCATION (STA):** 433+07 -L- **OFFSET:** 35.0' LT.
COLLAR ELEV: 273.60' **PERSONNEL:** **CORE SIZE:** NXWL
TOTAL DEPTH: 43.10' **DRILL MACHINE:** CME-550 **DATE STARTED:** 9/22/05
TOTAL RUN: 14.50' **DRILL EQUIP:** **DATE COMPLETED:** 09/22/05

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
245.00	28.60		1	100	71		GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE FS = THIN TO THICKLY BEDDED
240.20	33.40		2	100	96		GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE. FS = THIN TO THICKLY BEDDED
235.30	38.30		3	58	50		GRAY/BRN. SANDSTONE (AS RUN 2) TO MOD. SEV. WEATH. & MED. HARD META. GRANITIC ROCK STARTING AT ELEV. 231.60' FS = THIN TO THICKLY BEDDED.
230.50	43.10						

NOTES

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B1-B SBL	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 433+07.000	**OFFSET** 15.00ft LT	**24 HR** 3.00ft
COLLAR ELEV 276.80ft	**TOTAL DEPTH** 53.60ft	**START DATE** 9/23/05	**COMPLETION DATE** 09/23/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		Log B1-B SBL, Page 1 of 2

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
276.80						Ground Surface				
								▼		ALLUVIUM GRAY LOOSE WET CSE SAND W/GRAVEL (A-1-A)
270.00										
	14.20	5	4	2	1.0	6				
260.00										
	24.20	10	45	55	0.8	100		W		COASTAL PLAIN SEDIMENTARY ROCK (GRAY FRIABLE SANDSTONE W/ SOFTER LAYER @ 38.2')
250.00	28.20	10	67	33	0.7	100		M		
	33.20	15	68	32	0.7	100				
240.00	38.20	18	31	56	1.0	87				
	43.20	100			0.2	100				WEATHERED ROCK (SEV. WEATH. META. GRANITIC ROCK)
230.00	48.20	100			0.2	100				
223.20	53.20	100			0.4	100		M		

Continued on the next page.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B1-B SBL	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 433+07.000	**OFFSET** 15.00ft LT	**24 HR** 3.00ft
COLLAR ELEV 276.80ft	**TOTAL DEPTH** 53.60ft	**START DATE** 9/23/05	**COMPLETION DATE** 09/23/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		Log B1-B SBL, Page 2 of 2

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
223.20						TERMINATION BORING AT ELEVATION 223.2 IN WEATHERED ROCK (SEV. WEATH. GRANITIC ROCK)				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 434+27.000	**OFFSET** 39.00ft LT	**24 HR** 4.00ft
COLLAR ELEV 274.70ft	**TOTAL DEPTH** 55.70ft	**START DATE** 9/27/05	**COMPLETION DATE** 09/27/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B2-A, Page 1 of 2**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
274.70						Ground Surface				
270.00								▼		(ALLUVIAL) GRAY LOOSE MOIST TO WET CLAYEY CSE SAND (A-2-6)
260.00	15.40	3	4	4	1.0	8	SS-5	M		
	20.40	16	21	26	1.0	47	SS-6	M		(COASTAL PLAIN) GRAY W/BRN STREAK HARD MOIST SILTY SANDY CLAY (A-7-6)
250.00	24.50	16	100		1.0	100				COASTAL PLAIN SEDIMENTARY ROCK (GRAY/BRN. FRIABLE SANDSTONE & SANDY MUDSTONE)
	29.50	16	75	25	0.7	100				
240.00	34.50	16	50	50	0.8	100				
	39.50	21	50		0.8	71				
230.00	44.50	21	42	52	1.0	94	SS-7	M		(COASTAL PLAIN) OLIVE GRAY HARD SANDY SILT
227.70						Continued on the next page				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 434+27.000	**OFFSET** 39.00ft LT	**24 HR** 4.00ft
COLLAR ELEV 274.70ft	**TOTAL DEPTH** 55.70ft	**START DATE** 9/27/05	**COMPLETION DATE** 09/27/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B2-A, Page 2 of 2**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
227.70										
	49.50	50	50		1.0	100				WEATHERED ROCK (SEV. WEATH. SOFT META. GRANITIC ROCK)
220.00	54.50	21	71	29	0.8	100		M		
219.00						TERMINATED BORING AT ELEVATION 219.30 IN WEATHERED ROCK (SEV. WEATH. SOFT META. GRANITIC ROCK)				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B2-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 434+27.000	**OFFSET** 7.00ft LT	**24 HR** 2.00ft
COLLAR ELEV 274.10ft	**TOTAL DEPTH** 38.50ft	**START DATE** 9/28/05	**COMPLETION DATE** 09/28/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/NXWL		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** 21.20ft		**Log B2-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
274.10						Ground Surface				
270.00								▼		(ALLUVIUM) GRAY LOOSE WET CLAYEY CSE SAND (A-2-6)
260.00	14.90	4	3	4	1.0	7	SS-5	W		
	19.90	9	14	21	1.0	35	SS-6	M		(COASTAL PLAIN) GRAY HARD MOIST CSE SDY CLAY
250.00	24.00	6	53	47	0.8	100	RUN-1			COASTAL PLAIN SEDIMENTARY ROCK (GRAY BRN., FRIABLE, SANDSTONE TO SANDY MUDSTONE)
										25.2-33.7 GRY/BRN, FRIABLE TO MOD. INDURATION, SOFT SANDSTONE TO SANDY MUDSTONE REC=95% RQD=79%
240.00							RUN-2			
235.60						TERMINATED BORING AT ELEVATION 235.60 IN BRN. V. SOFT SANDSTONE.				33.7-38.5 GRY/BRN, FRIABLE TO MOD. INDURATION, SANDSTONE REC=98% RQD=83%

