

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4413	1	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33690.1.1	BRSTP-264(24)	P.E.	
		RAW & UTIL.	

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	11+80 TO 19+70	4	5
-DRI-	10+25 TO 13+35	4	5
-DR2-	10+14 TO 14+45	4	5

CROSS SECTION	STATION	PAGE
-L-	11+80 TO 15+00	6-7
-DRI-	10+80 TO 12+63	6-7

ROADWAY  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33690.1.1 (B-4413) F.A. PROJ. BRSTP-264(24)  
COUNTY BEAUFORT  
PROJECT DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER  
BROAD CREEK

INVENTORY

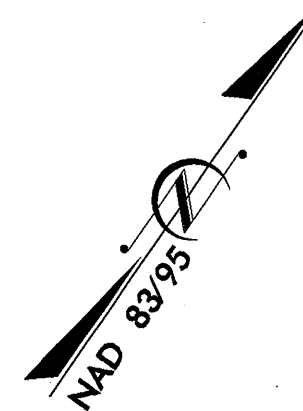
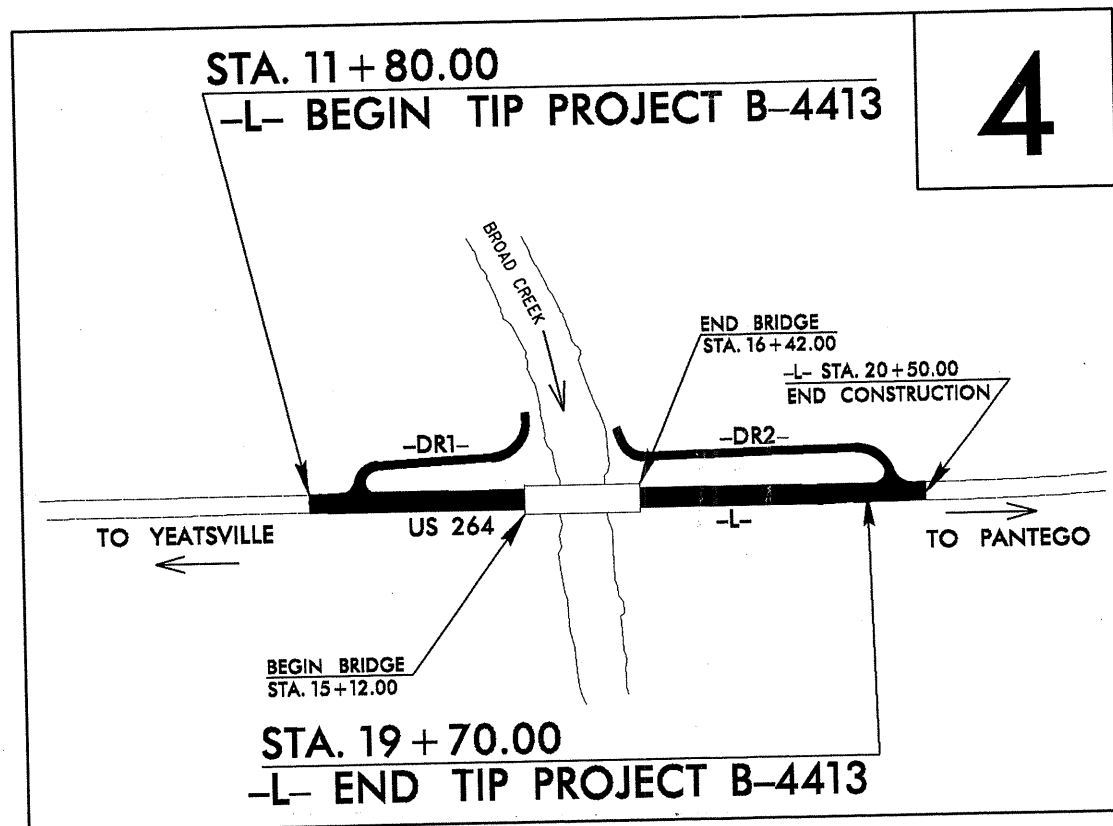
CAUTION NOTICE

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 1919 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.

CONTRACT: C202658 ID: B-4413



PERSONNEL

- S. DILLARD
- R. SMITH
- J. EDMONDSON

INVESTIGATED BY T.C. BOTTOMS  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE JUNE 2010



