

PROJECT: 33323.1.1 ID: B-3881

# STATE OF NORTH CAROLINA

## DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

### GEOTECHNICAL ENGINEERING UNIT

# STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33323.1.1 I.D. NO. B-3881  
 F.A. PROJECT BRSTP-117(9)  
 COUNTY NEW HANOVER  
 PROJECT DESCRIPTION BRIDGE #26 OVER  
CSXT ON US 117-NC 133  
(CORNELIUS HARNETT DRIVE)  
 SITE DESCRIPTION \_\_\_\_\_

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3881	1	22
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33323.1.1	BRSTP-117(9)	P.E. CONST.	

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### CAUTION NOTICE

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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.

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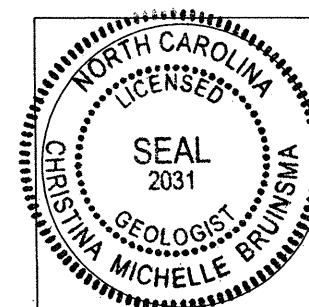
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INVESTIGATED BY C. BRUINSMA PERSONNEL P. ZHANG  
 CHECKED BY G. LANG, P.E. C. BRUINSMA  
 SUBMITTED BY TIERRA  
 DATE MAY, 2008

DRAWN BY: J. HAMM, C. BRUINSMA

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



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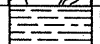
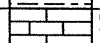
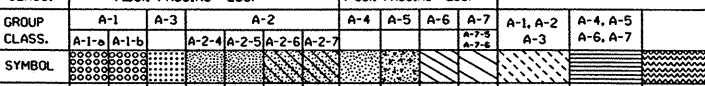














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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

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**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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE WASHO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, WASHO 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, HIGHLY 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. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: <b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. <b>CRYSTALLINE ROCK (CR)</b>  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. <b>NON-CRYSTALLINE ROCK (ICR)</b>  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE OF COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. <b>COASTAL PLAIN SEDIMENTARY ROCK (CPI)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	<b>ALLUVIUM (ALLUV.)</b> - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (F.P.)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOTT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (R.Q.D.)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR B.P.F. 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)</b> - 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. <b>TOPSOIL (T.S.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> GENERAL CLASS. GRANULAR MATERIALS (55% PASSING #200) SILT-CLAY MATERIALS (35% PASSING #200) ORGANIC MATERIALS 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 SYMBOL  % PASSING: 10, 40, 200 LIQUID LIMIT PLASTIC INDEX GROUP INDEX USUAL TYPES OF MAJOR MATERIALS: STONE FRAGS, GRAVEL AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND, SILTY SOILS, CLAYEY SOILS GEN. RATING AS A SUBGRADE: EXCELLENT TO GOOD, FAIR TO POOR, FAIR TO POOR, POOR, UNSUITABLE P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30	<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. <b>COMPRESSIBILITY</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 <b>PERCENTAGE OF MATERIAL</b> 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	<b>WEATHERING</b> FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V. SLT.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLT.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> 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>GROUND WATER</b>  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.  STATIC WATER LEVEL AFTER 24 HOURS.  PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA  SPRING OR SEEPAGE
<b>CONSISTENCY OR DENSENESS</b> PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) 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 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4	<b>MISCELLANEOUS SYMBOLS</b>  ROADWAY EMBANKMENT WITH SOIL DESCRIPTION  SOIL SYMBOL  ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS  INFERRED SOIL BOUNDARIES  INFERRED ROCK LINE  ALLUVIAL SOIL BOUNDARY  DIP/DIP DIRECTION OF ROCK STRUCTURES  SOUNDING ROD  SPT N-VALUE  SPT REFUSAL	<b>ROCK HARDNESS</b> 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 GROUDED OR GOUGED 0.85 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUDED 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.	<b>ABBREVIATIONS</b> AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE C.T. - CORING TERMINATED DHT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED FRAGS. - FRAGMENTS MED. - MEDIUM PMT - PRESSUREMETER TEST REF. - REFUSAL SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL γ <sub>u</sub> - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST
<b>TEXTURE OR GRAIN SIZE</b> U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.0 0.42 0.25 0.075 0.053 BOULDER (BLR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CS. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12" 3" 0.075 0.01 0.002 0.0002	<b>EQUIPMENT USED ON SUBJECT PROJECT</b> DRILL UNITS: <input type="checkbox"/> MOBILE B-___ <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45 <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> OTHER 0-25 <input type="checkbox"/> OTHER ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG.-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 3" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG.-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> OTHER HAMMER TYPE: <input type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> B-___ <input type="checkbox"/> N-Q-___ <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 <input type="checkbox"/> OTHER	<b>FRACATURE SPACING</b> 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 <b>BEDDING</b> 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	<b>INDURATION</b> 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.
<b>SOIL MOISTURE - CORRELATION OF TERMS</b> 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	<b>PLASTICITY</b> PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	<b>COLOR</b> DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL.-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	<b>NOTES:</b> HP: HIGHLY PLASTIC CLAY PI: REFERS TO PLASTICITY INDEX OF SOILS OCC: OCCASIONAL, OCCURRING IN LOW PERCENTAGE; RANDOMLY WITHIN SAMPLE BENCH MARK: BL 101, STATION 26+92.69, 39.48' LT ELEVATION: 44.76'

