

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | 32782.1.1 (B-2965)          | 1         | 10           |

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 32782.1.1 (B-2965) F.A. PROJ. BRSTP-064B(1)  
COUNTY EDGECOMBE  
PROJECT DESCRIPTION BRIDGE NO. 24 ON US 64 BUSINESS OVER  
TAR RIVER AT -L- STA. 39+59

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**CAUTION NOTICE**

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

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

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

**PROJECT: 32782.1.1 ID: B-2965**

PERSONNEL

JRS

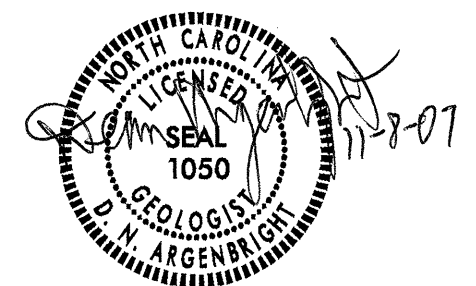
S&ME

INVESTIGATED BY D.N.ARGENBRIGHT

CHECKED BY D.N.ARGENBRIGHT

SUBMITTED BY D.N.ARGENBRIGHT

DATE NOVEMBER 2007



DRAWN BY: C. M. KENT

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.

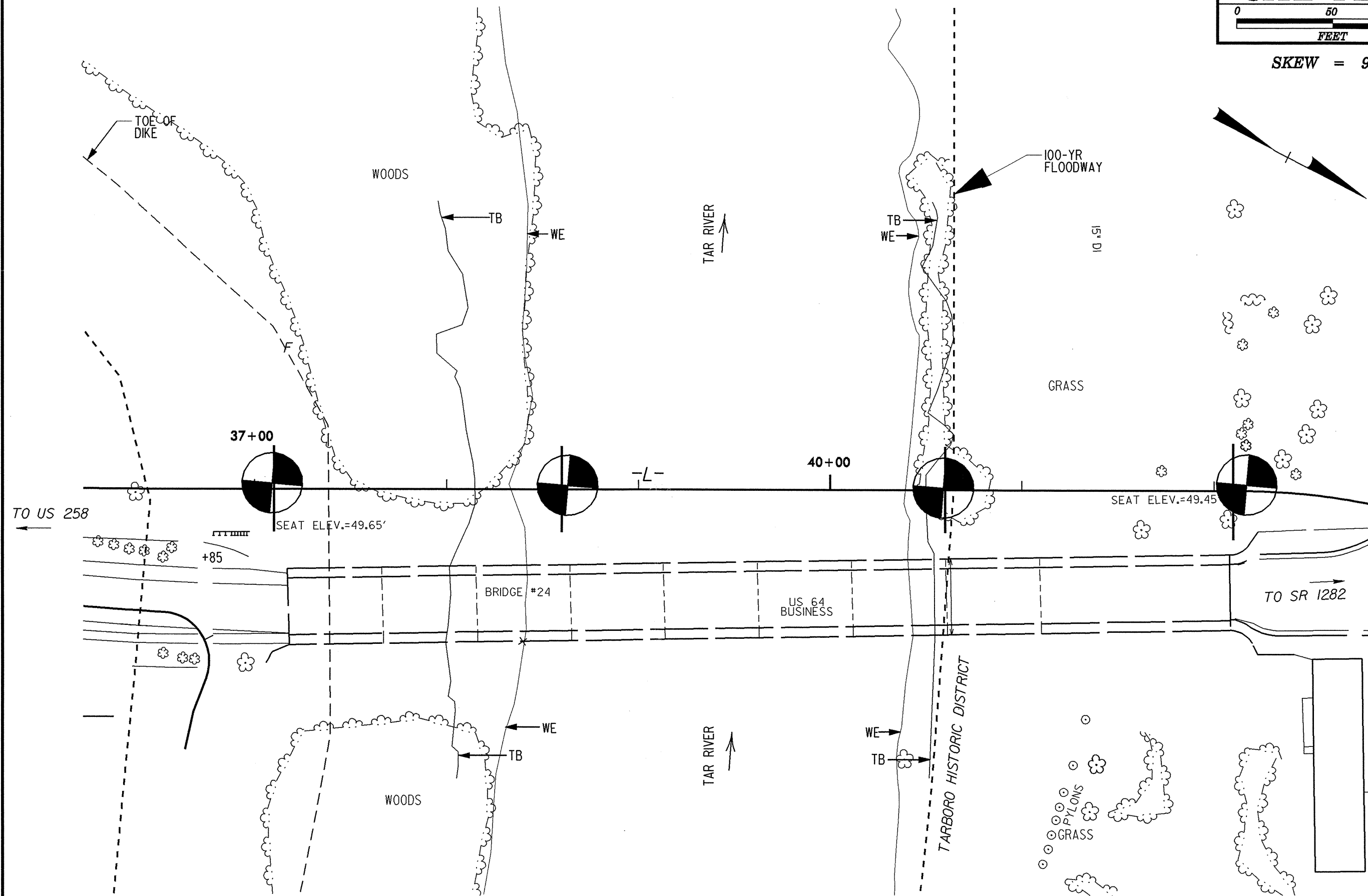
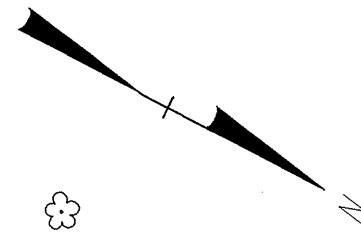
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

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 (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:<br><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i> |  | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.<br>UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)<br>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.<br>ANGULARITY OF GRAINS<br>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. |  | 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.<br>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:<br>WEATHERED ROCK (WR)<br>CRYSTALLINE ROCK (CR)<br>NON-CRYSTALLINE ROCK (NCR)<br>COASTAL PLAIN SEDIMENTARY ROCK (CP)  |  | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.<br>AQUIFER - A WATER BEARING FORMATION OR STRATA.<br>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.<br>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.<br>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.<br>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.<br>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.<br>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.<br>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.<br>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.<br>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.<br>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.<br>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.<br>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.<br>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.<br>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.<br>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.<br>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.<br>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.<br>MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.<br>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.<br>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.<br>ROCK QUALITY DESIGNATION (ROD) - 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.<br>SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.<br>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.<br>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.<br>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.<br>STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.<br>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.<br>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |  |  |  |  |  |
| <b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>  |  | <b>MINERALOGICAL COMPOSITION</b>  |  | <b>WEATHERING</b>   |  |   |  |  |  |  |  |
| GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS   |  | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.   |  | FRESH ROCK FRESH, CRYSTALLINE BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.<br>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.<br>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.<br>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.<br>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.<br>SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.<br>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.<br>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. |  | <b>COMPRESSIBILITY</b><br>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31<br>MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50<br>HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50  |  | <b>PERCENTAGE OF MATERIAL</b><br>ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL<br>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%<br>LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%<br>MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%<br>HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE |  |  |  |
| <b>TEXTURE OR GRAIN SIZE</b>  |  | <b>MISCELLANEOUS SYMBOLS</b>  |  | <b>ROCK HARDNESS</b>  |  |   |  |  |  |  |  |
| U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270<br>4.75 2.00 0.42 0.25 0.075 0.053   |  | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION<br>SOIL SYMBOL<br>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT<br>INFERRED SOIL BOUNDARY<br>INFERRED ROCK LINE<br>ALLUVIAL SOIL BOUNDARY<br>DIP & DIP DIRECTION OF ROCK STRUCTURES<br>SOUNDING ROD  |  | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.<br>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.<br>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.<br>MEDIUM HARD CAN BE GROVED 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.<br>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.<br>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.  |  | <b>ABBREVIATIONS</b><br>AR - AUGER REFUSAL<br>BT - BORING TERMINATED<br>CL - CLAY<br>CPT - CONE PENETRATION TEST<br>CSE - COARSE<br>DMT - DILATOMETER TEST<br>DPT - DYNAMIC PENETRATION TEST<br>e - VOID RATIO<br>F - FINE<br>FOSS - FOSSILIFEROUS<br>FRAC. - FRACTURED, FRACTURES<br>FRAGS. - FRAGMENTS<br>HI. - HIGHLY<br>MED. - MEDIUM<br>MICA - MICACEOUS<br>MOD. - MODERATELY<br>NP - NON PLASTIC<br>ORG. - ORGANIC<br>PMT - PRESSUREMETER TEST<br>SAP. - SAPROLITIC<br>SD. - SAND, SANDY<br>SL. - SILT, SILTY<br>SLI. - SLIGHTLY<br>TCR - TRICONE REFUSAL<br>v - MOISTURE CONTENT<br>V - VERY<br>VST - VANE SHEAR TEST<br>WEA. - WEATHERED<br>γ <sub>s</sub> - UNIT WEIGHT<br>γ <sub>d</sub> - DRY UNIT WEIGHT  |  |  |  |  |  |
| <b>SOIL MOISTURE - CORRELATION OF TERMS</b>   |  | <b>DRILL UNITS:</b>   |  | <b>FRACTURE SPACING</b>   |  | <b>BEDDING</b>  |  |  |  |  |  |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION  |  | MOBILE B-<br>BK-51<br>CME-45C<br>CME-550<br>PORTABLE HOIST  |  | TERM SPACING<br>VERY WIDE MORE THAN 10 FEET<br>WIDE 3 TO 10 FEET<br>MODERATELY CLOSE 1 TO 3 FEET<br>CLOSE 0.16 TO 1 FEET<br>VERY CLOSE LESS THAN 0.16 FEET  |  | TERM THICKNESS<br>VERY THICKLY BEDDED > 4 FEET<br>THICKLY BEDDED 1.5 - 4 FEET<br>THINLY BEDDED 0.16 - 1.5 FEET<br>VERY THINLY BEDDED 0.03 - 0.16 FEET<br>THICKLY LAMINATED 0.008 - 0.03 FEET<br>THINLY LAMINATED < 0.008 FEET   |  |  |  |  |  |
| <b>PLASTICITY</b>   |  | <b>ADVANCING TOOLS:</b>   |  | <b>INDURATION</b>   |  |   |  |  |  |  |  |
| NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY   |  | CLAY BITS<br>6" CONTINUOUS FLIGHT AUGER<br>8" HOLLOW AUGERS<br>HARD FACED FINGER BITS<br>TUNG-CARBIDE INSERTS<br>CASING w/ ADVANCER<br>TRICONE 2 1/4" * STEEL TEETH<br>TRICONE * TUNG-CARB.<br>CORE BIT   |  | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.<br>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.<br>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.<br>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.<br>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.  |  |   |  |  |  |  |  |
| <b>COLOR</b>  |  | <b>EQUIPMENT USED ON SUBJECT PROJECT</b>  |  |   |  |   |  |  |  |  |  |
| 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.  |  |   |  |   |  |   |  |  |  |  |  |