DRAWN BY: C.P. TURNER, T.C. BOTTOMS

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

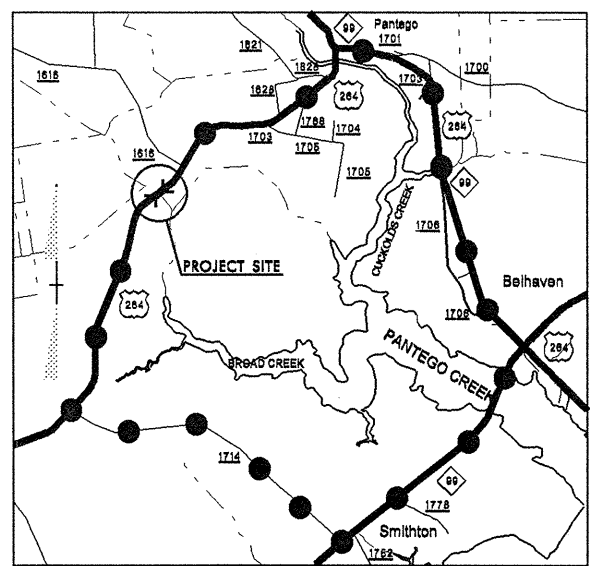
### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																							
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS 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:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>	<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>POORLY GRADED</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>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:</p>	<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN 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.</p> <p>STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - 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.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																							
<p style="text-align: center;"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (&lt; 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="3"></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="3"></td> </tr> <tr> <th>% PASSING</th> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td>10 30 60 100</td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <th>LIQUID LIMIT PLASTIC INDEX</th> <td colspan="4">6 MX</td> <td colspan="4">NP</td> <td colspan="4">40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN</td> <td colspan="4">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="4">0</td> <td colspan="4">0</td> <td colspan="4">4 MX</td> <td colspan="4">8 MX 12 MX 16 MX 20 MX</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="4">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS A SUBGRADE</th> <td colspan="4">EXCELLENT TO GOOD</td> <td colspan="4">FAIR TO POOR</td> <td colspan="2">FAIR TO POOR</td> <td colspan="2">POOR</td> <td colspan="2">UNSATURABLE</td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>	GENERAL CLASS.	GRANULAR MATERIALS (< 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS				GROUP CLASS.	A-1	A-3	A-2	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7				SYMBOL															% PASSING	10 30 60 100	10 30 60 100	10 30 60 100	10 30 60 100	10 30 60 100	10 30 60 100	10 30 60 100	10 30 60 100							LIQUID LIMIT PLASTIC INDEX	6 MX				NP				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				GROUP INDEX	0				0				4 MX				8 MX 12 MX 16 MX 20 MX				USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		HIGHLY ORGANIC SOILS				GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD				FAIR TO POOR				FAIR TO POOR		POOR		UNSATURABLE		<p style="text-align: center;"><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;"><b>COMPRESSIBILITY</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SLIGHTLY COMPRESSIBLE</td> <td>LIQUID LIMIT LESS THAN 31</td> </tr> <tr> <td>MODERATELY COMPRESSIBLE</td> <td>LIQUID LIMIT EQUAL TO 31-50</td> </tr> <tr> <td>HIGHLY COMPRESSIBLE</td> <td>LIQUID LIMIT GREATER THAN 50</td> </tr> </table> <p style="text-align: center;"><b>PERCENTAGE OF MATERIAL</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt;10%</td> <td>&gt;20%</td> <td>HIGHLY</td> </tr> </table> <p style="text-align: center;"><b>GROUND WATER</b></p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>	SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31	MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50	HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;"><b>WEATHERING</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>WEATHERING</th> <th>ROCK DESCRIPTION</th> </tr> <tr> <td>FRESH</td> <td>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</td> </tr> <tr> <td>VERY SLIGHT (V SLI)</td> <td>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.</td> </tr> <tr> <td>SLIGHT</td> <td>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.</td> </tr> <tr> <td>MODERATE (MOD)</td> <td>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.</td> </tr> <tr> <td>MODERATELY SEVERE (MOD. SEV.)</td> <td>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></td> </tr> <tr> <td>SEVERE (SEV.)</td> <td>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i></td> </tr> <tr> <td>VERY SEVERE (V SEV.)</td> <td>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i></td> </tr> <tr> <td>COMPLETE</td> <td>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.</td> </tr> </table> <p style="text-align: center;"><b>ROCK HARDNESS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ROCK HARDNESS</th> <th>DESCRIPTION</th> </tr> <tr> <td>VERY HARD</td> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> </tr> <tr> <td>HARD</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> </tr> <tr> <td>MODERATELY HARD</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK. 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PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )																																																																																																																																																																																																							
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**CONTRACT: TIP PROJECT: B-4413**

See Sheet 1-A For Index of Sheets  
See Sheet 1-B For Symbology



**VICINITY MAP**

●●●●● OFFSITE DETOUR

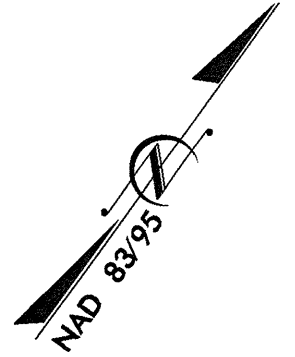
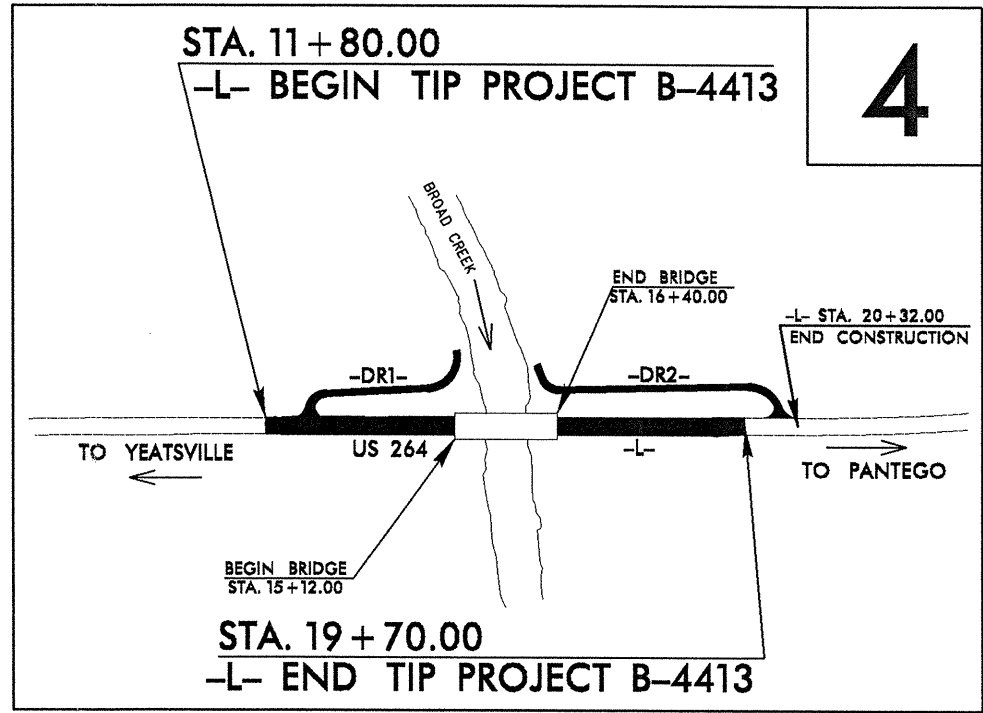
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**BEAUFORT COUNTY**