STATE PROJECT NO.: 33323.1.1

LD. NO.: B-3881

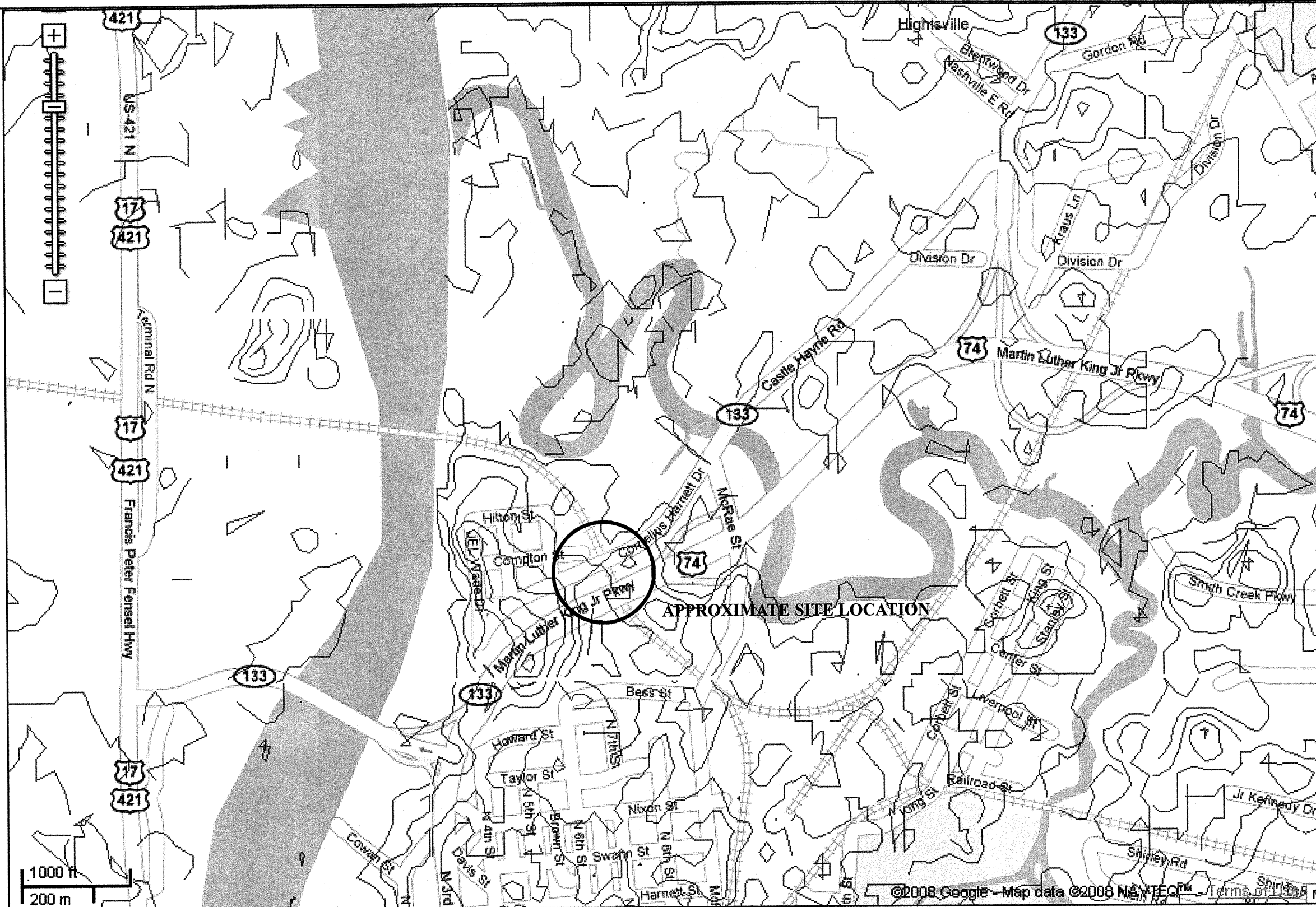
COUNTY: New Hanover

PROJECT DESCRIPTION: BRIDGE NO. 26 OVER CSXT ON US 117-NC133  
(CORNELIUS HARNETT DRIVE)

NOTES TO DESIGNER

Based on our field exploration the following conditions may impact design and construction of the proposed structures. Therefore the designer should be aware of the following subsurface conditions:

- Highly plastic alluvial clay exists beneath EB2 from elevation 15.2 to 12.1 feet.
  - EB2-A; 7.5 – 8.8'
  - EB2-B; 5.5 – 8.0' (PI=32)
- Soft to med. stiff alluvial soils were encountered beneath EB1 from elevation 16.3 to 4.8 feet, and EB2 from elevation 15.2 to 12.1 feet. These soft clays and silts may exhibit settlement.
  - EB1-A; 6.5 – 8.0' and 12.0 – 18.0'
  - EB1-B; 8.0 – 12.0'
  - EB2-A; 7.5 – 8.8'
  - EB2-B; 5.5 – 8.0'
- Hard drilling was encountered when drilling through cemented sands in all borings and may cause difficulty during pile driving operations. Cemented layers ranged from 0.1 to 2 feet thick, and began at depths of 22.5 to 25.2 feet at EB1, and 16.0 to 17.4 feet at EB2.
- A pile of railroad cross ties and debris has been placed up station of EB1 and Wall 1, west of the tracks. Removal of this large pile will be necessary during construction.
- Shallow groundwater was encountered along EB1 and Wall 1 (west) at elevations of approximately 20.5 to 20.3 feet and ranging in depths from 2.5 to 3.4 feet below existing ground surface.

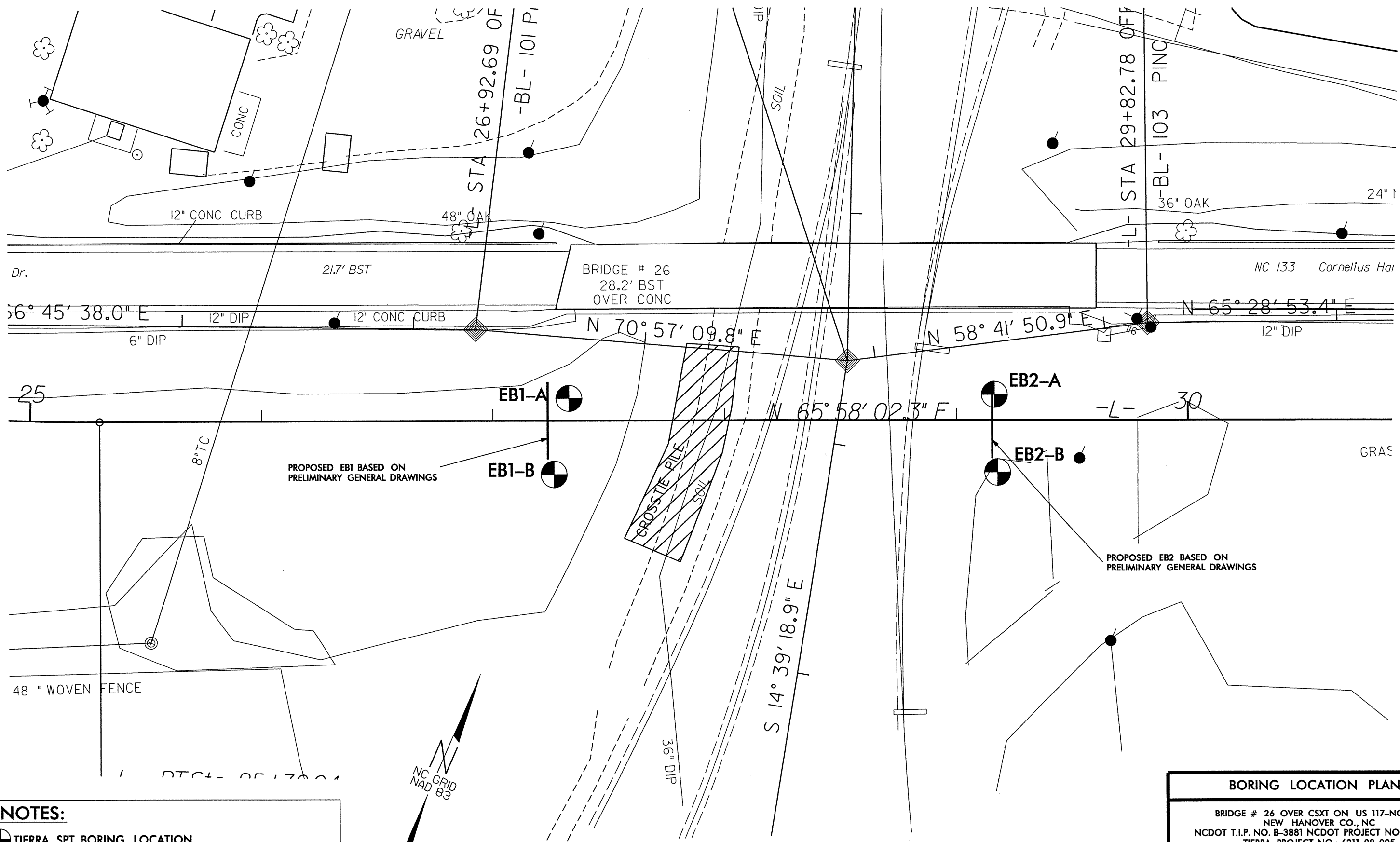


**SITE VICINITY MAP**

**BRIDGE #26 OVER CSXT ON US 117-NC 133  
(CORNELIUS HARNETT DRIVE)  
NEW HANOVER COUNTY, NORTH CAROLINA  
TIP NO: B-3881, STATE PROJECT NO: 33323.1.1**