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

PROJECT NO: 34438.1.1 **PROJECT ID:** R-2502B **COUNTY:** RICH./MOORE **GEOLOGIST:** R.W. TODD
SITE DESCRIPTION: BR #42 ON US 1 OVER DROWING CREEK. **DRILLER:** M.L. SMITH
BORING NO: B2B-SBL **BORING LOCATION (STA):** 434+27 -L- **OFFSET:** 7.0' LT.
COLLAR ELEV: 274.10' **PERSONNEL:** **CORE SIZE:** NXWL
TOTAL DEPTH: 38.50' **DRILL MACHINE:** CME-550 **DATE STARTED:** 9/28/05
TOTAL RUN: 13.30' **DRILL EQUIP:** **DATE COMPLETED:** 9/28/05

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
248.90	25.20		1	95	79		GRAY/BRN, FRIABLE TO MOD. INDURATION, , SANDSTONE TO SANDY MUDSTONE.
240.40	33.70		2	98	83		GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE.
235.60	38.50						FS = THINLY BEDDED

NOTES

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B3A-SBL	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 435+47.000	**OFFSET** 39.00ft LT	**24 HR** 4.00ft
COLLAR ELEV 272.50ft	**TOTAL DEPTH** 49.50ft	**START DATE** 9/29/05	**COMPLETION DATE** 09/29/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/NXWL		**HAMMER TYPE**
SURFACE WATER DEPTH	**DEPTH TO ROCK** 22.00ft		**Log B3A-SBL, Page 1 of 2**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
272.50						Ground Surface				
270.00								▼		(ALLUVIUM) GRAY LOOSE TO V. DENSE SAT. SAND W/GRAVEL @ 17.9 (A-1-B)
260.00	15.20	6	4	6	1.0	10				
	17.90	100			0.3	100		SAT		
250.00	24.30	17	60	40	0.9	100	SS-8	M		COASTAL PLAIN SEDIMENTARY ROCK (BRN & GRY, FRIABLE SANDSTONE)
	29.30	26	74		1.0	100	RUN-1	M		(COASTAL PLAIN SEDIMENTARY ROCK) GRAY/BRN, FRIABLE TO MOD. INDURATION, SANDSTONE. REC= 94% RQD =77%
240.00							RUN-2			
							RUN-3			(COASTAL PLAIN SEDIMENTARY ROCK) GRAY/BRN SANDSTONE TO GREEN, META. GRANITIC ROCK @38.3. REC=90% RQD =52%
230.00							RUN-4			GRN. MOD.SEV. WEATH. MED. HARD META. GRANITIC ROCK
223.00						Continued on the next page.				GRN. MOD. SEV. WEATH. & MED. HARD META. GRANITIC ROCK. REC =98%, RQD=69%
										GRN. MOD. SEV. WEATH. & MED. HARD META. GRANITIC ROCK. REC=89%,RQD= 68%

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B3A-SBL	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 435+47.000	**OFFSET** 39.00ft LT	**24 HR** 4.00ft
COLLAR ELEV 272.50ft	**TOTAL DEPTH** 49.50ft	**START DATE** 9/29/05	**COMPLETION DATE** 09/29/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/NXWL		**HAMMER TYPE**
SURFACE WATER DEPTH	**DEPTH TO ROCK** 22.00ft		**Log B3A-SBL, Page 2 of 2**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
223.00						TERMINATED BORING AT ELEVATION 223.00' IN GRN., MOD. SEV. WEATH. & MED. HARD, META. GRANITIC ROCK.				

