

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-4459 | 1 | 8 |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33710.1.1 | BRSTP-0042(12) | P.E. | |
| 33710.2.1 | BRSTP-0042(12) | R.W. | |
| 33710.3.1 | BRSTP-0042(12) | CONST. | |

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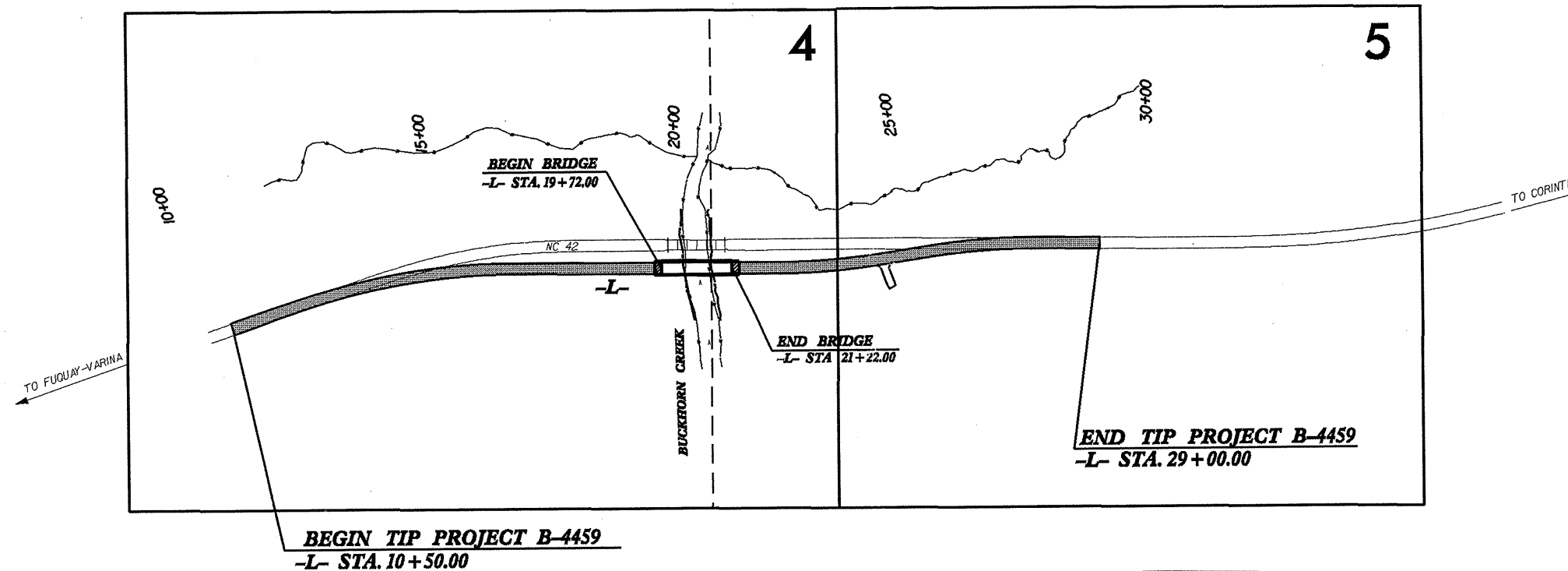
| LINE | STATION | PLAN | PROFILE | XSECT |
|------|----------------------|------|---------|-------|
| -L- | 10+50.00 to 29+00.00 | 4-5 | 6-7 | |

SAMPLE RESULTS SHEET 8

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33710.1.1 (B-4459) F.A. PROJ. BRSTP-0042(12)
COUNTY CHATHAM
PROJECT DESCRIPTION BRIDGE #56 ON NC 42
OVER BUCKHORN 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 (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 (ON-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.