SKEW = 90°

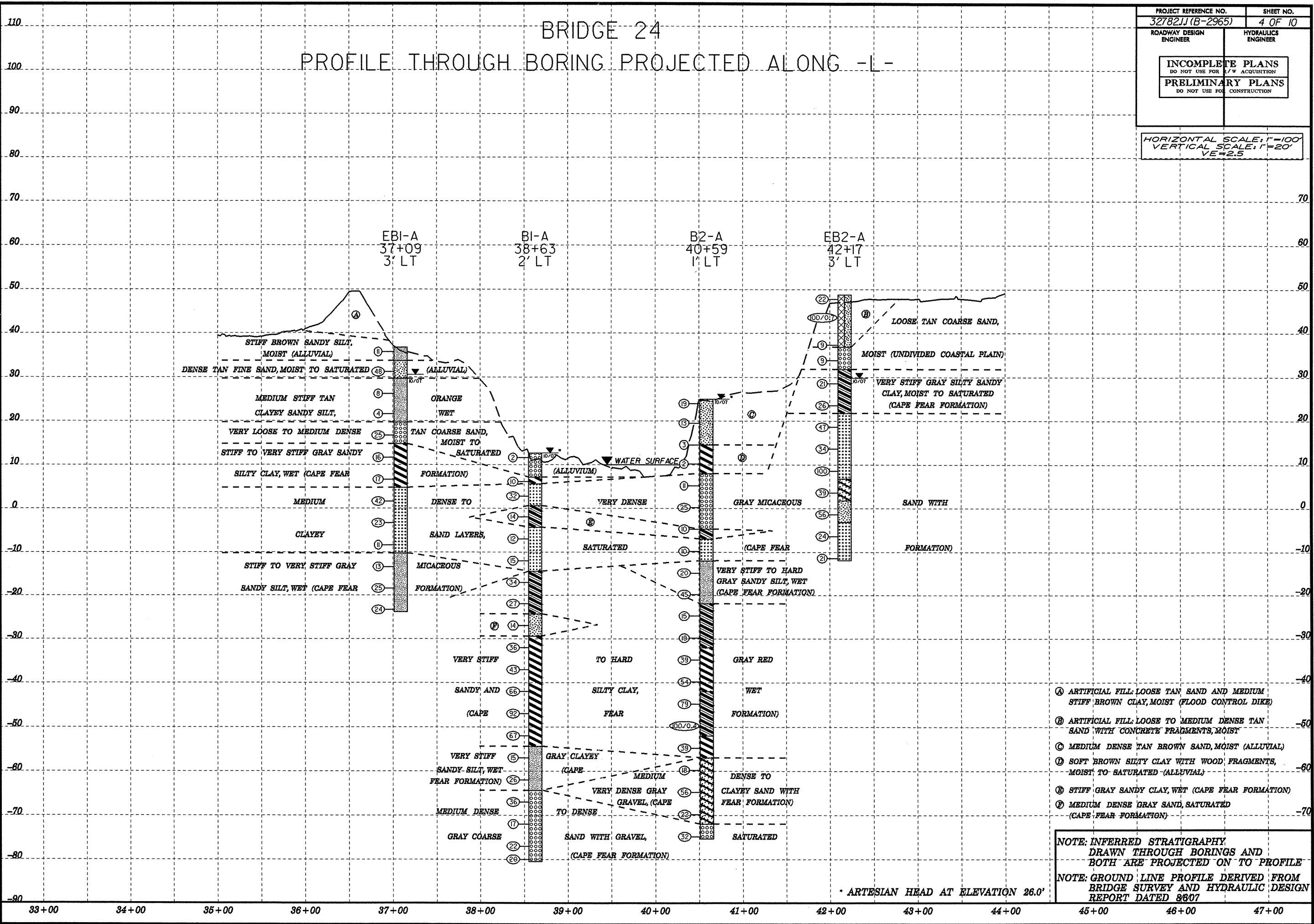


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# BRIDGE 24

## PROFILE THROUGH BORING PROJECTED ALONG -L-

|   |                             |
|---|-----------------------------|
| PROJECT REFERENCE NO.<br><b>32782JJ(B-2965)</b>               | SHEET NO.<br><b>4 OF 10</b> |
| ROADWAY DESIGN ENGINEER                                       | HYDRAULICS ENGINEER         |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR ACQUISITION         |                             |
| <b>PRELIMINARY PLANS</b><br>DO NOT USE FOR CONSTRUCTION       |                             |
| HORIZONTAL SCALE: 1"=100'<br>VERTICAL SCALE: 1"=20'<br>VE=2.5 |                             |



- Ⓐ ARTIFICIAL FILL: LOOSE TAN SAND AND MEDIUM STIFF BROWN CLAY, MOIST (FLOOD CONTROL DIKE)
- Ⓑ ARTIFICIAL FILL: LOOSE TO MEDIUM DENSE TAN SAND WITH CONCRETE FRAGMENTS, MOIST
- Ⓒ MEDIUM DENSE TAN BROWN SAND, MOIST (ALLUVIAL)
- Ⓓ SOFT BROWN SILTY CLAY WITH WOOD FRAGMENTS, MOIST TO SATURATED (ALLUVIAL)
- Ⓔ STIFF GRAY SANDY CLAY, WET (CAPE FEAR FORMATION)
- Ⓕ MEDIUM DENSE GRAY SAND, SATURATED (CAPE FEAR FORMATION)

**NOTE: INFERRED STRATIGRAPHY**  
 DRAWN THROUGH BORINGS AND BOTH ARE PROJECTED ON TO PROFILE  
**NOTE: GROUND LINE PROFILE DERIVED FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 8/07**

\* ARTESIAN HEAD AT ELEVATION 26.0'

33+00    34+00    35+00    36+00    37+00    38+00    39+00    40+00    41+00    42+00    43+00    44+00    45+00    46+00    47+00