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

PROJECT NO: 34438.1.1
PROJECT ID: R-2502B
COUNTY: RICH./MOORE
GEOLOGIST: R.W. TODD
SITE DESCRIPTION: BR #42 ON US 1 OVER DROWING CREEK.
BORING NO: B3A-SBL
BORING LOCATION (STA): 435+47 -L-
DRILLER: M.L. SMITH
COLLAR ELEV: 272.50'
PERSONNEL:
OFFSET: 39.0' LT.
TOTAL DEPTH: 49.50'
DRILL MACHINE: CME-550
CORE SIZE: NXWL
TOTAL RUN: 19.20'
DRILL EQUIP:
DATE STARTED: 9/29/05
DATE COMPLETED: 10/3/05

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
242.20	30.30		1	94	77	RS-1	GRAY/BRN., FRIABLE TO MOD. INDURATION, SANDSTONE. FS = THINLY BEDDED
237.50	35.00		2	90	52	RS-2	GRY/BRN/GRN, FRI. & MOD. IND., SDY MUDSTONE. TO GRN., MOD. SEV. WEATH. & MED. HARD, META. GRANITIC ROCK STARTING @ ELEV. 234.20'. FS = THINLY BEDDED TO CLOSE
232.50	40.00		3	98	69		GRN., MOD. SEV. WEATH. & MED. HARD, META. GRANITIC ROCK. FS = CLOSE
227.70 223.00	44.80 49.50		4	89	68		GRN., MOD. SEV. WEATH. & MED. HARD, META. GRANITIC ROCK. FS = CLOSE

NOTES FRI. = FRIABLE
IND. = INDURATION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B3-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 435+47.000	**OFFSET** 14.00ft LT	**24 HR** 3.00ft
COLLAR ELEV 274.30ft	**TOTAL DEPTH** 54.90ft	**START DATE** 10/04/05	**COMPLETION DATE** 10/04/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B3-B, Page 1 of 2**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	▼ MOI	LOG	SOIL AND ROCK DESCRIPTION
274.30						Ground Surface				
270.00								▼		ALLUVIUM BRN MOIST TO WET LOOSE SAND (A-1-B)
260.00	15.70	2	4	6	1.0	10	SS-9	M		BRN & GRAY STIFF HIGH PLASTIC (PI=34) MOIST SILTY CLAY (A-7-6)
	20.70	49	51		0.7	100	SS-10	D		COASTAL PLAIN SEDIMENTARY ROCK (GRAY/BRN. FRIABLE SANDSTONE)
250.00	24.70	26	74		0.8	100				
	29.70	23	39	52	1.0	91				COASTAL PLAIN GRAY & BRN V. DENSE CLAYEY CSE. SAND (A-2-7)
240.00	34.70	22	46	51	1.0	97				
	39.70	20	41	52	1.0	93				
231.30						Continued on the next page.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR-42 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO B3-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 435+47.000	**OFFSET** 14.00ft LT	**24 HR** 3.00ft
COLLAR ELEV 274.30ft	**TOTAL DEPTH** 54.90ft	**START DATE** 10/04/05	**COMPLETION DATE** 10/04/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B3-B, Page 2 of 2**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	▼ MOI	LOG	SOIL AND ROCK DESCRIPTION
231.30										
	44.70	100			0.3	100				WEATHERED ROCK (SEV. WEATH. & SOFT META. GRANITIC ROCK).
	49.70	100			0.2	100				
220.00 219.40	54.70	100			0.2	100				
						TERMINATED BORING AT ELEVATION 219.40 IN SEV. WEATH. & SOFT META. GRANITIC ROCK				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34438.1.1	**ID** R-2502B	**COUNTY** RICHMOND/MOORE	**GEOLOGIST** R.W.TODD
SITE DESCRIPTION BR4 2 ON US 1 OVER DROWNING CREEK			**GND WATER**
BORING NO EB2-A SBL	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT L2	**BORING LOCATION** 436+47.000	**OFFSET** 32.00ft LT	**24 HR** 2.00ft
COLLAR ELEV 272.90ft	**TOTAL DEPTH** 34.80ft	**START DATE** 10/04/05	**COMPLETION DATE** 10/05/05
DRILL MACHINE CME-550	**DRILL METHOD** NWCAS/TRI-CONE		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** N/A		**Log EB2-A SBL, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
272.90						Ground Surface				
270.00	5.80	1	8	11	1.0	19	SS-11	W		(ALLUVIUM) GRAY WET MED DENSE SILTY CLAYEY SAND (A-1-B)
	10.80	5	4	4	1.0	8	SS-12	M		GRAY LOOSE WET CLAYEY SAND (A-2-6)
260.00	14.50	13	38	49	1.0	87	SS-13	M		COASTAL PLAIN GRAY & WHITE V. DENSE MOIST CLAYEY CSE SAND MED.(PI=16,17)TO HIGH (PI=38)PLASTIC (A-2-7)
	19.50	13	30	31	1.0	61	SS-14	M		
250.00	23.60	18	65	35	0.7	100				COASTAL PLAIN SEDIMENTARY ROCK (GRAY & BROWN FRIABLE SANDSTONE)
	28.60	37	63		1.0	100				
240.00	33.60	21	61	39	0.6	100				
238.10						TERMINATION BORING AT ELEVATION 238.1 FEET IN GRAY & BROWN FRIABLE SANDSTONE.				