TIERRA  
2736 ROWLAND RD.  
RALEIGH, NC 27615  
PHONE (919) 871-0800  
FAX (919) 871-0803

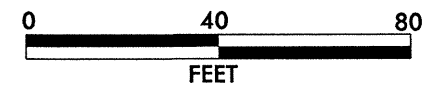


**NOTES:**

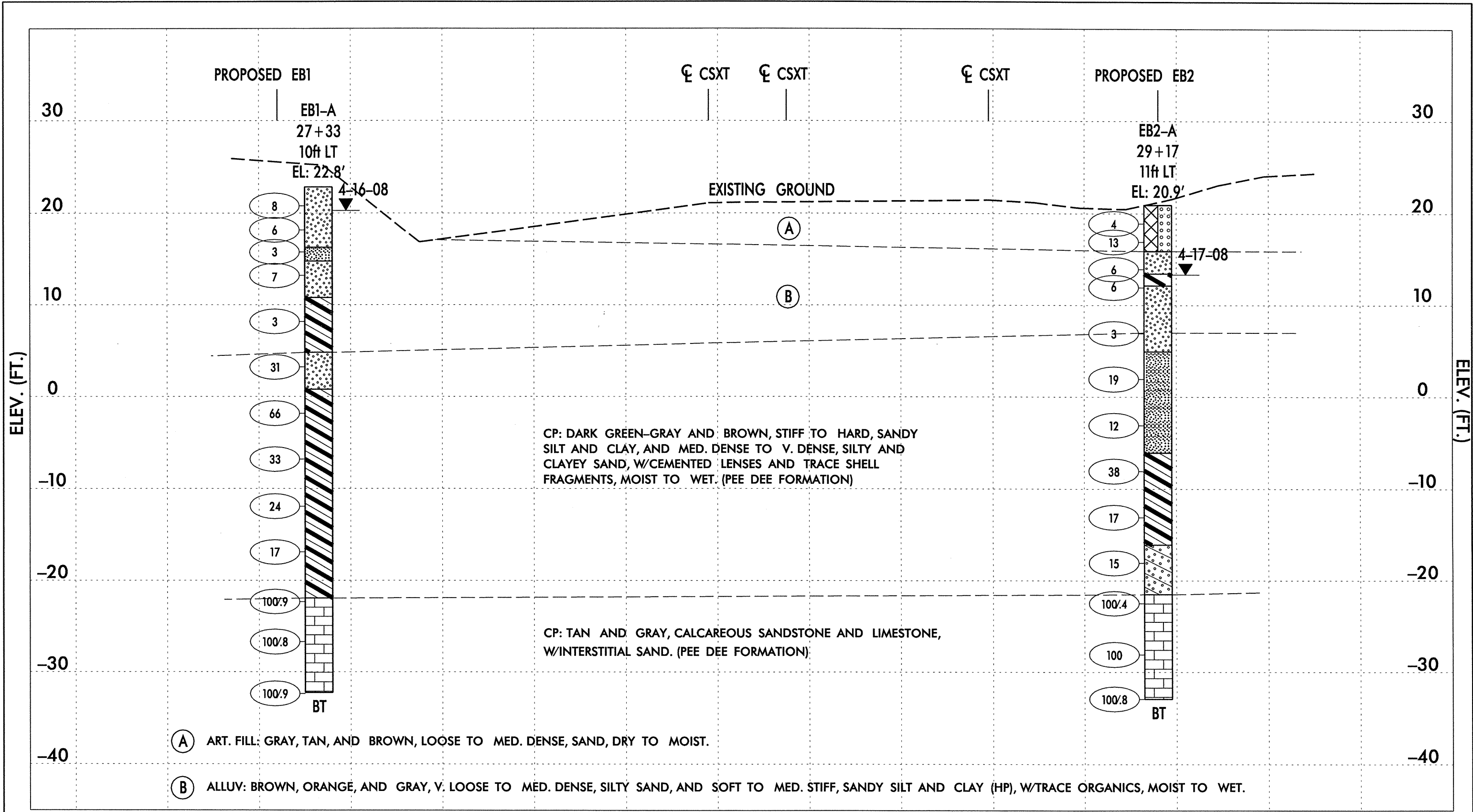
TIERRA SPT BORING LOCATION

BENCHMARK: BL 101, STA 26+92.69, 39.48' LT. ELEV. 44.76 FT.

PLANS ADOPTED FROM ELECTRONIC FILES  
RECEIVED FROM NCDOT, JANUARY, 2008.



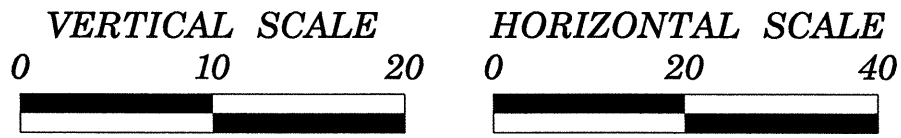
<b>BORING LOCATION PLAN</b>	
BRIDGE # 26 OVER CSXT ON US 117-NC 133 NEW HANOVER CO., NC NCDOT T.I.P. NO. B-3881 NCDOT PROJECT NO: 33323.1.1 TIERRA PROJECT NO.: 6211-08-005	
	TIERRA 2736 ROWLAND RD. RALEIGH, NC 27605 PHONE 919-871-0000 FAX 919-871-0003



- (A) ART. FILL: GRAY, TAN, AND BROWN, LOOSE TO MED. DENSE, SAND, DRY TO MOIST.
- (B) ALLUV: BROWN, ORANGE, AND GRAY, V. LOOSE TO MED. DENSE, SILTY SAND, AND SOFT TO MED. STIFF, SANDY SILT AND CLAY (HP), W/TRACE ORGANICS, MOIST TO WET.

**NOTES:**

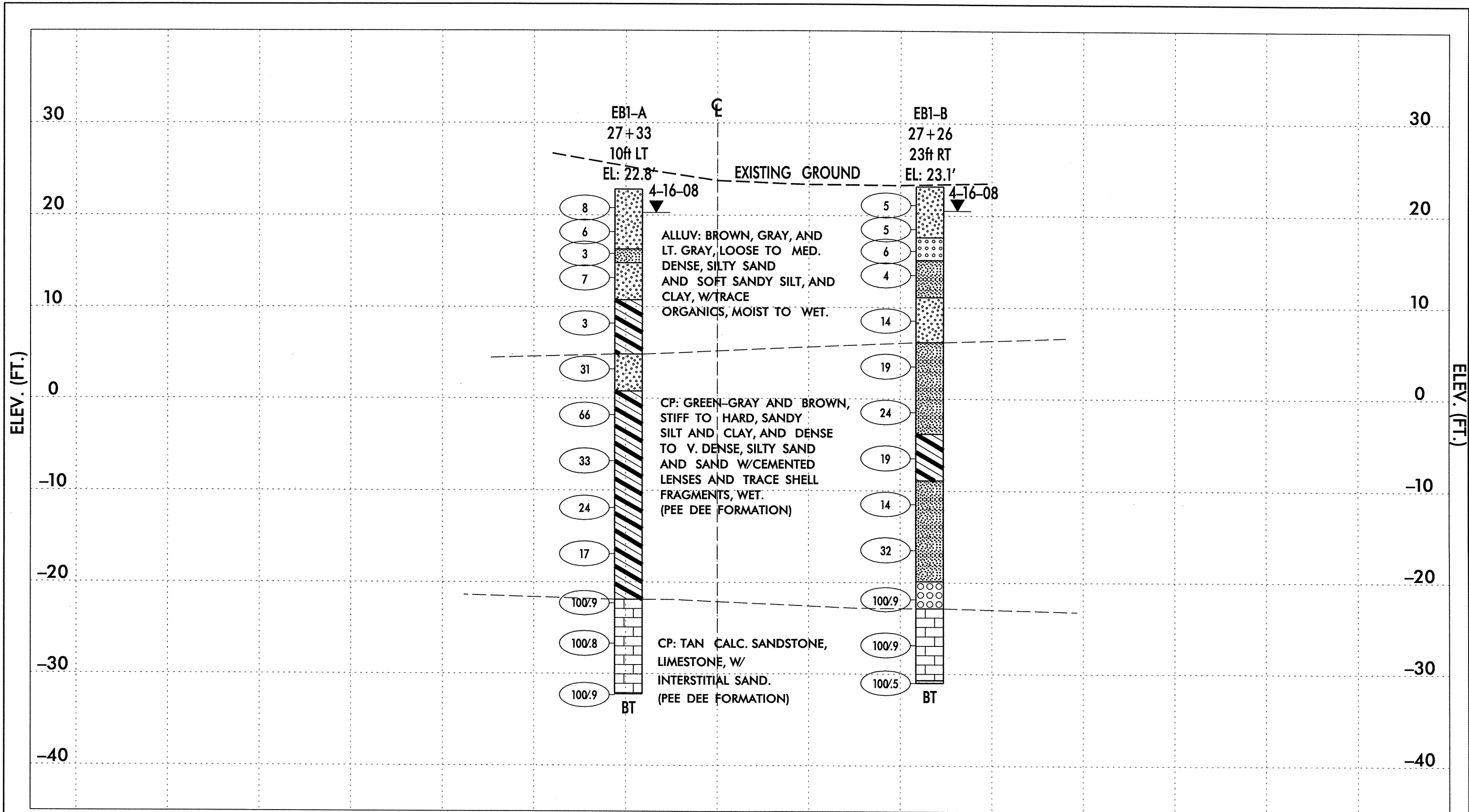
- GROUNDLINE PROFILE SURVEYED BY TIERRA AT  $\phi$  OF -L- ON 4-23-03.
- ELEVATIONS BASED ON SURVEY FROM BENCHMARK BL-101: STA. 26+92.69, 39.48' LT, ELEV. 44.76'