LOCATION: BRIDGE NO. 51 OVER BROAD CREEK ON US 264

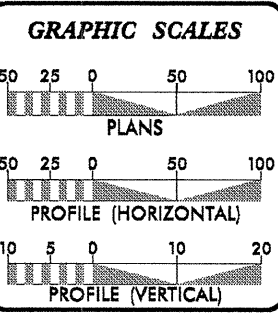
TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4413	2A	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33690.1.1	BRSTP-264(24)	PE	



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES  
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



**DESIGN DATA**

ADT 2010 =	3,792
ADT 2030 =	6,100
DHV =	10 %
D =	60 %
T =	7 % *
V =	60 MPH
FUNC. CLASS. =	RURAL MINOR ARTERIAL
*( TTST 3% + DUAL 4%)	

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-4413	=	0.125 MI
LENGTH STRUCTURE TIP PROJECT B-4413	=	0.025 MI
TOTAL LENGTH TIP PROJECT B-4413	=	0.150 MI

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: **OCTOBER 16, 2009**

LETTING DATE: **OCTOBER 19, 2010**

**BRENDA MOORE PE**  
PROJECT ENGINEER

**THAD F. DUNCAN 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



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE  
GOVERNOR

EUGENE A. CONTI, JR.  
SECRETARY

June 4, 2010

STATE PROJECT: 33690.1.1 (B-4413)  
F.A. PROJECT: BRSTP-0264(24)  
COUNTY: Beaufort  
DESCRIPTION: Bridge No. 51 on US 264 over Broad Creek  
  
SUBJECT: Geotechnical Inventory

**Project Description**

The project area lies along US 264 approximately 3 miles southwest of the town of Pantego in Beaufort County. This geotechnical investigation was confined to the areas of proposed construction.

Fieldwork for this project was completed in March of 2009. Hand auger borings were completed with representative soil samples collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

The following alignments, totaling 0.125 miles were investigated. Subsurface profiles or cross sections of these alignments are included in this report.

<u>Line</u>	<u>Station(±)</u>
-L-	11+80 to 19+70
-DR1-	10+25 to 13+35
-DR2-	10+14 to 14+45

**Areas of Special Geotechnical Interest**

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

<u>Line</u>	<u>Station(±)</u>
-L-	11+80 to 15+45
-DR1-	10+25 to 13+35

- 2) The entire project was found to exhibit seasonal high ground water.

**Physiography and Geology**

The project corridor is located in the Coastal Plain Physiographic Province and is underlain by alluvial sediments. Topography along the project is flat to gently sloping. Ground elevations along the project range from -9± feet along the bed of Broad Creek to 8± feet along the existing roadway embankment.

**Ground Water**

Groundwater data was collected in March, 2009 during below average rainfall conditions. Ground water elevations ranged from -1± foot to 1± foot along the project.

**Soils**

Soils present at the project site include roadway embankment soils and alluvial soils.

Soils identified as roadway embankment are comprised of 1± to 7± feet of loose silty sand (A-2-4).

Alluvial soils were encountered beneath the roadway embankment. Along the southwest approach, these soils consist of organic deposits primarily 3± to 7± feet in thickness and are comprised of very soft to medium stiff muck (A-5, A-6). Samples taken from within these units indicate organic contents ranging from 25% to 33%, and moisture contents ranging from 120% to 259%. Vane Shear tests indicate shear strength values between 271psi and 741psi. Loose sand (A-3) underlies the muck. Alluvial soils along the northeast approach consist of clayey sand (A-2-6) and sand (A-3)

**Undisturbed Samples**

An undisturbed thin wall Shelby tube sample was collected at the following location and submitted for testing.