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

|   |                            |                         |                           |
|---|----------------------------|-------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965                 | COUNTY Edgecombe        | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                            |                         | GROUND WTR (ft)           |
| BORING NO. EB1-A  | STATION 37+09              | OFFSET 3ft LT           | ALIGNMENT -L-             |
| COLLAR ELEV. 36.7 ft  | TOTAL DEPTH 60.6 ft        | NORTHING 783,191        | EASTING 2,434,732         |
| DRILL MACHINE CME-750   | DRILL METHOD ROTARY W/ MUD | HAMMER TYPE Automatic   |                           |
| START DATE 10/02/07   | COMP. DATE 10/02/07        | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A         |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT |       |       | BLOWS PER FOOT |    |    |    | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |  |            |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----------|-----|-----|---------------------------|--|------------|
|           |                 |            | 0.5ft      | 0.5ft | 0.5ft | 0              | 25 | 50 | 75 |           |     |     | 100                       | ELEV. (ft)   | DEPTH (ft) |
| 40        |                 |            |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| 36.7      | 36.7            | 0.0        |            |       |       |                |    |    |    |           |     |     |                           | GROUND SURFACE   | 0.0        |
| 35        |                 |            | 5          | 6     | 5     |                |    |    |    |           |     |     |                           | ALLUVIAL BROWN SANDY SILT, MOIST                                   | 3.0        |
| 32.2      | 32.2            | 4.5        | 27         | 23    | 25    |                |    |    |    |           |     |     |                           | ALLUVIAL TAN FINE SAND, MOIST                                      | 7.0        |
| 30        |                 |            |            |       |       |                |    |    |    |           |     |     |                           | ALLUVIAL TAN ORANGE CLAYEY SANDY SILT, WET                         | 17.0       |
| 27.2      | 27.2            | 9.5        | 3          | 3     | 5     |                |    |    |    |           |     |     |                           | ALLUVIAL TAN COARSE SAND, SATURATED                                | 22.0       |
| 25        |                 |            | 2          | 1     | 3     |                |    |    |    |           |     |     |                           | COASTAL PLAIN GRAY SANDY SILTY CLAY, WET (CAPE FEAR FORMATION)     | 32.0       |
| 22.6      | 22.6            | 14.1       |            |       |       |                |    |    |    |           |     |     |                           | COASTAL PLAIN GRAY MICACEOUS SAND, SATURATED (CAPE FEAR FORMATION) | 47.0       |
| 20        |                 |            | 6          | 10    | 15    |                |    |    |    |           |     |     |                           | COASTAL PLAIN GRAY MICACEOUS SANDY SILT, WET (CAPE FEAR FORMATION) | 60.6       |
| 17.6      | 17.6            | 19.1       |            |       |       |                |    |    |    |           |     |     |                           | Boring Terminated at Elevation -23.9 ft in Very Stiff Silt         |            |
| 15        |                 |            | 4          | 6     | 10    |                |    |    |    |           |     |     |                           |  |            |
| 12.6      | 12.6            | 24.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| 10        |                 |            | 5          | 7     | 10    |                |    |    |    |           |     |     |                           |  |            |
| 7.6       | 7.6             | 29.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| 5         |                 |            | 5          | 7     | 10    |                |    |    |    |           |     |     |                           |  |            |
| 2.6       | 2.6             | 34.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| 0         |                 |            | 18         | 22    | 20    |                |    |    |    |           |     |     |                           |  |            |
| -2.4      | -2.4            | 39.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -5        |                 |            | 10         | 13    | 10    |                |    |    |    |           |     |     |                           |  |            |
| -7.4      | -7.4            | 44.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -10       |                 |            | 8          | 5     | 6     |                |    |    |    |           |     |     |                           |  |            |
| -12.4     | -12.4           | 49.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -15       |                 |            | 3          | 6     | 7     |                |    |    |    |           |     |     |                           |  |            |
| -17.4     | -17.4           | 54.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -20       |                 |            | 7          | 7     | 18    |                |    |    |    |           |     |     |                           |  |            |
| -22.4     | -22.4           | 59.1       |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -25       |                 |            | 6          | 10    | 14    |                |    |    |    |           |     |     |                           |  |            |
| -30       |                 |            |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -35       |                 |            |            |       |       |                |    |    |    |           |     |     |                           |  |            |
| -40       |                 |            |            |       |       |                |    |    |    |           |     |     |                           |  |            |

NCDOT BORE DOUBLE B2965.GPJ NC\_DOT\_GDT\_11/08/07

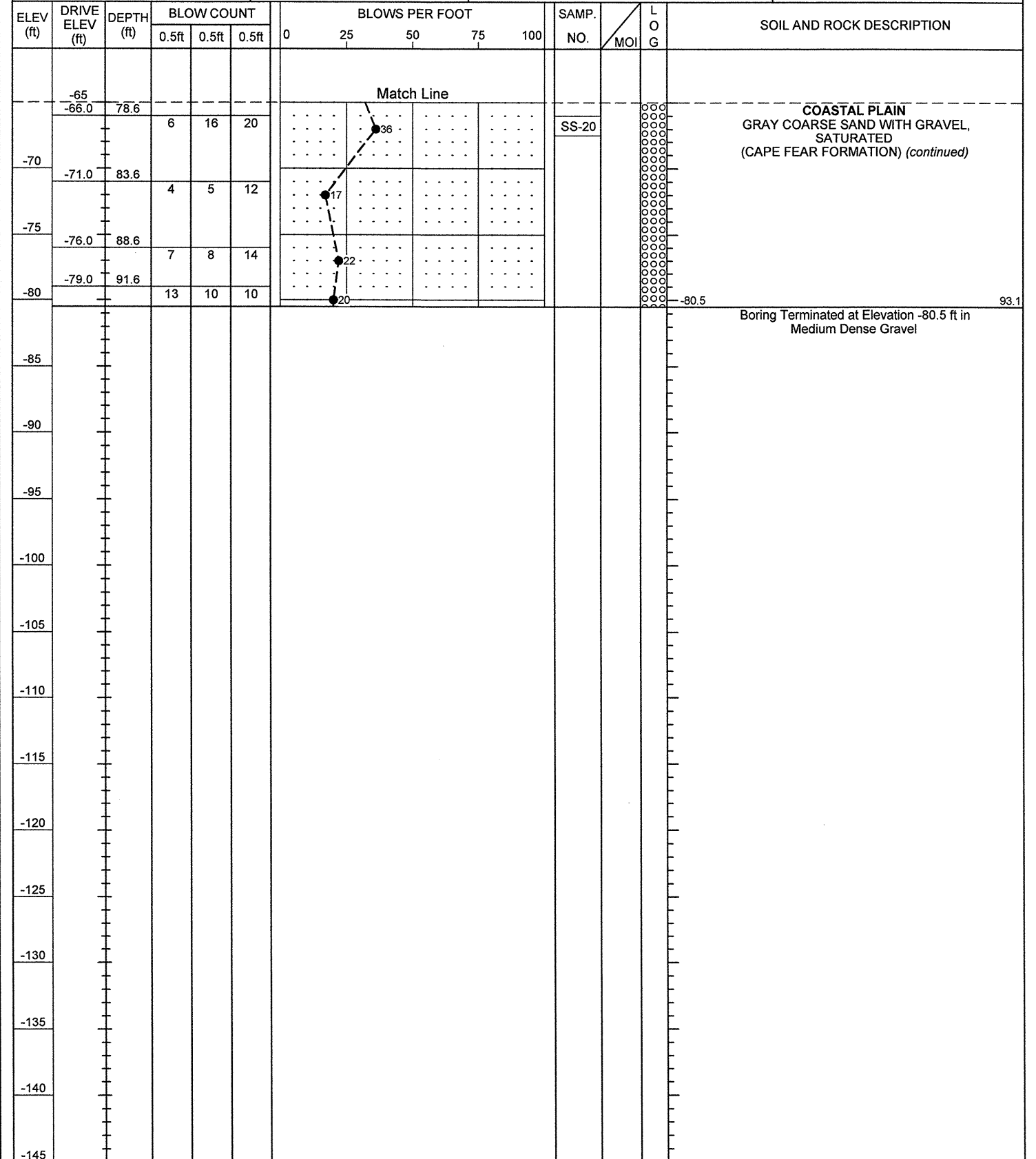
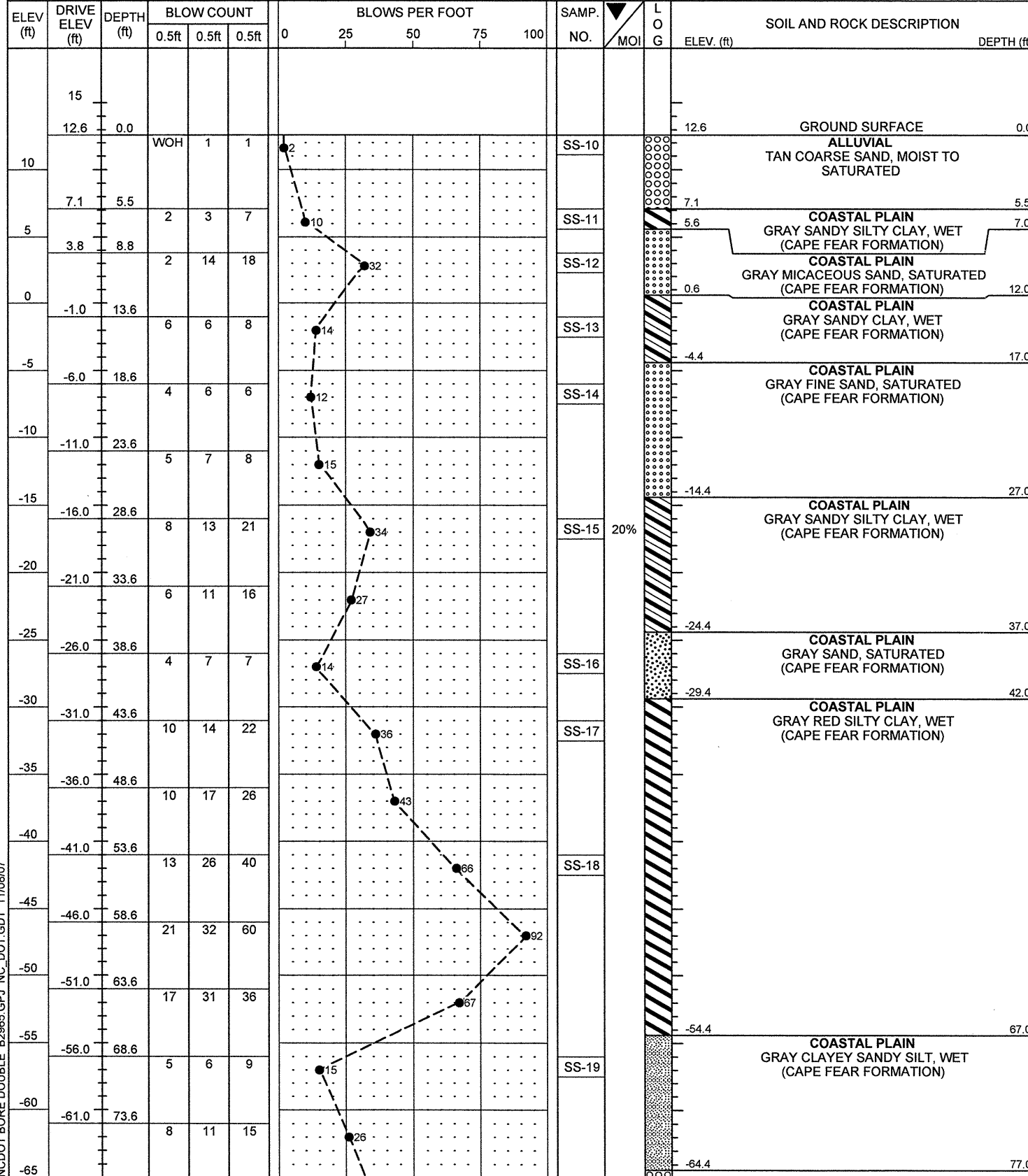