PROFILE ALONG -L- CENTER LINE

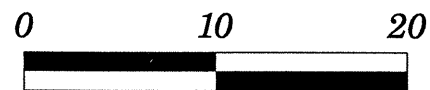
BRIDGE #26 OVER CSXT ON US 117-NC133  
NEW HANOVER CO., NC  
NCDOT T.J.P. NO. B-388 I NCDOT PROJECT NO. 33323.1.1  
TIERRA PROJECT NO. 6211-08-005

**TIERRA**  
2736 ROWLAND RD.  
RALEIGH, NC 27605  
PHONE 919 871-0800  
FAX 919 871-0803



**NOTES:**

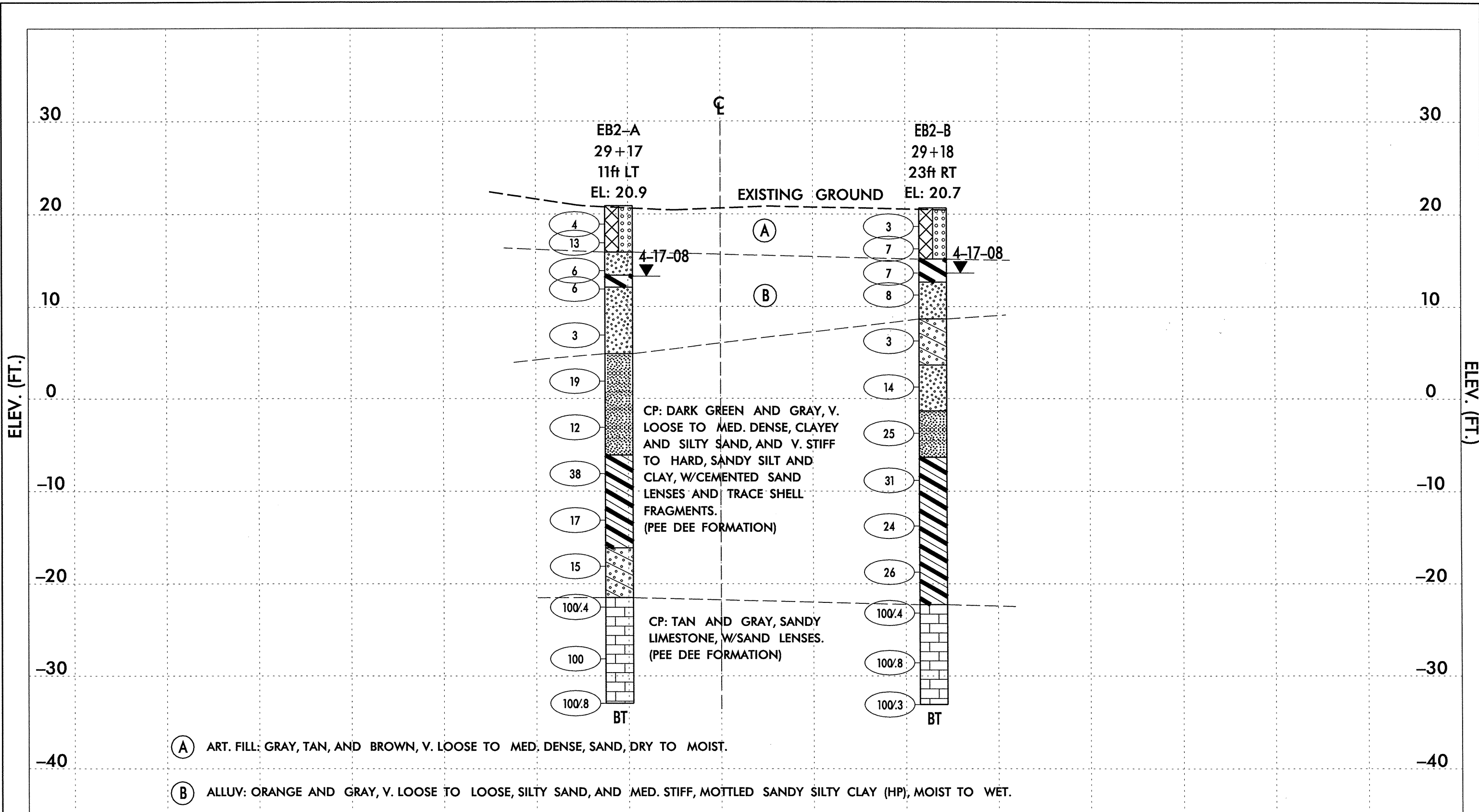
- GROUNDLINE SURVEYED BY TIERRA ON 4-23-08.
- ELEVATIONS BASED ON SURVEY FROM BENCHMARK BL-101: STA. 26+92.69, 39.48' LT, ELEV. 44.76'



**CROSS SECTION END BENT 1**

BRIDGE #26 OVER CSXT ON US 117-NC133  
 NEW HANOVER CO., NC  
 NCDOT T.L.P. NO. B-388 | NCDOT PROJECT NO. 33323.1.1  
 TIERRA PROJECT NO. 6211-08-005

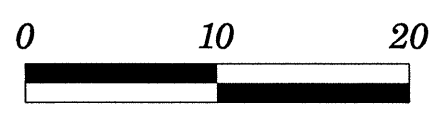




- (A) ART. FILL: GRAY, TAN, AND BROWN, V. LOOSE TO MED. DENSE, SAND, DRY TO MOIST.
- (B) ALLUV: ORANGE AND GRAY, V. LOOSE TO LOOSE, SILTY SAND, AND MED. STIFF, MOTTLED SANDY SILTY CLAY (HP), MOIST TO WET.