PERSONNEL
J. K. STICKNEY

C. L. SMITH

M. D. MAULDIN

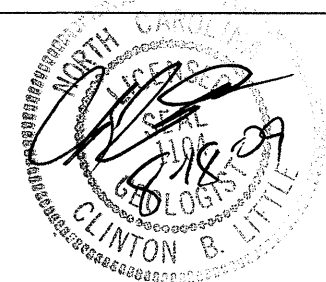
M. R. MOORE

INVESTIGATED BY J. E. BEVERLY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE JUNE, 2009



DRAWN BY: J. E. ROLFSMEYER

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.

CONTRACT: C202551, ID: B-4459

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

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

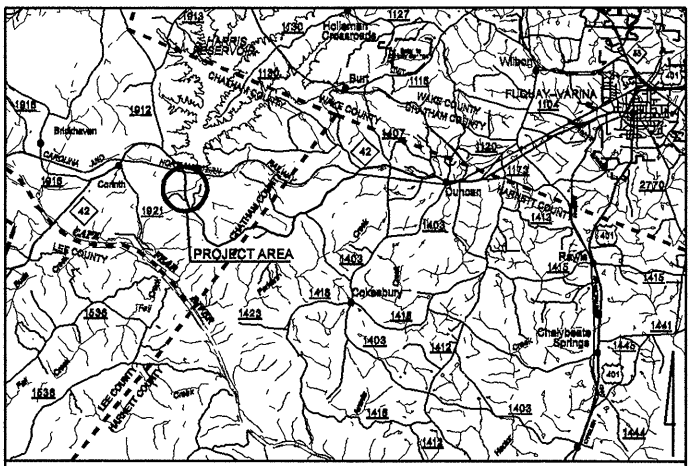
| SOIL DESCRIPTION | | GRADATION | | ROCK DESCRIPTION | | TERMS AND DEFINITIONS | |
|--|--|--|---|--|---|--|--|
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T208, 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, A-7-6</i> | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. | | 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: | | 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 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. STRATA CORE RECOVERY (SCREC) - 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. | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | MINERALOGICAL COMPOSITION | | WEATHERING | | | |
| GENERAL CLASS. | GRANULAR MATERIALS (<= 35% PASSING #200) | SILT-CLAY MATERIALS (> 35% PASSING #200) | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | | WEATHERED ROCK (WR) | | |
| GROUP CLASS. | A-1, A-2, A-3, A-4, A-5, A-6, A-7 | A-1, A-2, A-3, A-4, A-5, A-6, A-7 | | | CRYSTALLINE ROCK (CR) | | |
| SYMBOL | | | | | NON-CRYSTALLINE ROCK (NCR) | | |
| % PASSING | | | COMPRESSIBILITY | | COASTAL PLAIN SEDIMENTARY ROCK (CP) | | |
| LIQUID LIMIT PLASTIC INDEX | | | SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE | | | | |
| GROUP INDEX | | | LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50 | | | | |
| USUAL TYPES OF MAJOR MATERIALS | | | PERCENTAGE OF MATERIAL | | | | |
| GEN. RATING AS A SUBGRADE | | | ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL | | | | |
| | | | TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE | | | | |
| | | | GROUND WATER | | | | |
| | | | WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS 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 DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD | | SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE 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 | | |
| | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | |
| | | | DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST | | ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input checked="" type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT | | |
| | | | | | HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> B- <input type="checkbox"/> N- <input type="checkbox"/> H- HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST | | |
| | | | | | 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 FINGER NAIL. | | |
| | | | | | TEXTURE OR GRAIN SIZE | | |
| | | | | | U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 | | |
| | | | | | CONSISTENCY OR DENSENESS | | |
| | | | | | PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | |
| | | | | | GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE <4 4 TO 10 10 TO 30 30 TO 50 >50 N/A | | |
| | | | | | GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD <2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30 <0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4 | | |
| | | | | | CONCRETE OR DENESS | | |
| | | | | | U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 | | |
| | | | | | SOIL MOISTURE - CORRELATION OF TERMS | | |
| | | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | |
| | | | | | LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | |
| | | | | | PLASTICITY | | |
| | | | | | NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW SLIGHT MEDIUM 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. | | |
| | | | | | 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. | | |
| | | | | | BENCH MARK: | | |
| | | | | | ELEVATION: FT. | | |
| | | | | | NOTES: ALL BORING ELEVATIONS DERIVED FROM TIN FILE: B4459_Is_t1n_080522.dgn | | |