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

|   |                     |                            |                           |
|---|---------------------|----------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965          | COUNTY Edgecombe           | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                     |                            | GROUND WTR (ft)           |
| BORING NO. B1-A   | STATION 38+63       | OFFSET 2ft LT              | ALIGNMENT -L-             |
| COLLAR ELEV. 12.6 ft  | TOTAL DEPTH 93.1 ft | NORTHING 783,328           | EASTING 2,434,663         |
| DRILL MACHINE CME-750   |                     | DRILL METHOD ROTARY W/ MUD | HAMMER TYPE Automatic     |
| START DATE 10/02/07   | COMP. DATE 10/02/07 | SURFACE WATER DEPTH N/A    | DEPTH TO ROCK N/A         |

|   |                     |                            |                           |
|---|---------------------|----------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965          | COUNTY Edgecombe           | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                     |                            | GROUND WTR (ft)           |
| BORING NO. B1-A   | STATION 38+63       | OFFSET 2ft LT              | ALIGNMENT -L-             |
| COLLAR ELEV. 12.6 ft  | TOTAL DEPTH 93.1 ft | NORTHING 783,328           | EASTING 2,434,663         |
| DRILL MACHINE CME-750   |                     | DRILL METHOD ROTARY W/ MUD | HAMMER TYPE Automatic     |
| START DATE 10/02/07   | COMP. DATE 10/02/07 | SURFACE WATER DEPTH N/A    | DEPTH TO ROCK N/A         |



NCDOT BORE DOUBLE B2965.GPJ NC\_DOT\_GDT\_11/08/07



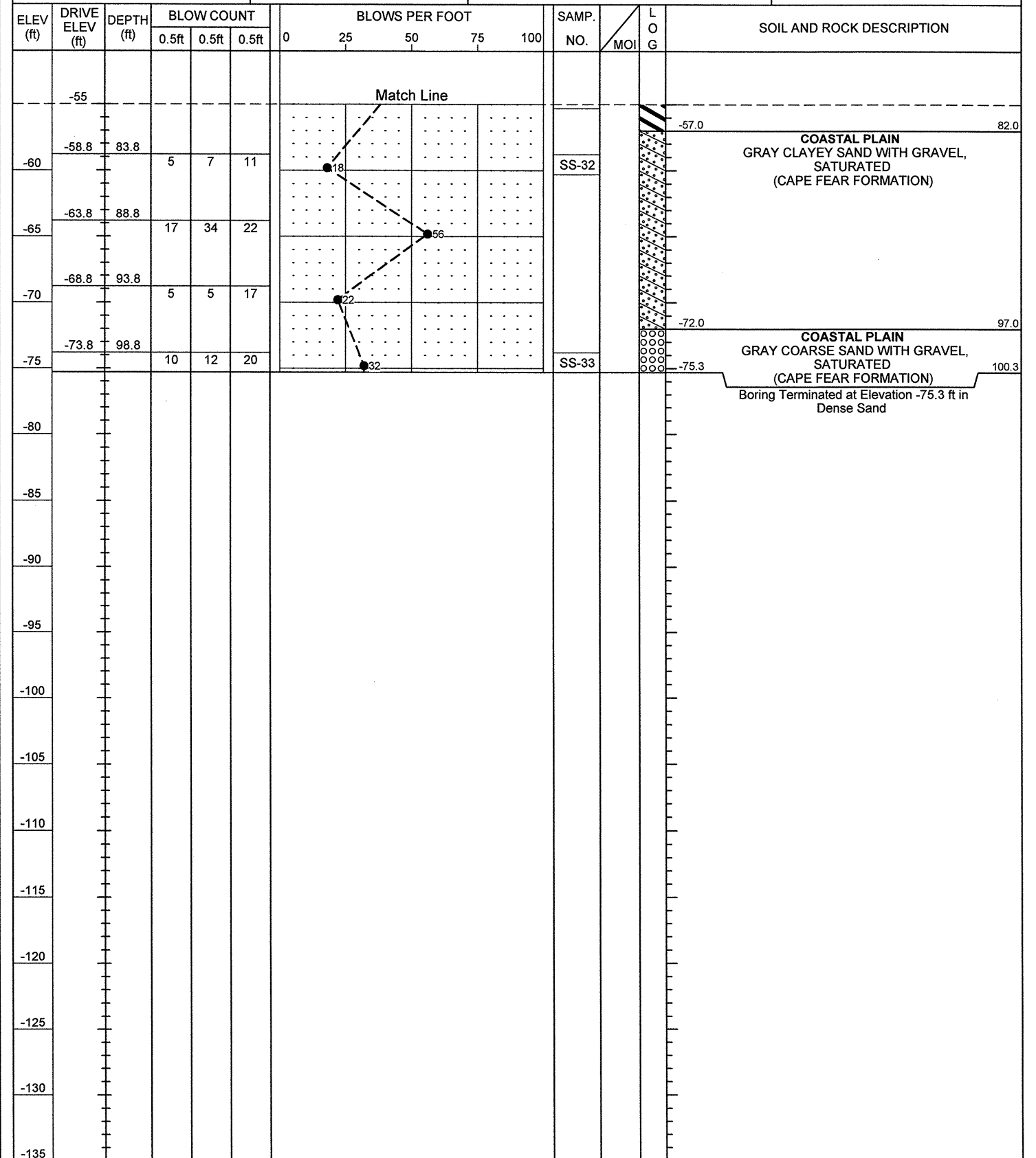
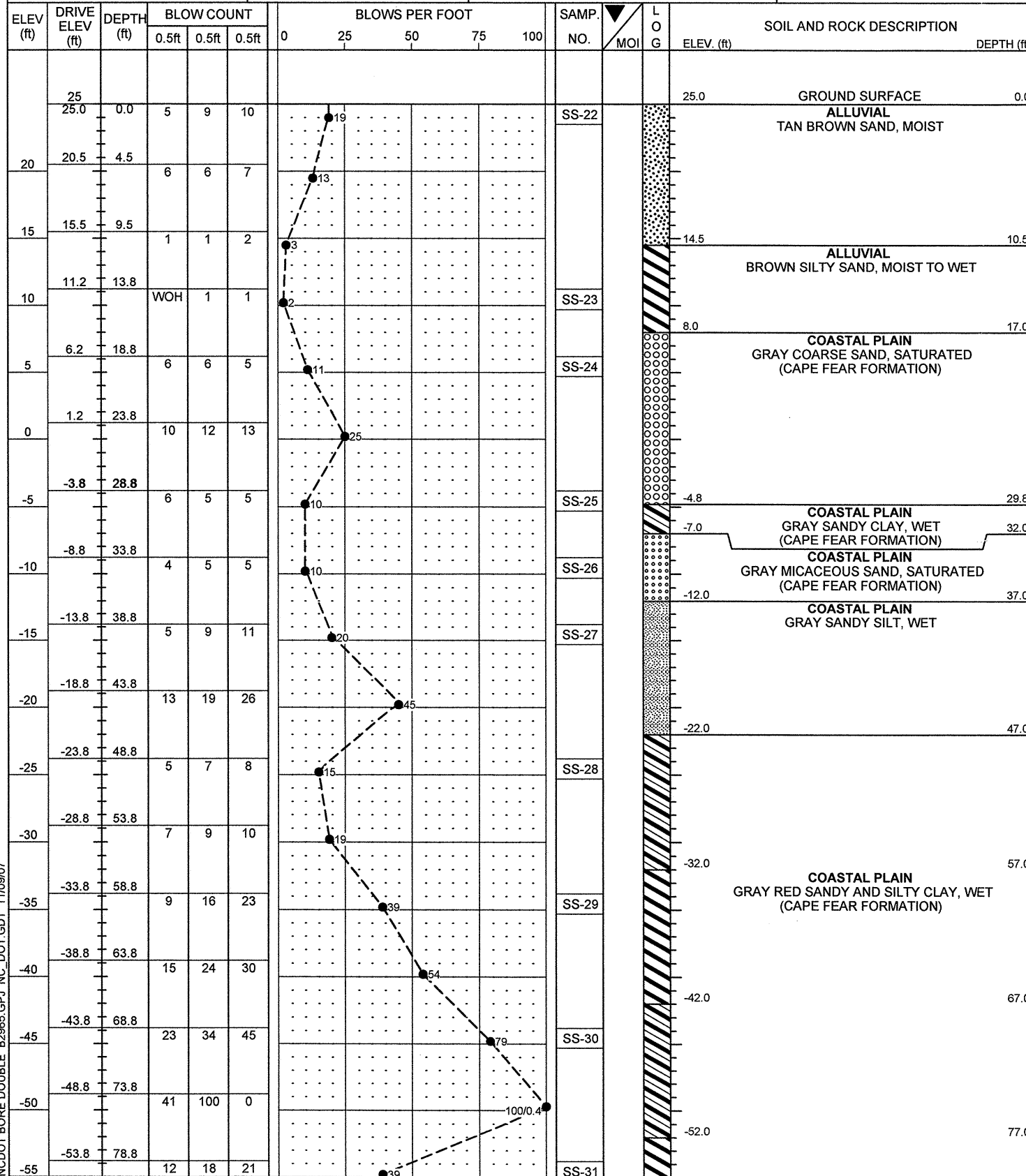