**NOTES:**

- GROUNDLINE SURVEYED BY TIERRA ON 4-23-08.
- ELEVATIONS BASED ON SURVEY FROM BENCHMARK BL-101: STA. 26+92.69, 39.48' LT, ELEV. 44.76'



**CROSS SECTION END BENT 2**

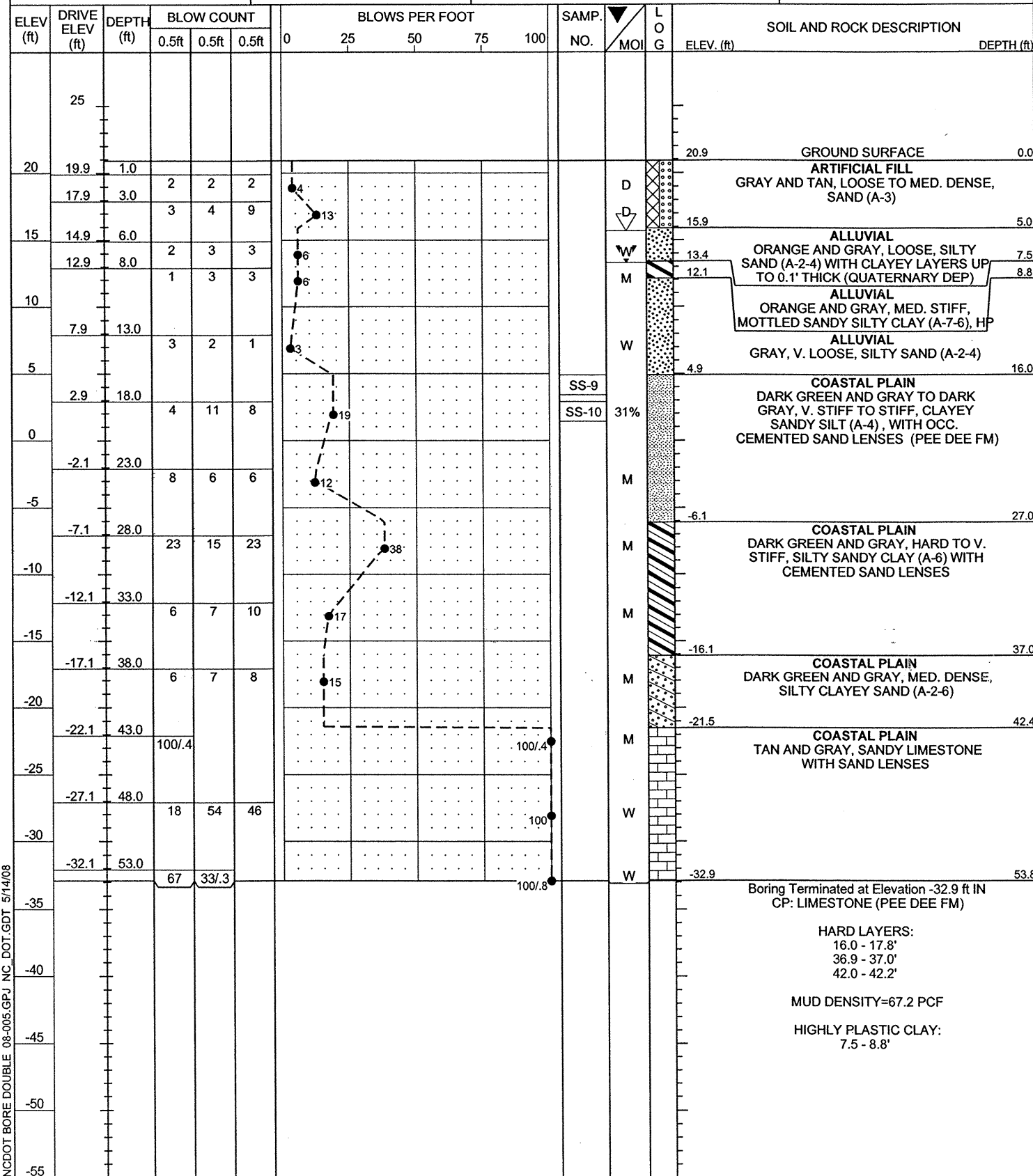
BRIDGE #26 OVER CSXT ON US 117-NC133  
NEW HANOVER CO., NC  
NCDOT T.L.P. NO. B-3881 NCDOT PROJECT NO. 33323.1.1  
TIERRA PROJECT NO. 6211-08-005

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RALEIGH, NC 27605  
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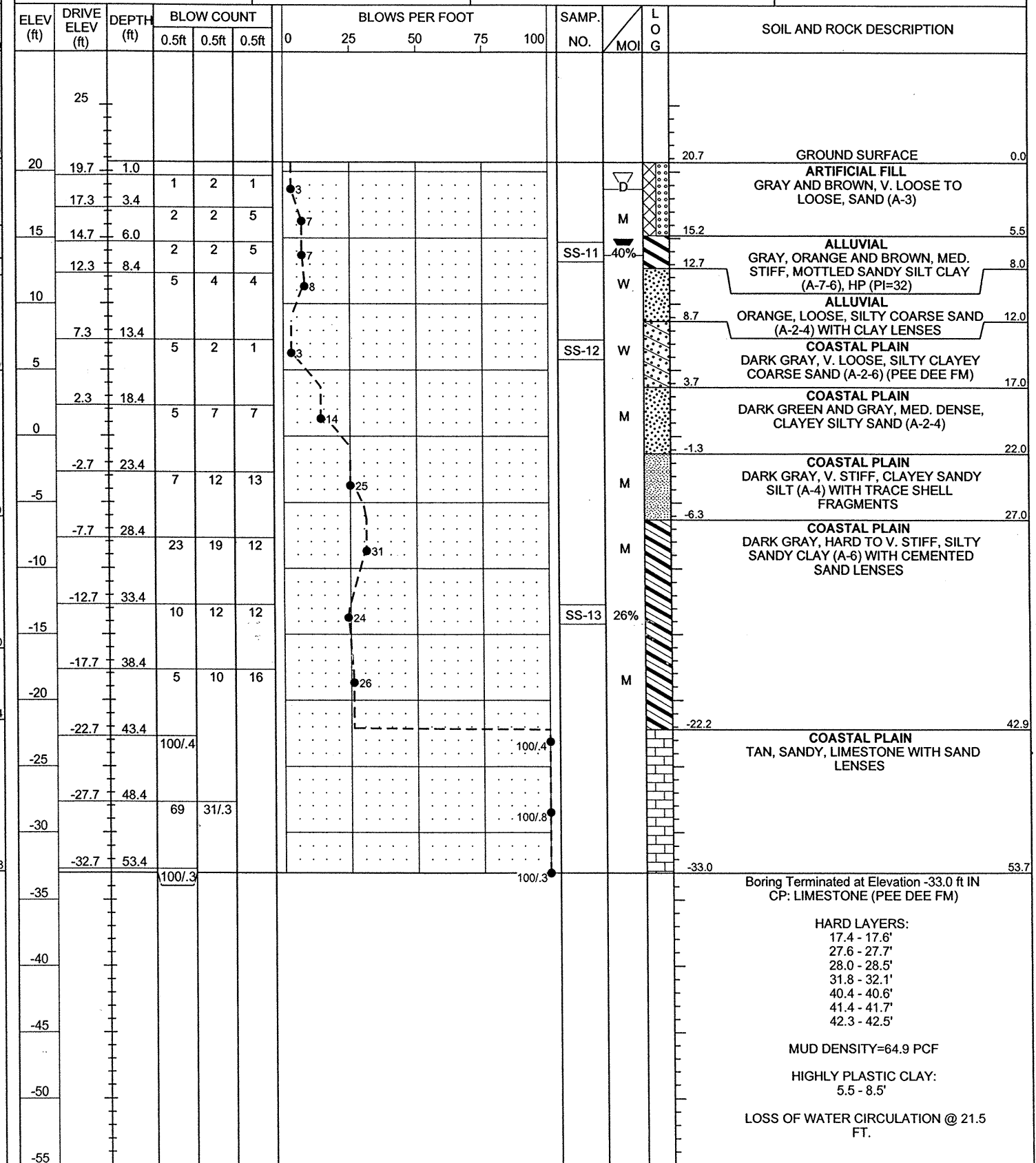




PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 29+17	OFFSET 11ft LT	ALIGNMENT -L-
COLLAR ELEV. 20.9 ft	TOTAL DEPTH 53.8 ft	NORTHING 185,696	EASTING 2,319,533
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/16/08	COMP. DATE 04/16/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 42.4 ft



PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 29+18	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 20.7 ft	TOTAL DEPTH 53.7 ft	NORTHING 185,666	EASTING 2,319,548
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/16/08	COMP. DATE 04/16/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 42.9 ft



NCDOT BORE DOUBLE 08-005.GPJ NC\_DOT.GDT 5/14/08

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 26 OVER CSXT ON US 117-NC133 (CORNELIUS HARNETT DRIVE)

NCDOT Project No: 33323.1.1 - T.I.P. No: B-3881

NEW HANOVER COUNTY, NORTH CAROLINA

TIERRA PROJECT NO: 6211-08-005

BORING #			SAMPLE #			TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limits		Moisture Content	Organic Content
AASHTO Classification			PERCENT PASSING			PERCENT RETAINED										
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PI	%	%			
EB1-A SS-1			98	92	20	18	63	7	12	13	NP	-	-			
A-2-4																
27+33	10' LT	1.0-2.5														
EB1-A SS-2			99	89	66	13	30	35	22	22	7	20.8	-			
A-4																
27+33	10' LT	6.0-7.5														
EB1-A SS-3			-	-	-	-	-	-	-	-	-	33.9	4.8			
A-6																
27+33	10' LT	13.6-15.1														
EB1-A SS-4			95	92	48	7	46	20	27	31	14	24.3	-			
A-6																
27+33	10' LT	33.6-35.1														
EB1-A SS-5			91	86	47	24	28	12	36	36	21	39.5	-			
A-6																
27+33	10' LT	43.7-45.2														
EB1-B SS-6			99	89	68	12	31	39	18	24	4	21.9	-			
A-4																
27+26	23' RT	8.6-10.1														
EB1-B SS-7			79	72	54	16	23	50	11	20	NP	15.8	-			
A-4																
27+26	23' RT	18.6-20.1														
EB1-B SS-8			94	88	39	12	48	18	22	25	9	23.5	-			
A-4																
27+26	23' RT	38.6-40.1														
EB2-A SS-9			100	98	33	3	74	11	12	20	NP	-	-			
A-2-4																
29+17	11' LT	18.0-19.5														
EB2-A SS-10			100	99	45	2	64	14	20	26	6	-	-			
A-4																
29+17	11' LT	23.0-24.5														

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 26 OVER CSXT ON US 117-NC133 (CORNELIUS HARNETT DRIVE)

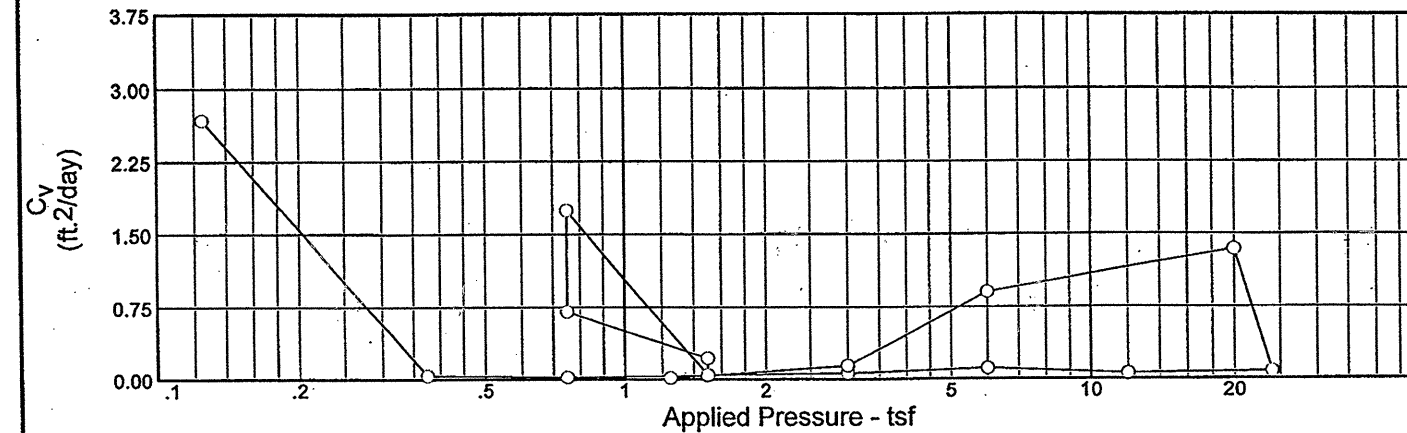
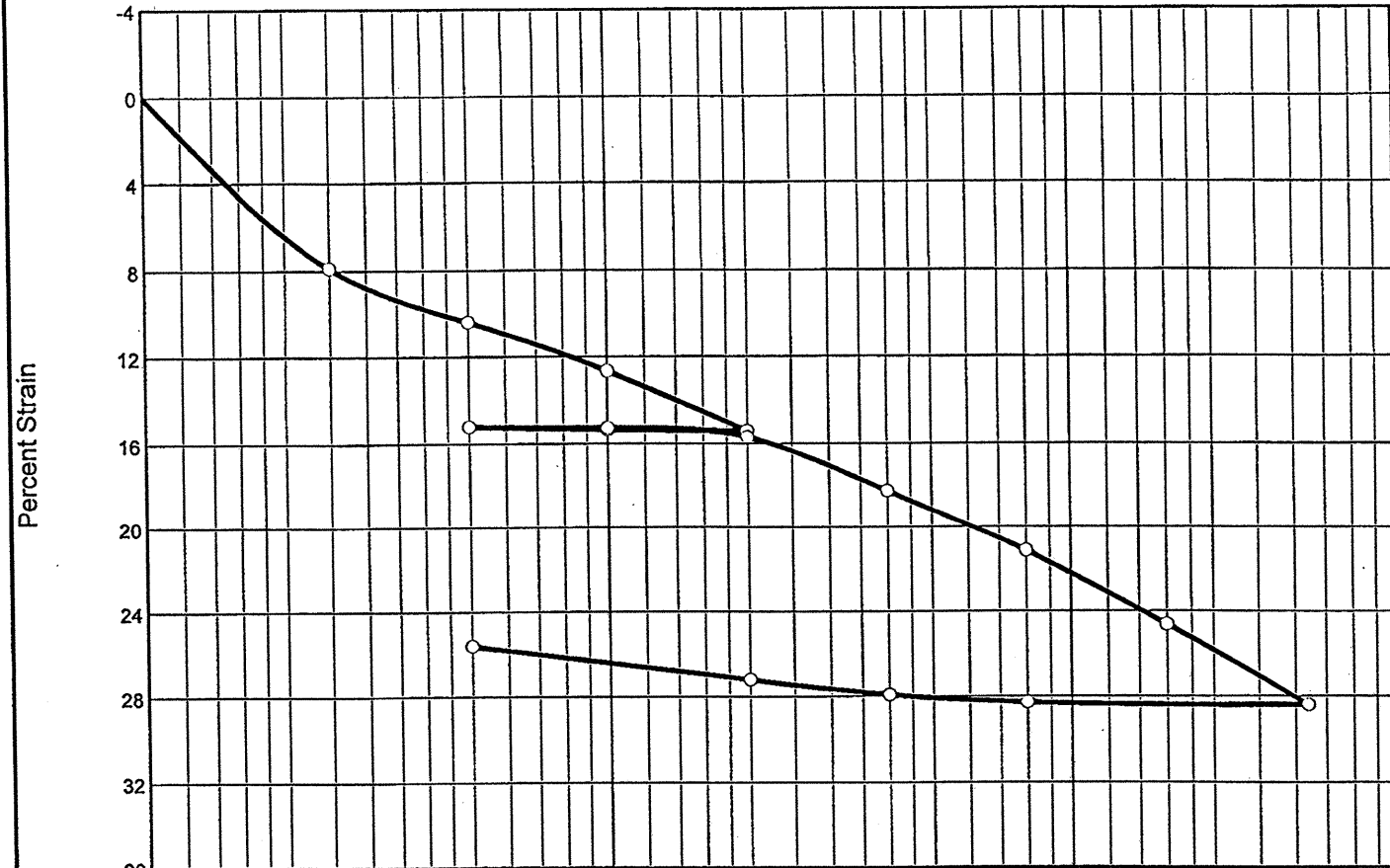
NCDOT Project No: 33323.1.1 - T.I.P. No: B-3881