<u>Sample No.</u>	<u>Station</u>	<u>Depth</u>	<u>Test</u>
ST-1	-DR1- Sta. 11+75 CL	1.0'-3.0'	Consolidation and Triaxial

Respectfully Submitted,  
*for* *Tyler Bottoms* *IRB*  
Tyler Bottoms, L.G.  
Project Engineering Geologist

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

TELEPHONE: 919-250-4088  
FAX: 919-250-4237  
  
WEBSITE: WWW.DOH.DOT.STATE.NC.US

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

PROJECT: B-4413

COUNTY: Beaufort

Volumes in Cubic Yards

DATE: 5/9/2011

COMPILED BY: GSBlrell

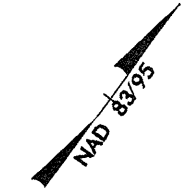
SHEET 1 OF 1 SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +30%		ROCK	SUITABLE	UNSUIT.	TOTAL
-L- STA 11+80	-L- STA 15+12	215				215	616		616	801	586				
-L- STA 16+42	-L- STA 19+70	244				244	502		502	653	409				
<b>SUBTOTAL</b>		459				459	1,118		1,118	1,454	995				
-DR1- STA 10+25	-DR1- STA 11+00	15				15	19		19	25	10				
-DR1- STA 12+69.42	-DR1- STA 13+23.14	3				3	131		131	170	167				
<b>SUBTOTAL</b>		18				18	150		150	195	177				
-DR2- STA 10+14	-DR2- STA 10+59.24	11				11	17		17	22	11				
-DR2- STA 13+51.74	-DR2- STA 14+30.37						113		113	147	147				
<b>SUBTOTAL</b>		11				11	130		130	169	158				
<b>SUBTOTAL</b>															
<b>TOTAL</b>		488				488	1,398		1,398	1,818	1,330				
MATERIAL FOR SHOULDER CONSTRUCTION															
LOSS DUE TO CLEARING & GRUBBING															
ADDITIONAL UNDERCUT															
ROCK WASTE TO REPLACE BORROW															
ADJUST FOR ROCK WASTE															
WASTE IN LIEU OF BORROW															
<b>PROJECT TOTAL</b>		488				488	1,398		1,398	1,818	1,330				
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											67				
<b>GRAND TOTAL</b>		488				488	1,398		1,398	1,818	1,397				
<b>SAY</b>		500									1,500				
PER GEOTECH RECOMMENDATION: ESTIMATED 700 CUBIC YARDS OF UNDERCUT TO BE USED AT THE DISCRETION OF THE RESIDENT ENGINEER.															

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. B-4413	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

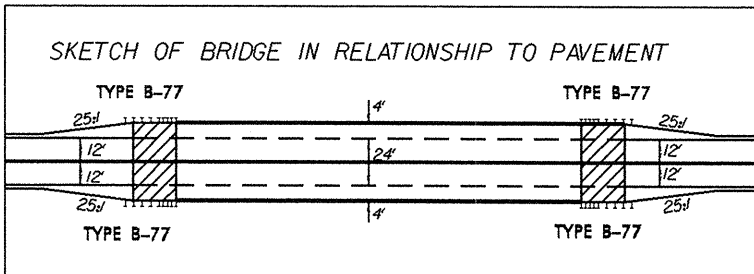
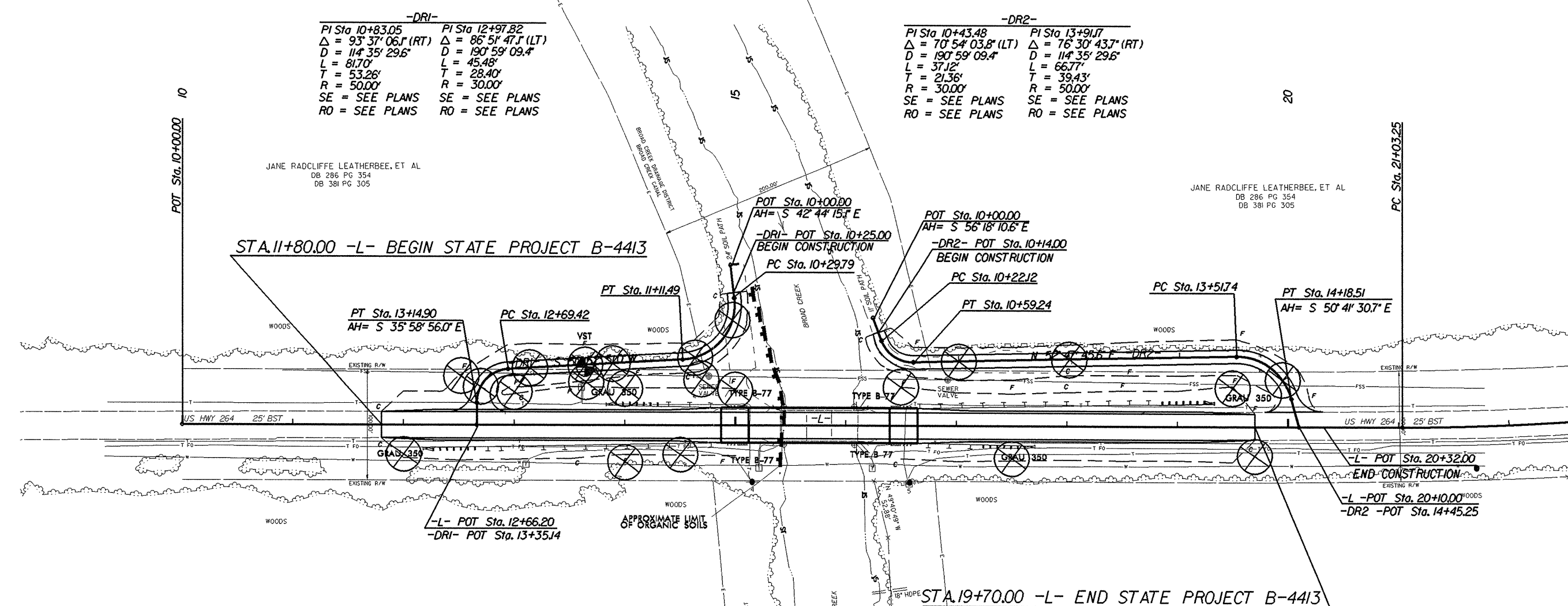