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jerolismeyer AT GCH226157

CONTRACT: 33710.1.1 **TIP PROJECT: B-4459**

See Sheet 1-A For Index of Sheets



VICINITY MAP

25% PLANS

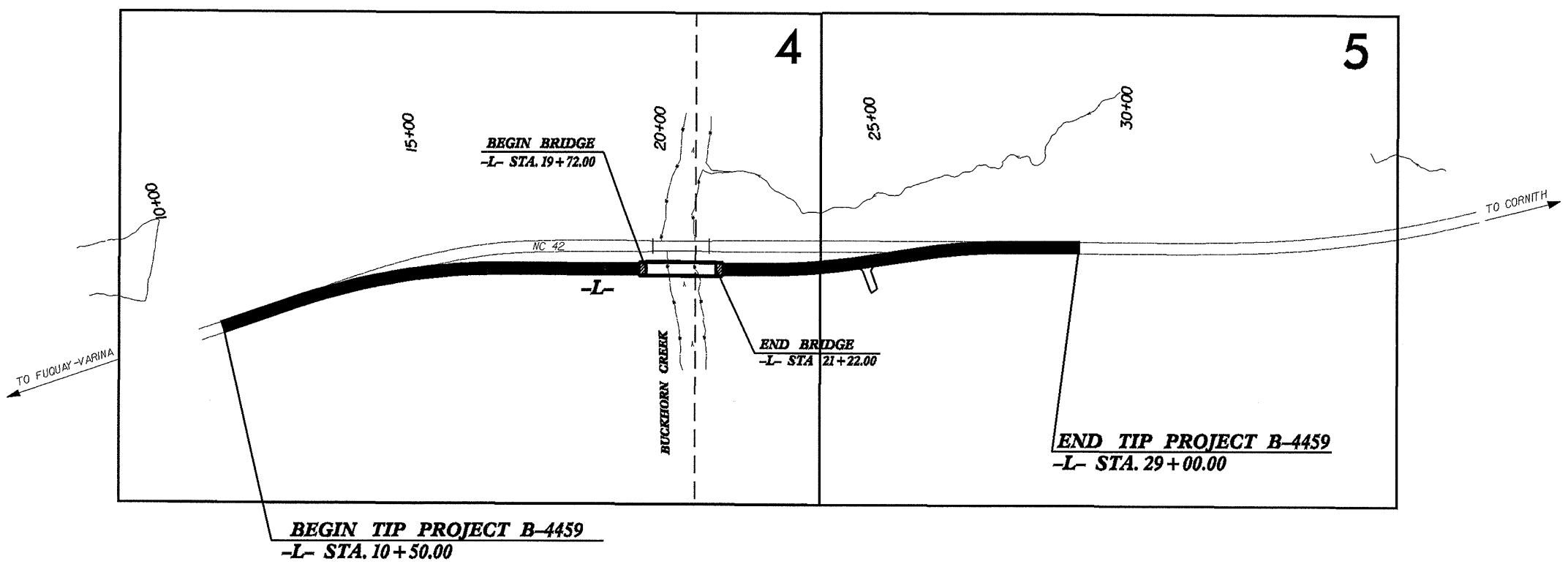
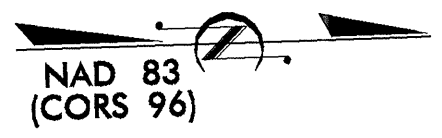
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CHATHAM COUNTY