NEW HANOVER COUNTY, NORTH CAROLINA

TIERRA PROJECT NO: 6211-08-005

BORING #			SAMPLE #			TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limits		Moisture Content	Organic Content
AASHTO Classification			PERCENT PASSING			PERCENT RETAINED										
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PI	%	%			
EB2-B SS-11			100	95	70	7	27	21	45	50	32	39.9	-			
A-7-6																
29+18	23' RT	6.0-7.5														
EB2-B SS-12			97	64	27	58	14	10	18	28	14	-	-			
A-2-6																
29+18	23' RT	13.4-14.9														
EB2-B SS-13			99	97	49	7	47	18	28	32	14	26.2	-			
A-6																
29+18	23' RT	33.4-34.9														
EB1-A ST-1			100	92	72	4	25	23	48	28	13	45.0	-			
A-6																
27+33	10' LT	13.9-15.9														

# CONSOLIDATION TEST REPORT



Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	P <sub>c</sub> (tsf)	C <sub>c</sub>	Initial Void Ratio
Saturation	Moisture	62.9	28	13	2.700	2.42	0.981
103.2 %	37.5 %						

MATERIAL DESCRIPTION						USCS	AASHTO
Gray Lean CLAY with sand						CL	A-6(7)

Project No. 646808	Client: TIERRA, INC.	Remarks:
Project: Bridge #26 Over CSXT		
Source: EB1-A	Sample No.: ST-1 Elev./Depth: 13.9-15.9'	
MACTEC, Inc.		Figure
Raleigh, North Carolina		

Client: TIERRA, INC.  
 Project: Bridge #26 Over CSXT  
 Project Number: 646808

### Sample Data

Source: EB1-A  
 Sample No.: ST-1  
 Elev. or Depth: 13.9-15.9' Sample Length (in./cm.):  
 Location:  
 Description: Gray Lean CLAY with sand  
 Liquid Limit: 28 Plasticity Index: 13  
 USCS: CL AASHTO: A-6(7) Figure No.:  
 Testing Remarks:

### Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 262.16 g.	Consolidometer # = 1	Wet w+t = 243.66 g.
Dry w+t = 221.06 g.		Dry w+t = 221.06 g.
Tare Wt. = 111.43 g.	Spec. Gravity = 2.700	Tare Wt. = 111.43 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 111.43 g.	Defl. Table = n/a	
Moisture = 37.5 %	Ht. Solids = 0.5048 in.	Moisture = 20.6 %
Wet Den. = 86.5 pcf	Dry Wt. = 81.05 g.	Dry Wt. = 109.63 g.*
Dry Den. = 62.9 pcf	Void Ratio = 0.981	Void Ratio = 0.474
Ovrbrdn. = 0.69 tsf	Saturation = 103.2 %	

\* Final dry weight used in calculations

### End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C <sub>v</sub> (ft.2/day)	C <sub>α</sub>	Void Ratio	% Compression / Swell
start	0.00000				0.981	
0.25	0.07870	0.00000	2.68	0.000	0.825	7.9 Compr.
0.50	0.10380	0.00000	0.04	0.005	0.775	10.4 Compr.
1.00	0.12650	0.00000	0.02	0.002	0.730	12.6 Compr.
2.00	0.15390	0.00000	0.04	0.002	0.676	15.4 Compr.
1.00	0.15330	0.00000	0.22	0.000	0.677	15.3 Compr.
0.50	0.15190	0.00000	0.70	0.000	0.680	15.2 Compr.
1.00	0.15240	0.00000	1.74	0.000	0.679	15.2 Compr.
2.00	0.15690	0.00000	0.04	0.000	0.670	15.7 Compr.
4.00	0.18250	0.00000	0.06	0.001	0.620	18.3 Compr.
8.00	0.21130	0.00000	0.11	0.001	0.562	21.1 Compr.
16.00	0.24610	0.00000	0.06	0.001	0.494	24.6 Compr.
32.00	0.28410	0.00000	0.08	0.000	0.418	28.4 Compr.
8.00	0.28280	0.00000	1.35	0.000	0.421	28.3 Compr.
4.00	0.27920	0.00000	0.91		0.428	27.9 Compr.



**PROFILE BRIDGE 26, LOOKING UPSTATION.**



**CSXT TRACKS LOOKING NORTH FROM CENTERLINE OF BRIDGE 26.**

**SITE PHOTOGRAPHS**

**BRIDGE #26 OVER CSXT ON US 117-NC 133  
 (CORNELIUS HARNETT DRIVE)  
 NEW HANOVER COUNTY, NORTH CAROLINA  
 TIP NO: B-3881, STATE PROJECT NO: 33323.1.1**