SHEET OF

PROJ. NO. - 34438.1.1

ID NO. - R-2502B

COUNTY - RICHMOND/MOORE

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	B1A		8.60-10.10	A-1-a(0)	20	NP	71.6	20.0	4.4	4.0	48	22	5	-	-
SS-2	B1A		18.6-20.10	A-2-7(2)	49	25	57.8	13.9	7.2	21.2	100	65	30	-	-
SS-3	EB1-B		5.70-7.20	A-2-7(2)	41	20	57.1	12.1	4.6	26.2	99	60	32	-	-
SS-4	EB1-B		20.70-21.90	A-2-7(2)	46	21	53.5	13.4	8.9	24.2	92	49	33	-	-
SS-5	B2-A		15.40-16.90	A-2-6(1)	28	15	53.8	19.8	4.2	22.2	96	62	26	-	-
SS-6	B2-A		20.40-21.90	A-7-6(5)	46	25	44.4	16.3	12.1	27.2	92	61	39	-	-
SS-7	B2-A		44.50-46.00	A-4(0)	37	5	50.2	15.7	26.0	8.1	100	60	37	-	-
SS-8	B3-A		24.30-25.40	A-6(2)	27	11	25.0	37.3	16.5	21.2	100	86	45	-	-
SS-9	B3-B		15.70-17.20	A-7-6(33)	57	34	5.1	9.1	21.1	64.7	100	98	88	-	-
SS-10	B3-B		20.70-21.50	A-2-7(2)	51	25	59.7	16.2	9.0	15.2	93	52	25	-	-
SS-11	EB2A		5.80-7.30	A-1-b(0)	23	NP	78.1	19.0	0.9	2.0	80	34	4	-	-
SS-12	EB2A		10.80-12.30	A-2-6(0)	31	16	63.1	10.9	2.7	23.3	83	43	23	-	-
SS-13	EB2A		14.50-16.00	A-2-7(1)	42	17	57.8	16.4	7.6	18.2	94	59	26	-	-
SS-14	EB2A		19.50-21.00	A-2-7(3)	58	38	59.6	12.5	8.7	19.2	90	46	27	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34438.1.1 TIP: R-2502B COUNTY: RICHMOND-MOORE

DESCRIPTION(1): BRIDGE 42 ON US 1 OVER DROWNING CREEK.

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) ____

Bridge No.: 42 Length: 297 Total Bents: 8 Bents in Channel: 2 Bents in Floodplain: 8
Foundation Type: UNKNOWN

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NO VISIBLE EVIDENCE OF SCOUR.

Interior Bents: NO VISIBLE EVIDENCE OF SCOUR.