-DRI-

PI Sta 10+83.05	PI Sta 12+97.82
$\Delta = 93^{\circ} 37' 06.1$ (RT)	$\Delta = 86^{\circ} 51' 47.1$ (LT)
D = 114' 35" 29.6"	D = 190' 59" 09.4"
L = 81.70'	L = 45.48'
T = 53.26'	T = 28.40'
R = 50.00'	R = 30.00'
SE = SEE PLANS	SE = SEE PLANS
RO = SEE PLANS	RO = SEE PLANS

-DR2-

PI Sta 10+43.48	PI Sta 13+91.7
$\Delta = 70^{\circ} 54' 03.8$ (LT)	$\Delta = 76^{\circ} 30' 43.7$ (RT)
D = 190' 59" 09.4"	D = 114' 35" 29.6"
L = 37.12'	L = 66.77'
T = 21.36'	T = 39.43'
R = 30.00'	R = 50.00'
SE = SEE PLANS	SE = SEE PLANS
RO = SEE PLANS	RO = SEE PLANS



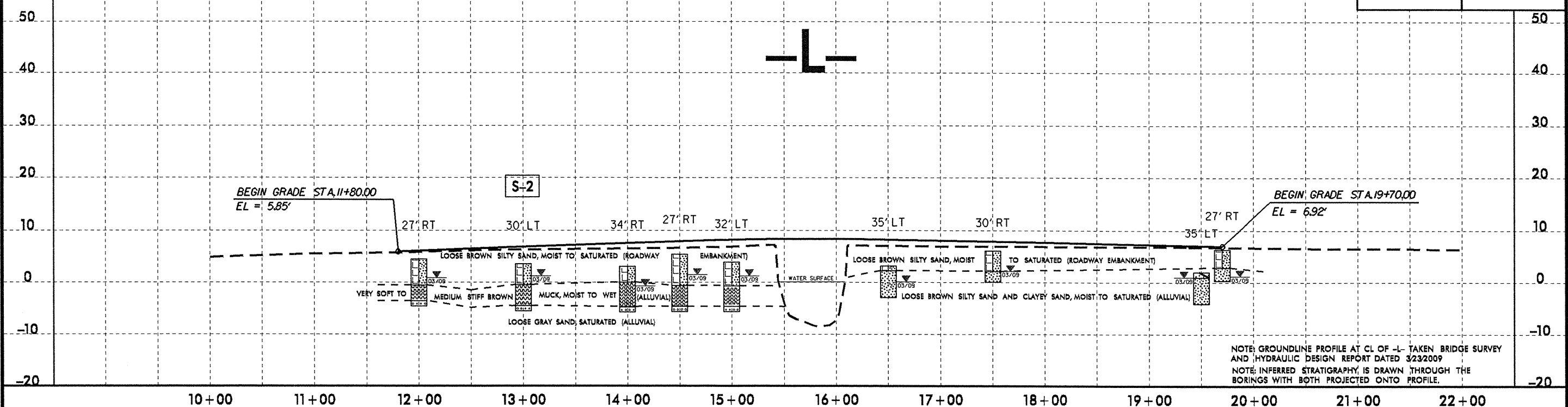
FOR -L- PROFILE SEE SHEET 5  
 FOR -DRI- PROFILE SEE SHEET 5  
 FOR -DR2- PROFILE SEE SHEET 5

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PROJECT REFERENCE NO. <b>B-4413</b>	SHEET NO. <b>5</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

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		
S-2	30' LT	13+00	4.0-6.0	A-6(4)	27	12	1.8	41.8	24.1	32.3	100	100	60	-	-



NOTE: GROUNDLINE PROFILE AT CL OF -L- TAKEN BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 3/23/2009  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