LOCATION: BRIDGE NO. 56 ON NC 42 OVER BUCKHORN CREEK

TYPE OF WORK: GRADING, DRAINAGE, PAVING,
& STRUCTURE

| | | | |
|-----------------|-----------------------------|-------------|--------------|
| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
| N.C. | B-4459 | 2a | 8 |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33710.1.1 | BRSTP-0042(12) | P.E. | |
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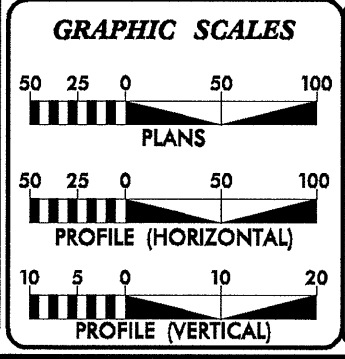
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

** DESIGN EXCEPTION REQUIRED FOR VERTICAL DESIGN.

NCDOT CONTACT: MR. DOUG TAYLOR, P.E.
ROADWAY DESIGN - ENGINEERING COORDINATION

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 2011 = | 2,200 |
| ADT 2031 = | 4,515 |
| DHV = | 10 % |
| D = | 60 % |
| T = | 6 % * |
| V = | 50 MPH |
| *(TTST 2% + DUAL 4%) | |
| FUNC. CLASS = | MAJOR COLL. |

PROJECT LENGTH

| | | |
|-------------------------------------|---|-----------|
| LENGTH ROADWAY TIP PROJECT B-4459 | = | 0.322 mi |
| LENGTH STRUCTURE TIP PROJECT B-4459 | = | 0.028 mi |
| TOTAL LENGTH OF TIP PROJECT B-4459 | = | 0.350 mi. |

Prepared in the Office of:

for North Carolina Department of Transportation

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 19, 2010

LETTING DATE: MARCH 15, 2011

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A Florence & Hulsebosch, Inc. Company
6151 RESORDOM WAY, SUITE 100, RALEIGH, N.C. 27607
(919) 841-6044

BRIAN A. WILES, P.E.
PROJECT ENGINEER

YVETTE T. MARIOTTE
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 EVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

May 21, 2009

STATE PROJECT: 33710.1.1 (B-4459)
FEDERAL PROJECT: BRSTP-0042(12)
COUNTY: Chatham
DESCRIPTION: Bridge No. 56 on NC 42 over Buckhorn Creek

SUBJECT: Geotechnical Report - Inventory

PROJECT DESCRIPTION

The proposed project area lies in rural Chatham County south of Jordan Lake. This is a bridge replacement job with a realignment of the roadway and bridge to the east. The geotechnical investigation consists of three roadway SPT borings and a preliminary bridge SPT boring. The borings were obtained using a CME-550 drill machine and 8" hollow stem augers. The bridge boring was completed on July 9, 2008 and the roadway borings were performed on April 22, 2009.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

There are alluvial areas associated with the floodplain for Buckhorn Creek. In our bridge boring alluvium is comprised of medium stiff clayey sandy silt (A-4) with quartz pebbles. Softer alluvial soils may be interspersed in other areas of the floodplain.

There is also an area of artificial fill in the southeastern region of the existing bridge. Artificial fill soil consists of medium stiff clayey sandy silt (A-4) with debris in the form of plastic bottles, cans, and tires noted in the top 3 – 4 feet of the fill.

PHYSIOGRAPHY AND GEOLOGY

Geologically this site falls within the Carolina Slate Belt. Rock core samples were not obtained at boring locations and there were no observed rock outcrops. Based strictly on location in reference to the NC Geologic Map, underlying rock type for this site is felsic metavolcanic in origin. Residual soil types are stiff silty sandy clay (A-7-5) and very stiff clayey sandy silt (A-4). Severely weathered crystalline rock was encountered in our 2 northern most borings at depths of 18.8' (bridge) and 5' (roadway). Auger refusal on rock was achieved in our preliminary bridge boring at a depth of 21.4',

placing rock 12 feet below creek bed elevation. Groundwater was not present in any of the roadway borings. The bridge boring was filled immediately after drilling, thus water level was undetermined.