Channel Bed: UNABLE TO DIRECTLY OBSERVE CHANNEL BED.

Channel Bank: CHANNEL BANKS STABLE.

EXISTING SCOUR PROTECTION

Type(3): NO

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): OLD WOOD PILES IN STREAM AT END BENT

INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the Design Scour Elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): BRN. SAND & GRAVEL AS SS-1.

Channel Bank Material(8): GRAY CLAYEY SAND AS SS-5.

Channel Bank Cover(9): TREES - ALL STRAIGHT W/STABLE BANKS.

Floodplain Width(10): APP. 1000'

Floodplain Cover(11): TREES

Stream is(12): Aggrading ____ Degrading ____ Static X

Channel Migration Tendency(13): NO TENDENCY OBSERVED.

Observations and Other Comments: 9/22/05 TO 10/03/05 - ENTIRE FLOODPLAIN DRY. 10/10/05 - ENTIRE FLOODPLAIN UNDER WATER.

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

	BENTS B1	B2	B3
SB Lane	270	261	269
NB Lane	258	271	270

Comparison of DSE to Hydraulics Unit theoretical scour:
DSE MATCHES THE THEORETICAL SCOUR PREDICTIONS FROM THE HYDRAULICS UNIT.

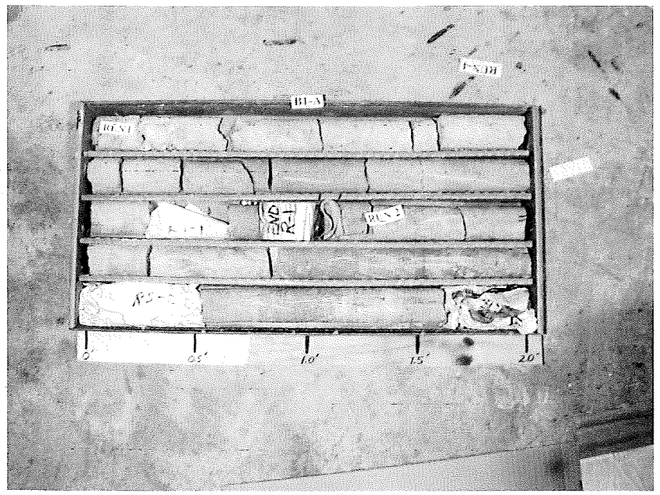
SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

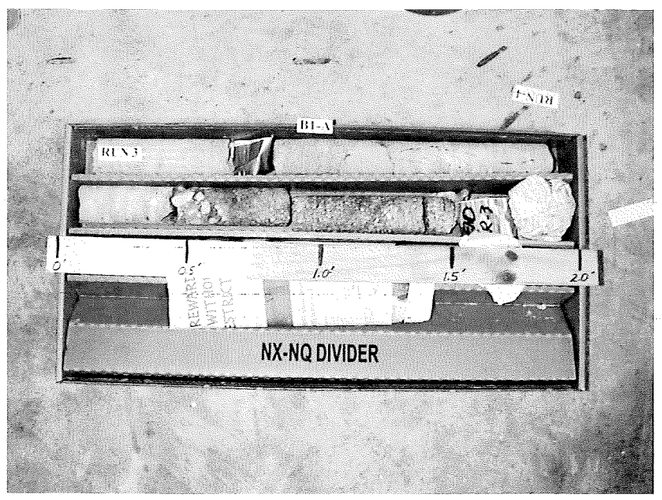
Bed or Bank	REFER	TO	PG. 19	FOR	SOIL	TEST	RESULTS.
Sample No.	SS-1 &	SS-5.					
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

Template Revised 02/07/06

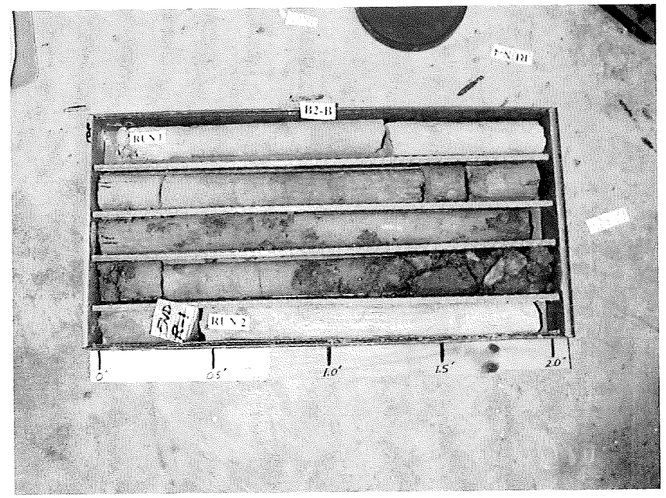
Reported by: RW TODD **Date:** 10/5/2005