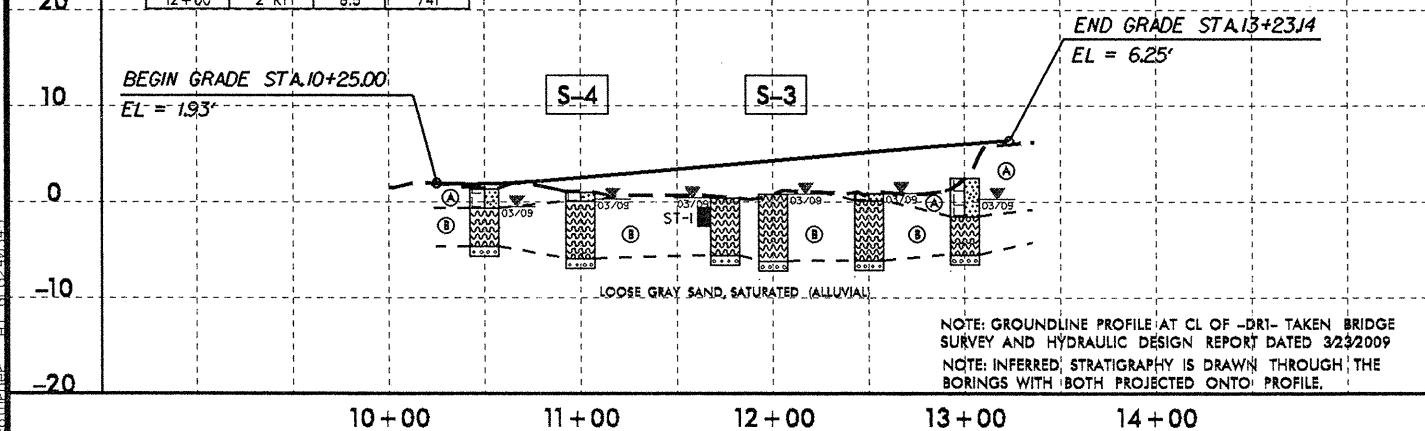
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-4	CL	11+00	2.0-7.0	A-5(13)	70	7	11.5	13.5	50.8	24.2	99	91	76	119.8	24.8
S-3	CL	12+00	1.0-7.0	A-5(16)	87	10	15.5	10.7	45.5	28.3	99	89	75	259.3	32.4

- Ⓐ LOOSE BROWN SILTY SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
- Ⓑ VERY SOFT TO MEDIUM STIFF BROWN MUCK, MOIST TO WET (ALLUVIAL)

**VANE SHEAR TESTS**

STATION	OFFSET	DEPTH	S (psf)
12+00	2' RT	0.5	386
12+00	2' RT	1.0	543
12+00	2' RT	1.5	230
12+00	2' RT	2.0	209
12+00	2' RT	3.5	313
12+00	2' RT	4.0	271
12+00	2' RT	5.0	470
12+00	2' RT	6.0	418
12+00	2' RT	6.5	741

-DR1-

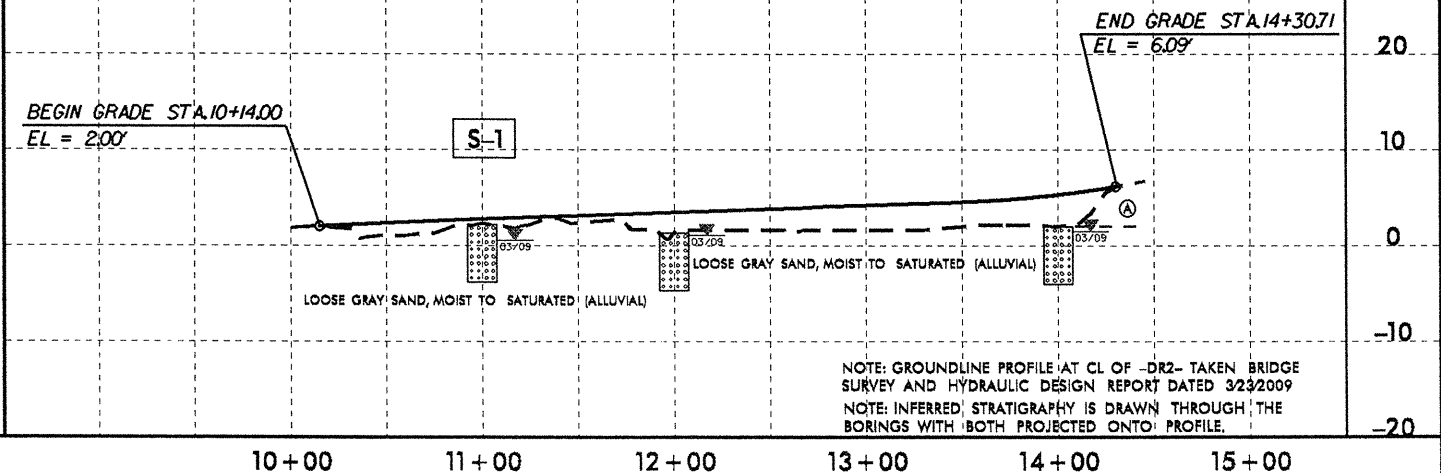


NOTE: GROUNDLINE PROFILE AT CL OF -DR1- TAKEN BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 3/23/2009  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

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		
S-1	CL	11+00	1.0-6.0	A-3(0)	24	NP	1.3	91.8	3.8	3.0	100	100	9	-	-

- Ⓐ LOOSE BROWN SILTY SAND, MOIST (ROADWAY EMBANKMENT)

-DR2-



NOTE: GROUNDLINE PROFILE AT CL OF -DR2- TAKEN BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 3/23/2009  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.