Respectfully submitted,

Eddie Beverly

Eddie Beverly
Project Geological Engineer

PROJECT: B-4459

COUNTY: Chatham

Volumes in Cubic Yards
DATE: 3/18/2010

COMPILED BY: B. Wiles

SHEET 1 OF 1 SHEETS

| STATION | STATION | EXCAVATION | | | | | EMBANKMENT | | | BORROW | WASTE | | | | |
|---|-----------------|----------------|------|----------|------------------|-------------------|------------|------|-------|--------|--------------|------|----------|---------|--------|
| | | TOTAL UNCLASS. | ROCK | UNDERCUT | UNSUIT. UNCLASS. | SUITABLE UNCLASS. | TOTAL | ROCK | EARTH | | EMBANK. +20% | ROCK | SUITABLE | UNSUIT. | TOTAL |
| -L- 10+50 | -L- 19+72 | 7,304 | | | | 7,304 | 4,448 | | 4,448 | 5,338 | | | 1,966 | | 1,966 |
| | SUBTOTAL | 7,304 | | | | 7,304 | 4,448 | | 4,448 | 5,338 | | | 1,966 | | 1,966 |
| -L- 21+22 | -L- 29+00 | 2,632 | | | | 2,632 | 5,434 | | 5,434 | 6,521 | 3,889 | | | | |
| | SUBTOTAL | 2,632 | | | | 2,632 | 5,434 | | 5,434 | 6,521 | 3,889 | | | | |
| | SUBTOTAL | | | | | | | | | | | | | | |
| | SUBTOTAL | | | | | | | | | | | | | | |
| | SUBTOTAL | | | | | | | | | | | | | | |
| | TOTAL | 9,936 | | | | 9,936 | 9,882 | | 9,882 | 11,858 | 3,889 | | 1,966 | | 1,966 |
| LOSS DUE TO CLEARING & GRUBBING | | -600 | | | | -600 | | | | | 600 | | | | 110 |
| UNDERCUT (19+75 TO 20+20) | | | | 110 | | | 60 | | 60 | 72 | 72 | | | | 110 |
| UNCLASSIFIED EXCAVATION (END BENT #1) | | 105 | | | | 105 | | | | | | | 105 | | 105 |
| WASTE IN LIEU OF BORROW | | | | | | | | | | | -2,071 | | -2,071 | | -2,071 |
| PROJECT TOTAL | | 9,441 | | 110 | | 9,441 | 9,942 | | 9,942 | 11,930 | 2,490 | | | | 110 |
| EST. 5% TO REPLACE TOP SOIL ON BORROW PIT | | | | | | | | | | | 124 | | | | |
| GRAND TOTAL | | 9,441 | | 110 | | 9,441 | 9,942 | | 9,942 | 11,930 | 2,614 | | | | 110 |
| SAY | | 9,500 | | | | | | | | | 2,700 | | | | |

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.

- DDE = 480 CUBIC YARDS
- SUBGRADE UNDERCUT = 1,000 CUBIC YARDS
- SHALLOW UNDERCUT = 750 CUBIC YARDS
- FABRIC FOR SOIL STABILIZATION = 2,650 SY
- CLASS IV SUBGRADE STABILIZATION = 1,500 TONS
- 6" PERFORATED SUBDRAIN PIPE = 250 LF
- SELECT GRANULAR MATERIAL = 1,650 CY

8/17/99

| | |
|---|-----------------------|
| PROJECT REFERENCE NO. 33710.1.1 (B-4459) | SHEET NO. 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 | |

| | |
|--------------------------------------|--------------------------------------|
| -L- | -L- |
| PI Sta 23+28.63 | PI Sta 26+53.28 |
| $\Delta = 8^{\circ} 50' 54.1''$ (LT) | $\Delta = 8^{\circ} 50' 54.1''$ (RT) |
| D = 418' 28.6" | D = 418' 28.6" |
| L = 205.40' | L = 205.40' |
| T = 102.90' | T = 102.90' |
| R = 1,330.00' | R = 1,330.00' |
| DS = 60 mph | DS = 60 mph |
| SE = 4.0% | SE = 4.0% |

NAD 83 (CORS 96)

PROGRESS ENERGY CAROLINAS INC.
 DB 359 PG 426
 UNRECORDED PLAT
 L-D-3064
 MOORE, GARNER, & ASC. INC.