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

|   |                      |                            |                           |
|---|----------------------|----------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965           | COUNTY Edgecombe           | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                      |                            | GROUND WTR (ft)           |
| BORING NO. B2-A   | STATION 40+59        | OFFSET 1ft LT              | ALIGNMENT -L-             |
| COLLAR ELEV. 25.0 ft  | TOTAL DEPTH 100.3 ft | NORTHING 783,503           | EASTING 2,434,574         |
| DRILL MACHINE CME-750   |                      | DRILL METHOD ROTARY W/ MUD |                           |
| START DATE 10/04/07   |                      | COMP. DATE 10/08/07        |                           |
| SURFACE WATER DEPTH N/A   |                      | DEPTH TO ROCK N/A          |                           |

|   |                      |                            |                           |
|---|----------------------|----------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965           | COUNTY Edgecombe           | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                      |                            | GROUND WTR (ft)           |
| BORING NO. B2-A   | STATION 40+59        | OFFSET 1ft LT              | ALIGNMENT -L-             |
| COLLAR ELEV. 25.0 ft  | TOTAL DEPTH 100.3 ft | NORTHING 783,503           | EASTING 2,434,574         |
| DRILL MACHINE CME-750   |                      | DRILL METHOD ROTARY W/ MUD |                           |
| START DATE 10/04/07   |                      | COMP. DATE 10/08/07        |                           |
| SURFACE WATER DEPTH N/A   |                      | DEPTH TO ROCK N/A          |                           |



NCDOT BORE DOUBLE B2965.GPJ NC\_DOT.GDT 11/09/07



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

|   |                     |                            |                           |
|---|---------------------|----------------------------|---------------------------|
| PROJECT NO. 32782.1.1   | ID. B-2965          | COUNTY Edgecombe           | GEOLOGIST Swartley, J. R. |
| SITE DESCRIPTION BRIDGE NO. 24 ON -L- (US 64 BUS.) OVER TAR RIVER |                     |                            | GROUND WTR (ft)           |
| BORING NO. EB2-A  | STATION 42+17       | OFFSET 3ft LT              | ALIGNMENT -L-             |
| COLLAR ELEV. 48.8 ft  | TOTAL DEPTH 60.7 ft | NORTHING 783,642           | EASTING 2,434,499         |
| DRILL MACHINE CME-750   |                     | DRILL METHOD ROTARY W/ MUD |                           |
| START DATE 10/08/07   |                     | COMP. DATE 10/08/07        |                           |
| SURFACE WATER DEPTH N/A   |                     | DEPTH TO ROCK N/A          |                           |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT |       |       | BLOWS PER FOOT |    |    |    |     | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION  | DEPTH (ft) |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|--|------------|
|           |                 |            | 0.5ft      | 0.5ft | 0.5ft | 0              | 25 | 50 | 75 | 100 |           |     |  |            |
| 50        | 48.8            | 0.0        |            |       |       |                |    |    |    |     |           |     | GROUND SURFACE   | 0.0        |
| 45        | 44.8            | 4.0        | 5          | 14    | 8     |                |    |    |    |     |           |     | ARTIFICIAL FILL<br>TAN SAND WITH CONCRETE<br>FRAGMENTS, MOIST                    |            |
| 40        | 38.3            | 10.5       | 5          | 7     | 93    |                |    |    |    |     | SS-34     |     |  |            |
| 35        | 34.8            | 14.0       | 6          | 5     | 4     |                |    |    |    |     |           |     | TAN COARSE SAND, MOIST<br>(UNDIVIDED COASTAL PLAIN)                              | 12.0       |
| 30        | 29.6            | 19.2       | 3          | 5     | 4     |                |    |    |    |     | SS-35     |     | COASTAL PLAIN<br>GRAY SILTY SANDY CLAY, MOIST TO<br>WET<br>(CAPE FEAR FORMATION) | 17.0       |
| 25        | 24.6            | 24.2       | 3          | 9     | 12    |                |    |    |    |     |           |     |  |            |
| 20        | 19.6            | 29.2       | 7          | 12    | 14    |                |    |    |    |     | SS-36     |     | COASTAL PLAIN<br>GRAY MICACEOUS SAND, SATURATED<br>(CAPE FEAR FORMATION)         | 27.0       |
| 15        | 14.6            | 34.2       | 12         | 13    | 34    |                |    |    |    |     | SS-37     |     |  |            |
| 10        | 9.6             | 39.2       | 6          | 11    | 23    |                |    |    |    |     |           |     |  |            |
| 5         | 4.6             | 44.2       | 23         | 41    | 59    |                |    |    |    |     |           |     | COASTAL PLAIN<br>GRAY CLAYEY SAND, SATURATED<br>(CAPE FEAR FORMATION)            | 42.0       |
| 0         | -0.4            | 49.2       | 21         | 21    | 18    |                |    |    |    |     | SS-38     |     |  |            |
| -5        | -5.4            | 54.2       | 13         | 22    | 34    |                |    |    |    |     |           |     | COASTAL PLAIN<br>GRAY MICACEOUS SAND, SATURATED<br>(CAPE FEAR FORMATION)         | 47.0       |
| -10       | -10.4           | 59.2       | 7          | 10    | 14    |                |    |    |    |     | SS-39     |     |  |            |
| -15       |                 |            | 9          | 9     | 12    |                |    |    |    |     |           |     |  |            |
| -20       |                 |            |            |       |       |                |    |    |    |     | SS-40     |     |  |            |
| -25       |                 |            |            |       |       |                |    |    |    |     |           |     |  |            |
| -30       |                 |            |            |       |       |                |    |    |    |     |           |     | Boring Terminated at Elevation -11.9 ft in<br>Medium Dense Sand                  | 60.7       |