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

-DRI-  
STA. 10+80.00

14+97



VERY SOFT TO MEDIUM STIFF BROWN MUCK, MOIST TO WET (ALLUVIAL)  
LOOSE GRAY SAND, SATURATED (ALLUVIAL)

LOOSE BROWN SILTY SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

VERY SOFT TO MEDIUM STIFF BROWN MUCK, WET (ALLUVIAL)

LOOSE GRAY SAND, SATURATED (ALLUVIAL)

15 + 00.00

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
S-4	CL	11+00	2.0-7.0	A-5(13)	70	7	C. SAND	F. SAND	SILT	CLAY	10	40	200		
							11.5	13.5	50.8	24.2	99	97	76	119.8	24.6

-DRI-  
STA. 11+13.75

14+64



S-4

14+69



VERY SOFT TO MEDIUM STIFF BROWN MUCK, WET (ALLUVIAL)  
LOOSE GRAY SAND, SATURATED (ALLUVIAL)

LOOSE BROWN SILTY SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

14 + 50.00

-DRI-  
STA. 11+63.83

13+89



ST-1

13+89



VERY SOFT TO MEDIUM STIFF BROWN MUCK, MOIST TO WET (ALLUVIAL)  
LOOSE GRAY SAND, SATURATED (ALLUVIAL)

LOOSE BROWN SILTY SAND, MOST (ROADWAY EMBANKMENT)

14 + 00.00

VANE SHEAR TESTS

STATION	OFFSET	DEPTH	S (psf)
12+00	2' RT	0.5	386
12+00	2' RT	1.0	543
12+00	2' RT	1.5	230
12+00	2' RT	2.0	209
12+00	2' RT	3.5	313
12+00	2' RT	4.0	271
12+00	2' RT	5.0	470
12+00	2' RT	6.0	418
12+00	2' RT	6.5	741

-DRI-  
STA. 12+13.90

13+64



S-3

13+65



VERY SOFT TO MEDIUM STIFF BROWN MUCK, MOIST TO WET (ALLUVIAL)  
LOOSE GRAY SAND, SATURATED (ALLUVIAL)

LOOSE BROWN SILTY SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

13 + 50.00

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
S-3	CL	12+00	1.0-7.0	A-5(16)	87	8	C. SAND	F. SAND	SILT	CLAY	10	40	200		
							15.5	10.7	45.5	28.3	99	89	75	259.3	32.4

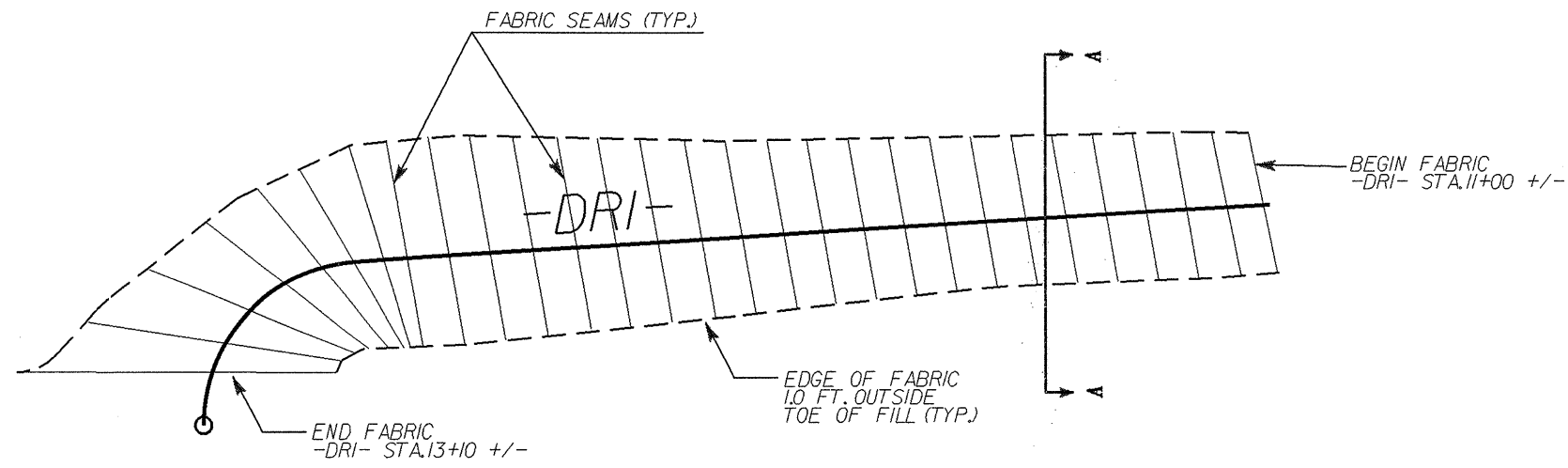
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GEOTECHNICAL ENGINEER