PROGRESS ENERGY CAROLINAS INC.
 DB ?? PG ??
 PLAT SLIDE ?? PG ??

END TIP PROJECT B-4459
END CONSTRUCTION
 -L- POT 29+00.00

C. WESLEY & ROBIN TUTOR
 & CHARLES & LOIS JONES
 DB 544 PG 770
 PLAT SLIDE 89 PG 82

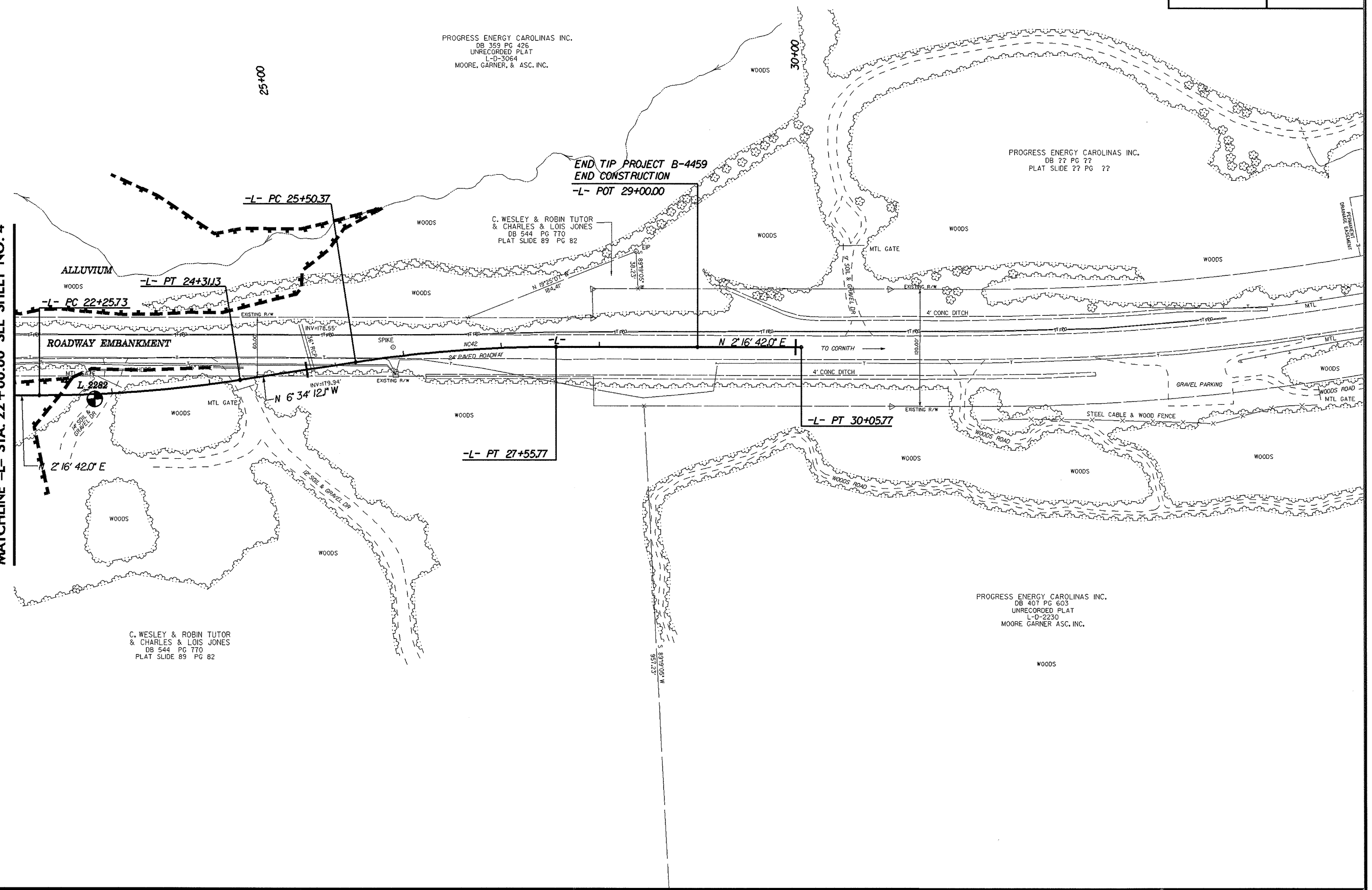
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 & CHARLES & LOIS JONES
 DB 544 PG 770
 PLAT SLIDE 89 PG 82