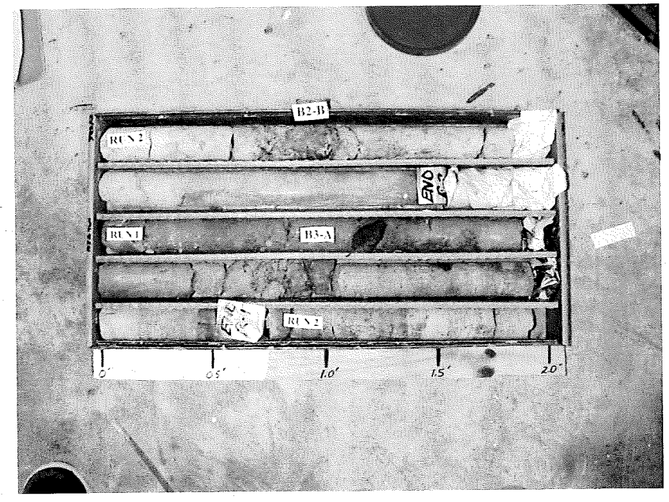
34438.1.1 (R-2502B)
RICHMOND/MOORE COUNTIES
CORE PHOTOS
BENT ONE



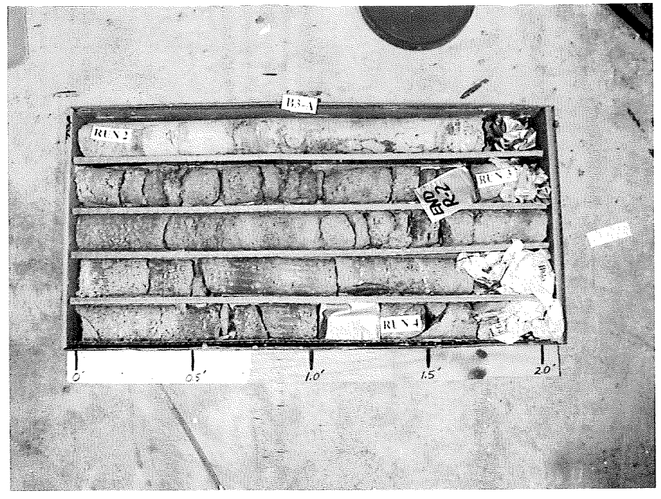


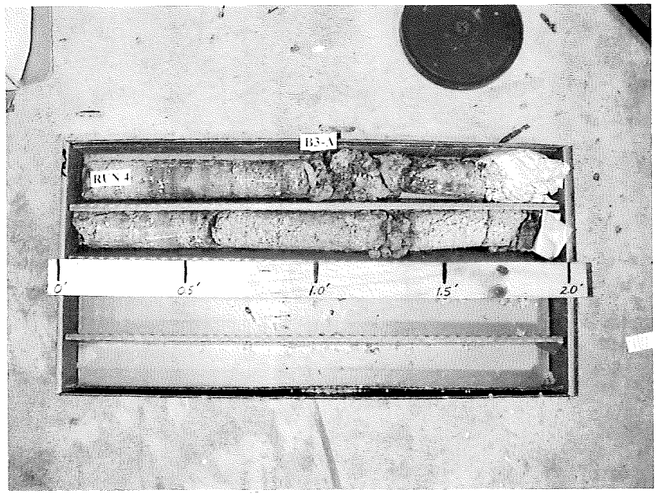
34438.1.1 (R-2502B)
RICHMOND/MOORE COUNTIES
CORE PHOTOS
BENT TWO & THREE





34438.1.1 (R-2502B)
RICHMOND/MOORE COUNTIES
CORE PHOTOS
BENT THREE





34438.1.1 (R-2502B)
RICHMOND/MOORE COUNTIES
SITE PHOTO

AREA AROUND BENT THREE SBL

34438.1.1 (R-2502B)
RICHMOND/MOORE COUNTIES
SITE PHOTO