NCDOT BORE DOUBLE B2965.GPJ NC\_DOT\_GDT 11/08/07



**32782.1.1 B-2965**  
**Bridge No. 24 on US 264 Bus. over Tar River**

| HOLE # | SAMPLE # | RET 4 | PASS 10 | PASS 40 | PASS 200 | CS SAND | FINESAND | SI   | CL   | LL | PI       | CLASS      | DEPTH     | MOIST. | ORG. |
|--------|----------|-------|---------|---------|----------|---------|----------|------|------|----|----------|------------|-----------|--------|------|
| EB1-A  | SS-1     | -     | 95      | 68      | 36       | 40.7    | 25.4     | 15.7 | 18.3 | 25 | 9        | A-4(0)     | 1.0-1.5   |        |      |
|        | SS-2     | -     | 100     | 100     | 15       | 10.9    | 77.5     | 5.5  | 6.1  | 15 | NP       | A-2-4(0)   | 4.5-6.0   |        |      |
|        | SS-3     | -     | 100     | 100     | 41       | 6.7     | 59.1     | 11.8 | 22.4 | 22 | 6        | A-4(0)     | 9.5-11.0  |        |      |
|        | SS-4     | -     | 99      | 31      | 6        | 81.5    | 13.8     | 2.6  | 2.0  | 19 | NP       | A-1-b(0)   | 19.1-20.6 |        |      |
|        | SS-5     | -     | 92      | 89      | 76       | 4.1     | 22.8     | 44.7 | 28.5 | 41 | 16       | A-7-6(12)  | 24.1-25.6 | 24.8%  |      |
|        | SS-6     | -     | 95      | 92      | 62       | 8.9     | 36.6     | 30.1 | 24.4 | 43 | 22       | A-7-6(11)  | 29.1-30.6 |        |      |
|        | SS-7     | -     | 100     | 62      | 10       | 62.0    | 29.4     | 3.6  | 5.1  | 23 | NP       | A-3(0)     | 34.1-35.6 |        |      |
|        | SS-8     | -     | 100     | 65      | 5        | 85.6    | 10.3     | 3.2  | 1.0  | 23 | NP       | A-3(0)     | 44.1-45.6 |        |      |
|        | SS-9     | -     | 100     | 97      | 76       | 4.1     | 33.5     | 48.2 | 14.2 | 36 | 8        | A-4(6)     | 49.1-50.6 |        |      |
| B1-A   | SS-10    | -     | 83      | 19      | 2        | 89.6    | 9.0      | 0.3  | 1.0  | 25 | NP       | A-1-b(0)   | 1.0-1.5   |        |      |
|        | SS-11    | -     | 100     | 94      | 77       | 13.2    | 13.8     | 26.2 | 46.7 | 42 | 27       | A-7-6(19)  | 5.5-6.0   |        |      |
|        | SS-12    | -     | 99      | 67      | 8        | 71.1    | 22.9     | 1.9  | 4.1  | 15 | NP       | A-3(0)     | 8.8-10.3  |        |      |
|        | SS-13    | -     | 95      | 89      | 48       | 13.0    | 44.5     | 18.1 | 24.4 | 26 | 12       | A-6(2)     | 13.6-15.1 |        |      |
|        | SS-14    | -     | 100     | 59      | 8        | 84.9    | 8.5      | 1.5  | 5.1  | 23 | NP       | A-3(0)     | 18.6-20.1 |        |      |
|        | SS-15    | -     | 100     | 99      | 83       | 2.2     | 22.8     | 46.5 | 28.5 | 39 | 23       | A-6(18)    | 28.6-30.1 | 20.0%  |      |
|        | SS-16    | -     | 100     | 79      | 19       | 58.4    | 24.2     | 6.2  | 11.2 | 21 | NP       | A-2-4(0)   | 38.6-40.1 |        |      |
|        | SS-17    | -     | 100     | 98      | 87       | 4.7     | 11.6     | 47.2 | 36.6 | 53 | 23       | A-7-5(23)  | 43.6-45.1 |        |      |
|        | SS-18    | -     | 100     | 93      | 84       | 10.0    | 8.3      | 16.7 | 65.0 | 54 | 31       | A-7-6(28)  | 53.6-55.1 |        |      |
|        | SS-19    | -     | 100     | 90      | 37       | 42.1    | 22.2     | 7.3  | 28.5 | 24 | 10       | A-4(0)     | 68.6-70.1 |        |      |
| SS-20  | -        | 96    | 46      | 20      | 73.4     | 6.6     | 3.8      | 16.3 | 19   | 6  | A-1-b(0) | 78.6-80.1  |           |        |      |
| B2-A   | SS-22    | -     | 93      | 64      | 20       | 49.3    | 32.5     | 10.1 | 8.1  | 16 | NP       | A-2-4(0)   | 1.0-1.5   |        |      |
|        | SS-23    | -     | 100     | 100     | 92       | 0.6     | 12.6     | 46.2 | 40.6 | 49 | 18       | A-7-5(20)  | 13.8-15.3 |        |      |
|        | SS-24    | -     | 93      | 36      | 3        | 85.2    | 12.7     | 1.1  | 1.0  | 14 | NP       | A-1-b(0)   | 18.8-20.3 |        |      |
|        | SS-25    | -     | 100     | 91      | 54       | 13.8    | 42.2     | 25.7 | 18.3 | 37 | 15       | A-6(5)     | 28.8-30.3 |        |      |
|        | SS-26    | -     | 100     | 78      | 10       | 64.0    | 27.0     | 1.9  | 7.1  | 18 | NP       | A-3(0)     | 33.8-35.3 |        |      |
|        | SS-27    | -     | 100     | 99      | 67       | 2.2     | 42.6     | 38.9 | 16.2 | 28 | 9        | A-4(4)     | 38.8-40.3 |        |      |
|        | SS-28    | -     | 100     | 97      | 57       | 14.2    | 37.0     | 28.5 | 20.3 | 33 | 17       | A-6(7)     | 48.8-50.3 |        |      |
|        | SS-29    | -     | 100     | 99      | 94       | 2.4     | 4.9      | 23.7 | 69.0 | 65 | 41       | A-7-6(44)  | 58.8-60.3 |        |      |
|        | SS-30    | -     | 100     | 95      | 73       | 11.4    | 18.9     | 12.8 | 56.9 | 40 | 17       | A-6(12)    | 68.8-70.3 |        |      |
|        | SS-31    | -     | 100     | 97      | 87       | 6.1     | 10.8     | 32.3 | 50.8 | 50 | 24       | A-7-6(23)  | 78.8-80.3 | 25.6%  |      |
|        | SS-32    | -     | 98      | 67      | 30       | 57.4    | 12.5     | 4.7  | 25.4 | 29 | 16       | A-2-6(1)   | 83.8-85.3 |        |      |
| SS-33  | -        | 75    | 21      | 7       | 82.9     | 8.9     | 2.0      | 6.1  | 18   | 4  | A-1-b(0) | 98.8-100.3 |           |        |      |
| EB2-A  | SS-34    | -     | 95      | 72      | 29       | 38.3    | 37.0     | 13.5 | 11.2 | 18 | 3        | A-2-4(0)   | 4.0-5.2   |        |      |
|        | SS-35    | -     | 96      | 25      | 4        | 89.6    | 7.4      | 0.9  | 2.0  | 14 | NP       | A-1-b(0)   | 14.0-15.5 |        |      |
|        | SS-36    | -     | 100     | 91      | 52       | 24.8    | 30.5     | 26.5 | 18.2 | 30 | 17       | A-6(5)     | 24.2-25.7 | 22.6%  |      |
|        | SS-37    | -     | 100     | 75      | 7        | 66.5    | 28.0     | 3.5  | 2.0  | 20 | NP       | A-3(0)     | 29.2-30.7 |        |      |
|        | SS-38    | -     | 99      | 45      | 19       | 68.2    | 13.5     | 4.1  | 14.1 | 30 | 17       | A-2-6(0)   | 44.2-45.7 |        |      |
|        | SS-39    | -     | 100     | 99      | 16       | 29.1    | 57.7     | 5.1  | 8.1  | 21 | NP       | A-2-4(0)   | 49.2-50.7 |        |      |
|        | SS-40    | -     | 100     | 62      | 6        | 73.4    | 21.1     | 3.5  | 2.0  | 19 | NP       | A-3(0)     | 59.2-60.7 |        |      |



# FIELD SCOUR REPORT

WBS: 32782.1.1 TIP: B-2965 COUNTY: Edgecombe

DESCRIPTION(1): Bridge No. 24 on US 64 Business over the Tar River

### EXISTING BRIDGE

Information from: Field Inspection  Microfilm \_\_\_\_\_ (reel \_\_\_\_\_ pos: \_\_\_\_\_)  
 Other (explain) Bridge Document Management System

Bridge No.: 24 Length: 490 ft. Total Bents: 11 Bents in Channel: 4 Bents in Floodplain: 6  
 Foundation Type: Timber pile footings

#### EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Scour pockets 2 to 4 feet deep around bent 3, 4, 5, 6 and extending 25 feet on the downstream side of the bent

Channel Bed: None

Channel Bank: Erosion due to surface runoff perpendicular to river for approximately 25 feet up the bank just north and south of the existing bridge.

#### EXISTING SCOUR PROTECTION

Type(3): Concrete abutment and wing walls

Extent(4): 20 feet outside edge of bridge

Effectiveness(5): Appears satisfactory

Obstructions(6): None

#### 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 theoretical 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): Coarse sand

Channel Bank Material(8): Sand, silt and clay

Channel Bank Cover(9): Trees and shrubs

Floodplain Width(10): 250 feet if the flood control dike is not breached

Floodplain Cover(11): Trees and shrubs

Stream is(12): Aggrading \_\_\_\_\_ Degrading  Static \_\_\_\_\_

Channel Migration Tendency(13): Very slight chance of migration toward End Bent 2

Observations and Other Comments: River is entrenched

#### DESIGN SCOUR ELEVATIONS(14)

Feet  Meters \_\_\_\_\_

##### BENTS

| B1  | B2 |  |  |  |  |  |  |  |  |  |  |
|-----|----|--|--|--|--|--|--|--|--|--|--|
| 0.3 | 19 |  |  |  |  |  |  |  |  |  |  |
|     |    |  |  |  |  |  |  |  |  |  |  |
|     |    |  |  |  |  |  |  |  |  |  |  |
|     |    |  |  |  |  |  |  |  |  |  |  |
|     |    |  |  |  |  |  |  |  |  |  |  |

Comparison of DSE to Hydraulics Unit theoretical scour:

Design Scour Elevation agrees with the Hydraulic Unit's 100year scour elevation at Bent 1 and Bent 2.

#### SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

|             |  |  |  |  |  |  |  |  |  |  |
|-------------|--|--|--|--|--|--|--|--|--|--|
| Sample No.  |  |  |  |  |  |  |  |  |  |  |
| Retained #4 |  |  |  |  |  |  |  |  |  |  |
| Passed #10  |  |  |  |  |  |  |  |  |  |  |
| Passed #40  |  |  |  |  |  |  |  |  |  |  |
| Passed #200 |  |  |  |  |  |  |  |  |  |  |
| Coarse Sand |  |  |  |  |  |  |  |  |  |  |
| Fine Sand   |  |  |  |  |  |  |  |  |  |  |
| Silt        |  |  |  |  |  |  |  |  |  |  |
| Clay        |  |  |  |  |  |  |  |  |  |  |
| LL          |  |  |  |  |  |  |  |  |  |  |
| PI          |  |  |  |  |  |  |  |  |  |  |
| AASHTO      |  |  |  |  |  |  |  |  |  |  |
| Station     |  |  |  |  |  |  |  |  |  |  |
| Offset      |  |  |  |  |  |  |  |  |  |  |
| Depth       |  |  |  |  |  |  |  |  |  |  |

See Sheet 9,  
 "Soil Test Results",  
 for samples:  
 Channel Bank: SS-1,2,3,22,23  
 Channel Bed: SS-10

Reported by: Dean N. Algenbright  
 Dean N. Algenbright

Date: 11/6/2007

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | 32782.1.1 B-2965            | 1         | 5            |

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

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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 32782.1.1 (B-2965) F.A. PROJ. BRSTP-064B(2)  
COUNTY EDGEcombe  
PROJECT DESCRIPTION BRIDGE NO. 24 OVER THE TAR RIVER  
ON US 64 BUSINESS /NC 33 (MAIN ST.) FROM US 258 /  
NC 111-122 (MUTUAL BLVD) TO SR 1308 (ALBEMARLE AVE)  
SITE DESCRIPTION RETAINING WALL LOCATED 33.8 TO 44.71 FEET  
LEFT OF -L- STA. 28+00

**CAUTION NOTICE**

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

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

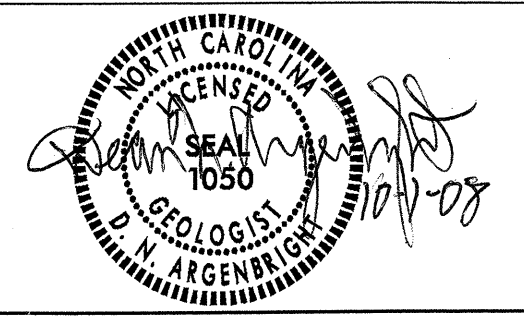
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

**PROJECT: 32782.1.1 ID: B-2965**

**PERSONNEL**

R.E. SMITH  
J. M. EDMONDSON  
F. M. WESCOTT III

INVESTIGATED BY F.M. WESCOTT III  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE OCTOBER, 2008



DRAWN BY: C.P. TURNER

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.

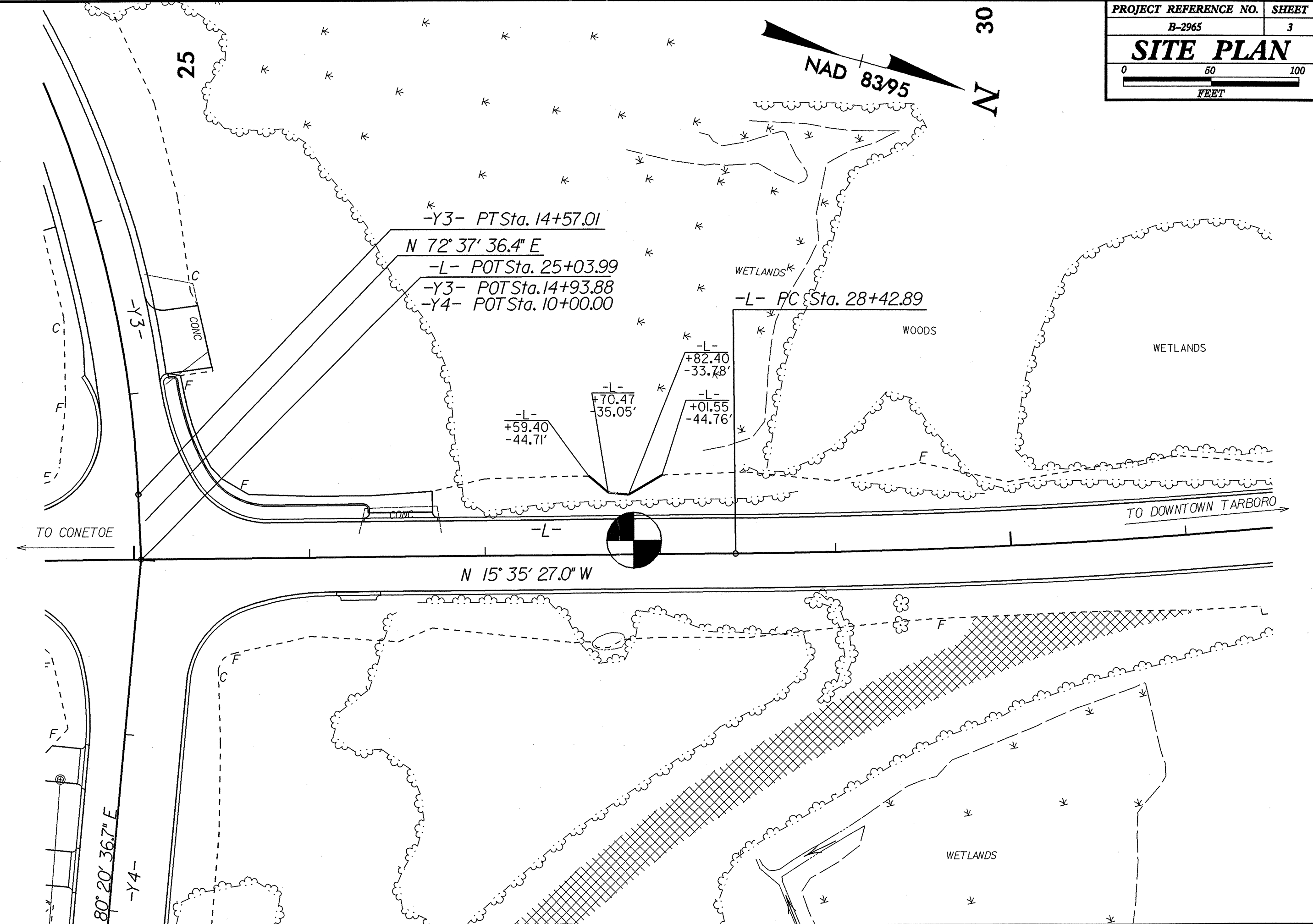
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