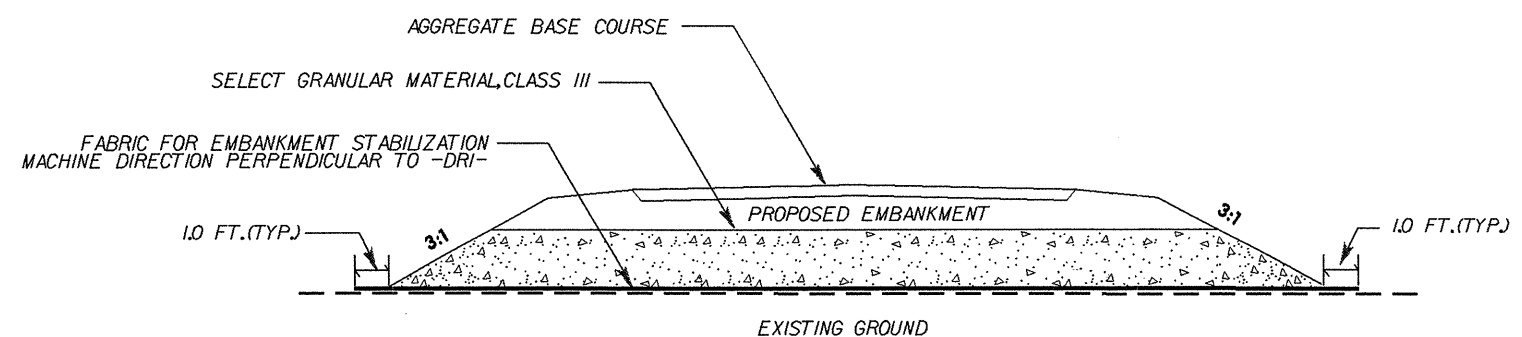
ENGINEER



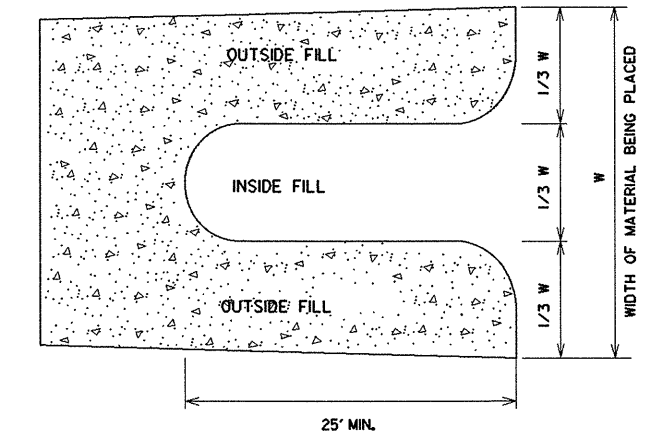
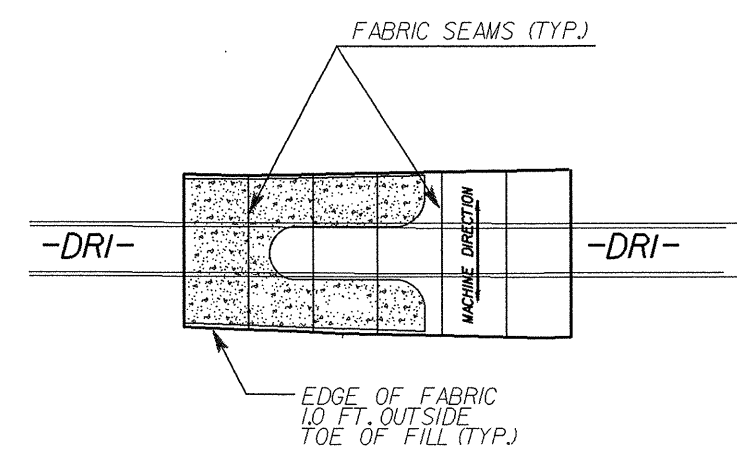
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FABRIC FOR EMBANKMENT STABILIZATION LAYOUT  
N.T.S.



TYP. SECTION A-A  
N.T.S.



FILL PLACEMENT DETAIL  
N.T.S.

NOTES

FOR FABRIC FOR EMBANKMENT STABILIZATION, SEE SPECIAL PROVISION.  
PLACE FABRIC FOR EMBANKMENT STABILIZATION FROM -DRI- STA. 11+00 +/- TO STA. 13+10 +/- AS SHOWN IN THE PLAN OR AS DIRECTED BY THE ENGINEER.  
ESTIMATED QUANTITY OF FABRIC FOR EMBANKMENT STABILIZATION IS 900 SQUARE YARD.

CONSTRUCTION SEQUENCE

1. PREPARE SUBGRADE BY CUTTING TREES AND STUMPS FLUSH WITH GROUND SURFACE. GRUBBING IS NOT TO BE PERFORMED IN THE FABRIC PLACEMENT AREA.
2. PLACE FABRIC FOR EMBANKMENT STABILIZATION WITH MACHINE DIRECTION PERPENDICULAR TO THE EMBANKMENT ALIGNMENT AND SEW STRIPS TOGETHER.
3. PLACE 3 FEET OF SELECT GRANULAR MATERIAL, CLASS III, ABOVE FABRIC FOR EMBANKMENT STABILIZATION AS SHOWN IN FILL PLACEMENT DETAIL OR DIRECTED BY THE ENGINEER.
4. PLACE REMAINING EMBANKMENT FILL MATERIAL.

FILL PLACEMENT SEQUENCE:

1. CONSTRUCT OUTSIDE SECTIONS (OUTSIDE FILL) ALONG THE EDGE OF FABRIC AND PARALLEL TO THE ROADWAY ALIGNMENT TO ANCHOR FABRIC.
2. CONSTRUCT INSIDE SECTION (INSIDE FILL) PARALLEL TO THE ROADWAY ALIGNMENT TO TENSION FABRIC.

PROJECT NO.: 33690.1.1 (B-4413)  
BEAUFORT COUNTY  
STATION: -DR1- 11+00 +/- TO 13+10 +/-

PREPARED BY: TTZ	DATE: 07/2010
REVIEWED BY: JRB	DATE: 07/2010

**GEOTECHNICAL ENGINEERING UNIT**

EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

FABRIC FOR EMBANKMENT STABILIZATION					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		