PROGRESS ENERGY CAROLINAS INC.
 DB 407 PG 603
 UNRECORDED PLAT
 L-D-2230
 MOORE GARNER ASC. INC.

MATCHLINE -L- STA. 22+00.00 SEE SHEET NO. 4

REVISIONS

18-MAY-2009 10:50
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 157
 157



5/14/99

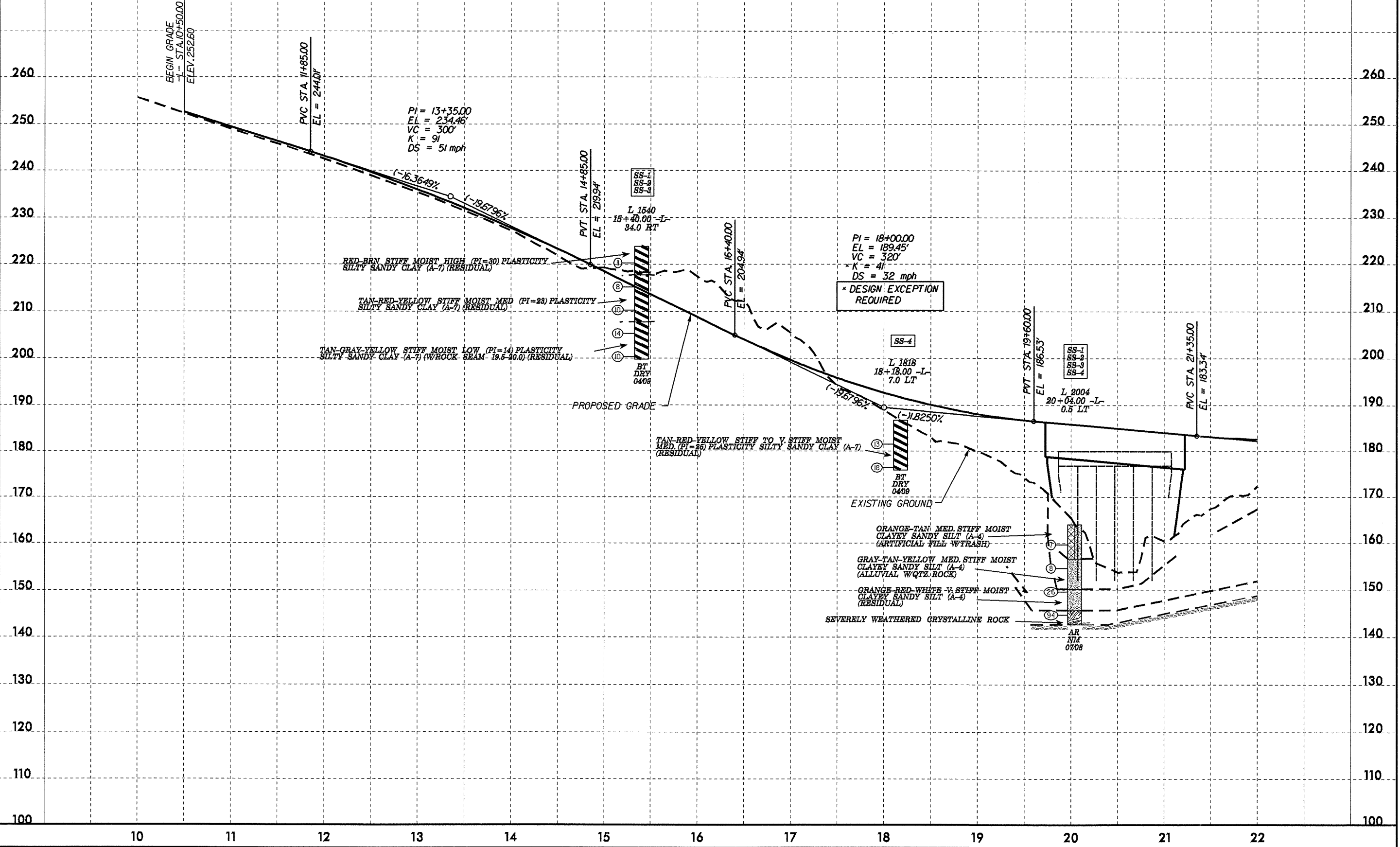
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BM#1
RR SPIKE BASE OF 14' PINE
BL STA 5+00.00 56.86' RT
-L- STA 9+99.03 41.25' RT
ELEV = 258.33'