PROJECT REFERENCE NO. B-2965  
 SHEET NO. 2 OF 6

**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 (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:<br><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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)<br>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.<br><br>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. |  | 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.<br>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:<br><br>WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.<br><br>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.<br><br>NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.<br><br>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.  |  | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.<br>AQUIFER - A WATER BEARING FORMATION OR STRATA.<br>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.<br>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.<br>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.<br>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.<br>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.<br>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.<br>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.<br>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.<br>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.<br>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.<br>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.<br>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.<br>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.<br>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.<br>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.<br>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.<br>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.<br>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.<br>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.<br>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.<br>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.<br>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.<br>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.<br>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.<br>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.<br>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.<br>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.<br>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) ORGANIC MATERIALS  |  | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.  |  | FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.<br><br>VERY SLIGHT (V SLJ) 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.<br><br>SLIGHT (SLJ) 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.<br><br>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.<br><br>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.<br><br>SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.<br><br>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.<br><br>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. |  | COMPRESSIBILITY<br>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31<br>MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50<br>HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50   |  | FRESH<br>VERY SLIGHT (V SLJ)<br>SLIGHT (SLJ)<br>MODERATE (MOD.)<br>MODERATELY SEVERE (MOD. SEV.)<br>SEVERE (SEV.)<br>VERY SEVERE (V SEV.)<br>COMPLETE |  |  |  |
| PERCENTAGE OF MATERIAL  |  | GROUND WATER   |  | ROCK HARDNESS  |  |   |  |   |  |  |  |
| ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL<br>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%<br>LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%<br>MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%<br>HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE   |  | WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING<br>STATIC WATER LEVEL AFTER 24 HOURS<br>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA<br>SPRING OR SEEP   |  | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.<br><br>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.<br><br>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.<br><br>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.<br><br>SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.<br><br>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.   |  |   |  |   |  |  |  |
| CONSISTENCY OR DENSENESS  |  | MISCELLANEOUS SYMBOLS  |  | ABBREVIATIONS  |  |   |  |   |  |  |  |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )  |  | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION<br>SOIL SYMBOL<br>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT<br>INFERRED SOIL BOUNDARY<br>INFERRED ROCK LINE<br>ALLUVIAL SOIL BOUNDARY<br>DIP & DIP DIRECTION OF ROCK STRUCTURES<br>SOUNDING ROD   |  | SPT DPT DMT TEST BORING<br>AUGER BORING<br>CORE BORING<br>MONITORING WELL<br>PIEZOMETER INSTALLATION<br>SLOPE INDICATOR INSTALLATION<br>SPT N-VALUE<br>SPT REFUSAL   |  | AR - AUGER REFUSAL<br>BT - BORING TERMINATED<br>CL - CLAY<br>CPT - CONE PENETRATION TEST<br>CSE - COARSE<br>DMT - DILATOMETER TEST<br>DPT - DYNAMIC PENETRATION TEST<br>e - VOID RATIO<br>F - FINE<br>FOSS - FOSSILIFEROUS<br>FRAC - FRACTURED, FRACTURES<br>FRAGS - FRAGMENTS<br><br>HL - HIGHLY<br>MED. - MEDIUM<br>MICA - MICACEOUS<br>MOD. - MODERATELY<br>NP - NON PLASTIC<br>ORG. - ORGANIC<br>PMT - PRESSUREMETER TEST<br>SAP. - SAPROLITIC<br>SD. - SAND, SANDY<br>SL. - SILT, SILTY<br>SLJ. - SLIGHTLY<br>TCR - TRICONE REFUSAL<br><br>w - MOISTURE CONTENT<br>v - VERY<br>VST - VANE SHEAR TEST<br>WEA. - WEATHERED<br>W - UNIT WEIGHT<br>W <sub>d</sub> - DRY UNIT WEIGHT  |  |   |  |  |  |
| TEXTURE OR GRAIN SIZE   |  | EQUIPMENT USED ON SUBJECT PROJECT  |  | FRACTURE SPACING   |  | BEDDING   |  |   |  |  |  |
| U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270<br>4.75 2.00 0.42 0.25 0.075 0.053   |  | DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-45B  |  | ADVANCING TOOLS: CLAY BITS 6' CONTINUOUS FLIGHT AUGER 8' HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 15/16 STEEL TEETH TRICONE * TUNG-CARB. CORE BIT  |  | TERM SPACING MORE THAN 10 FEET 3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FEET LESS THAN 0.16 FEET  |  | TERM THICKNESS > 4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET 0.03 - 0.16 FEET 0.008 - 0.03 FEET < 0.008 FEET  |  |  |  |
| SOIL MOISTURE - CORRELATION OF TERMS  |  | HAMMER TYPE:   |  | INDURATION   |  | BENCH MARK:   |  |   |  |  |  |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION  |  | X AUTOMATIC MANUAL   |  | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.<br><br>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.<br><br>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.<br><br>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.<br><br>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.   |  | ELEVATION: FT.  |  |   |  |  |  |
| LL LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE<br>- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE<br>- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE<br>- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE   |  | CORE SIZE: -B -N -H<br>HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST  |  | INDURATION   |  | NOTES:  |  |   |  |  |  |
| PLASTICITY  |  | COLOR  |  |  |  |   |  |   |  |  |  |
| NONPLASTIC 0-5 VERY LOW<br>LOW PLASTICITY 6-15 SLIGHT<br>MED. PLASTICITY 16-25 MEDIUM<br>HIGH PLASTICITY 26 OR MORE HIGH  |  | 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.   |  |  |  |   |  |   |  |  |  |



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cshurter AT 11/18/2004

# HEAD WALL PROFILE THROUGH BORING PROJECTED ALONG HEADWALL

|  |                     |
|--|---------------------|
| PROJECT REFERENCE NO.<br>B-2965  | SHEET NO.<br>4      |
| ROADWAY DESIGN ENGINEER  | HYDRAULICS ENGINEER |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR ACQUISITION<br><b>PRELIMINARY PLANS</b><br>DO NOT USE FOR CONSTRUCTION |                     |

VE = 0.5

40

30

20

10

26+50

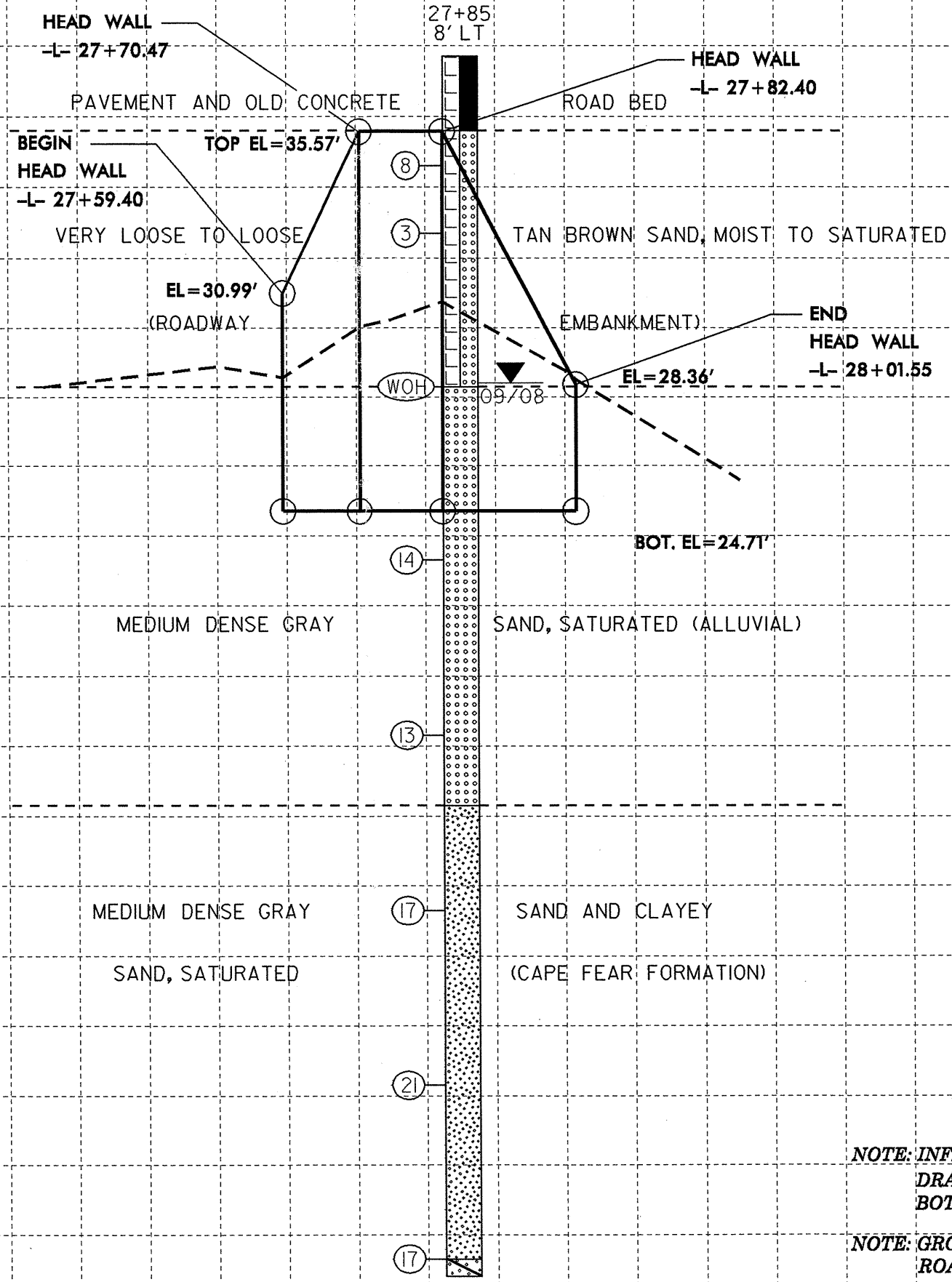
27+00

27+50

28+00

28+50

29+00



NOTE: INFERRED STRATIGRAPHY  
 DRAWN THROUGH BORINGS AND  
 BOTH ARE PROJECTED ON TO PROFILE

NOTE: GROUND LINE PROFILE DERIVED FROM  
 ROADWAY DESIGN FILE DATED 9/308



**B-2965**  
**SOILS TEST RESULTS**

| HOLE # | SAMPLE # | PASS 10 | PASS 40 | PASS 200 | CSESAND | FINESAND | SI   | CL   | LL | PI | CLASS    | DEPTH     | MOIST. | ORG. |
|--------|----------|---------|---------|----------|---------|----------|------|------|----|----|----------|-----------|--------|------|
| 27+85  | SS-1     | 98      | 83      | 9        | 43.1    | 49.9     | 3.0  | 4.0  | 12 | NP | A-3(0)   | 2.1-3.6   |        |      |
| 8' LT  | SS-2     | 96      | 58      | 11       | 60.7    | 29.7     | 5.6  | 4.0  | 17 | NP | A-2-4(0) | 13.4-14.9 |        |      |
|        | SS-3     | 99      | 71      | 12       | 67.3    | 22.6     | 8.1  | 2.0  | 21 | NP | A-2-4(0) | 23.4-24.9 |        |      |
|        | SS-4     | 61      | 38      | 22       | 49.0    | 18.6     | 14.3 | 18.0 | 32 | 11 | A-2-6(0) | 34.4-34.9 |        |      |