-L-
FOR PLAN, SEE SHEET NO. 4

BM#2
RR SPIKE BASE OF 30' BEECH TREE
BL STA 14+85 74' RT
-L- STA 19+78.92 38.78' RT
ELEV = 172.78'

| | |
|--|---------------------|
| PROJECT REFERENCE NO. 33710.1.1 (B-4469) | SHEET NO. 6 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |
| INCOMPLETE PLANS DO NOT USE FOR 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 | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC | Line or Boring ID |
|------------|---------|----------|----------------|---------------|------|------|-------------|--------|------|------|--------------------|----|-----|------------|-----------|-------------------|
| | | | | | | | C.SAND | F.SAND | SILT | CLAY | 10 | 40 | 200 | | | |
| PDEA | 8/2008 | | | | | | | | | | | | | - | - | |
| SS-1 | 0.5 LT | 20+04.00 | 3.80-4.80 | A-4(3) | 25 | 8 | 5.7 | 30.7 | 35.4 | 28.3 | 100 | 98 | 72 | - | - | L |
| SS-2 | 0.5 LT | 20+04.00 | 8.80-9.80 | A-4(0) | 22 | NP | 22.8 | 42.0 | 25.1 | 10.1 | 87 | 75 | 38 | - | - | L |
| SS-3 | 0.5 LT | 20+04.00 | 13.80-14.80 | A-4(0) | 31 | 7 | 34.1 | 33.5 | 24.2 | 8.1 | 100 | 78 | 40 | - | - | L |
| SS-4 | 0.5 LT | 20+04.00 | 18.80-19.80 | A-1-b(0) | 24 | NP | 53.9 | 29.1 | 12.9 | 4.0 | 81 | 46 | 18 | - | - | L |
| RDWY | 4/2009 | | | | | | | | | | | | | - | - | |
| SS-1 | 34.0 RT | 15+40.00 | 3.00-4.00 | A-7-5(27) | 60 | 30 | 9.3 | 12.9 | 21.3 | 56.5 | 100 | 94 | 81 | - | - | L |
| SS-2 | 34.0 RT | 15+40.00 | 8.00-9.00 | A-7-5(16) | 58 | 23 | 13.9 | 23.4 | 30.4 | 32.3 | 100 | 93 | 67 | - | - | L |
| SS-3 | 34.0 RT | 15+40.00 | 18.00-19.00 | A-7-5(6) | 46 | 14 | 24.4 | 25.8 | 27.5 | 22.2 | 99 | 83 | 54 | - | - | L |
| SS-4 | 7.0 LT | 18+18.00 | 4.70-5.70 | A-7-5(16) | 63 | 25 | 21.8 | 17.6 | 24.3 | 36.3 | 96 | 80 | 62 | - | - | L |