**TIERRA**  
 2736 ROWLAND RD.  
 RALEIGH, NC 27615  
 PHONE (919) 871-0800  
 FAX (919) 871-0803



**END BENT 1 LOOKING LEFT TO RIGHT.**



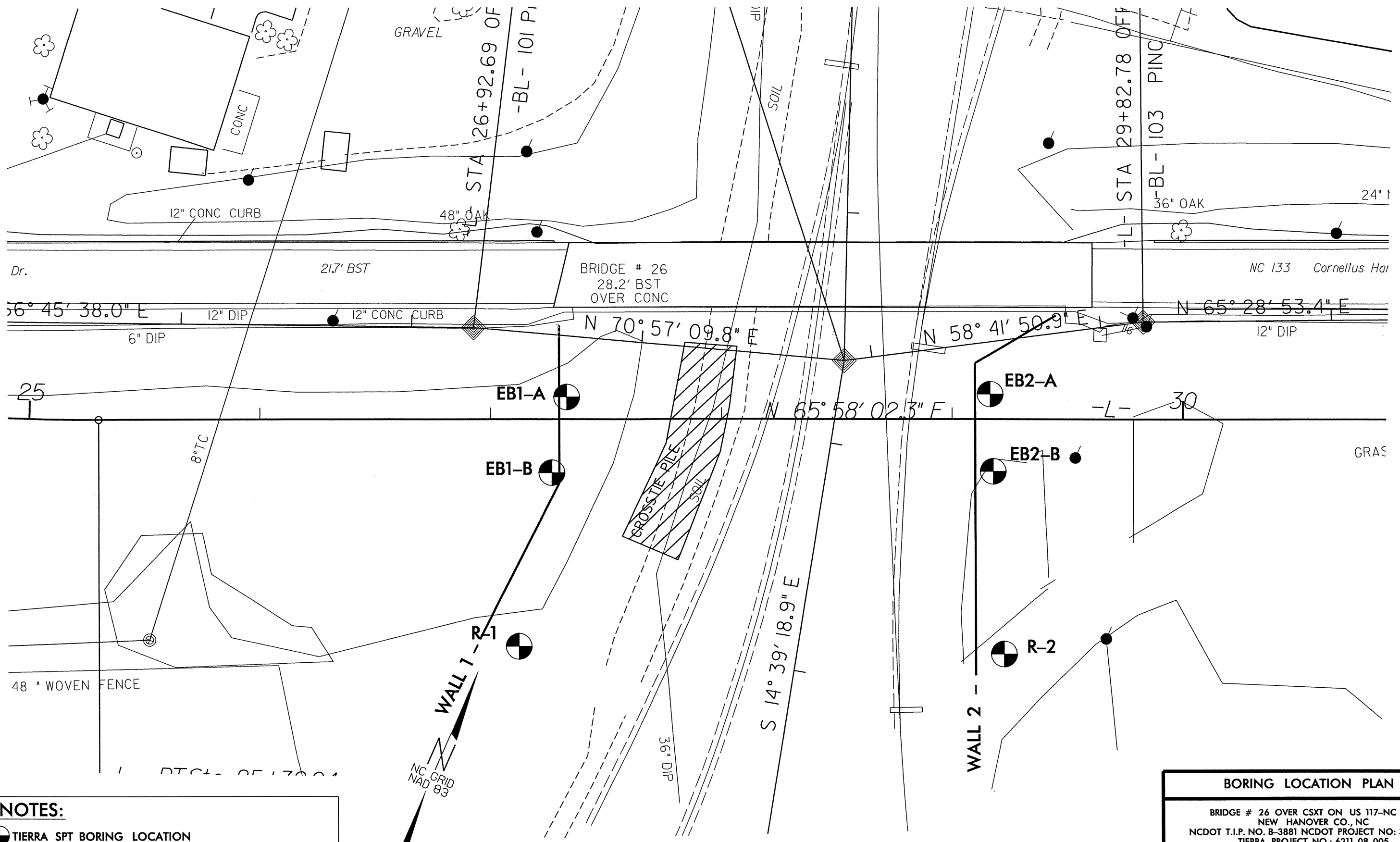
**END BENT 2 LOOKING LEFT TO RIGHT.**


**SITE PHOTOGRAPHS**

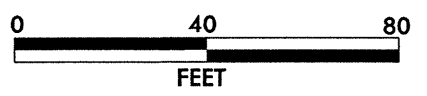
**BRIDGE #26 OVER CSXT ON US 117-NC 133  
(CORNELIUS HARNETT DRIVE)  
NEW HANOVER COUNTY, NORTH CAROLINA  
TIP NO: B-3881, STATE PROJECT NO: 33323.1.1**




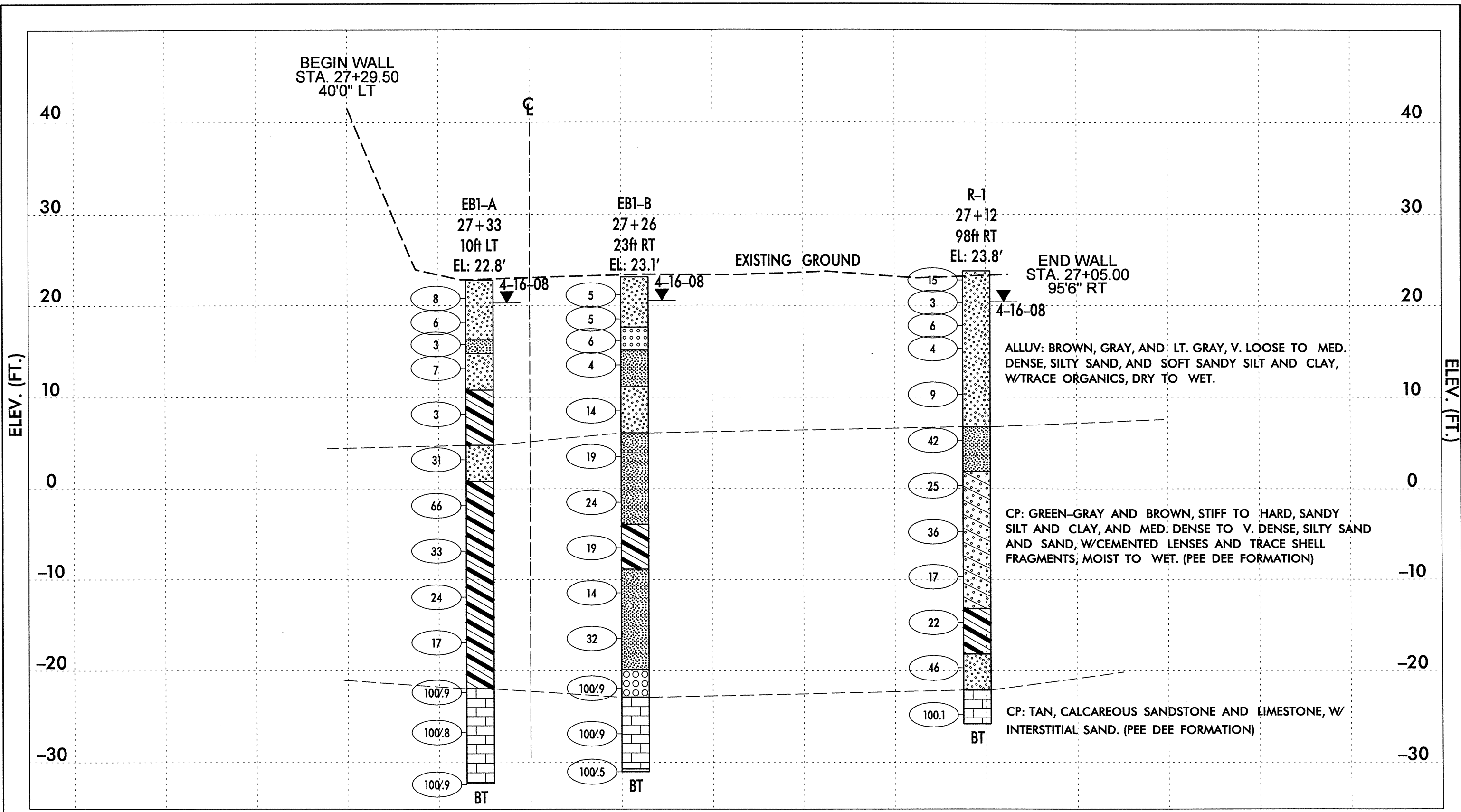
**TIERRA**  
2736 ROWLAND RD.  
RALEIGH, NC 27615  
PHONE (919) 871-0800  
FAX (919) 871-0803



**NOTES:**  
 TIERRA SPT BORING LOCATION  
 BENCHMARK: BL 101, STA 26+92.69, 39.48' LT. ELEV. 44.76 FT.  
 PLANS ADOPTED FROM ELECTRONIC FILES  
 RECEIVED FROM NCDOT, JANUARY, 2008.

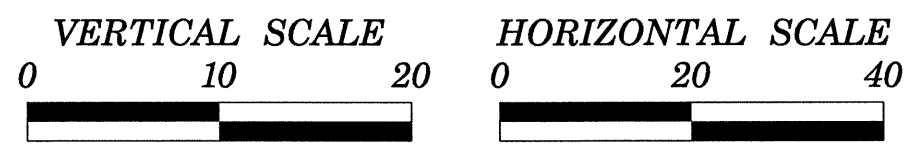


<b>BORING LOCATION PLAN</b>	
BRIDGE # 26 OVER CSXT ON US 117-NC 133 NEW HANOVER CO., NC NCDOT T.I.P. NO. B-3881 NCDOT PROJECT NO: 33323.1.1 TIERRA PROJECT NO.: 6211-08-005	
	TIERRA 2735 RIVINGTON RD. RALEIGH, NC 27615 PHONE 1919-871-0800 FAX 1919-871-0803



**NOTES:**

- GROUNDLINE SURVEYED BY TIERRA ON 4-23-08.
- ELEVATIONS BASED ON SURVEY FROM BENCHMARK BL-101: STA. 26+92.69, 39.48' LT, ELEV. 44.76'

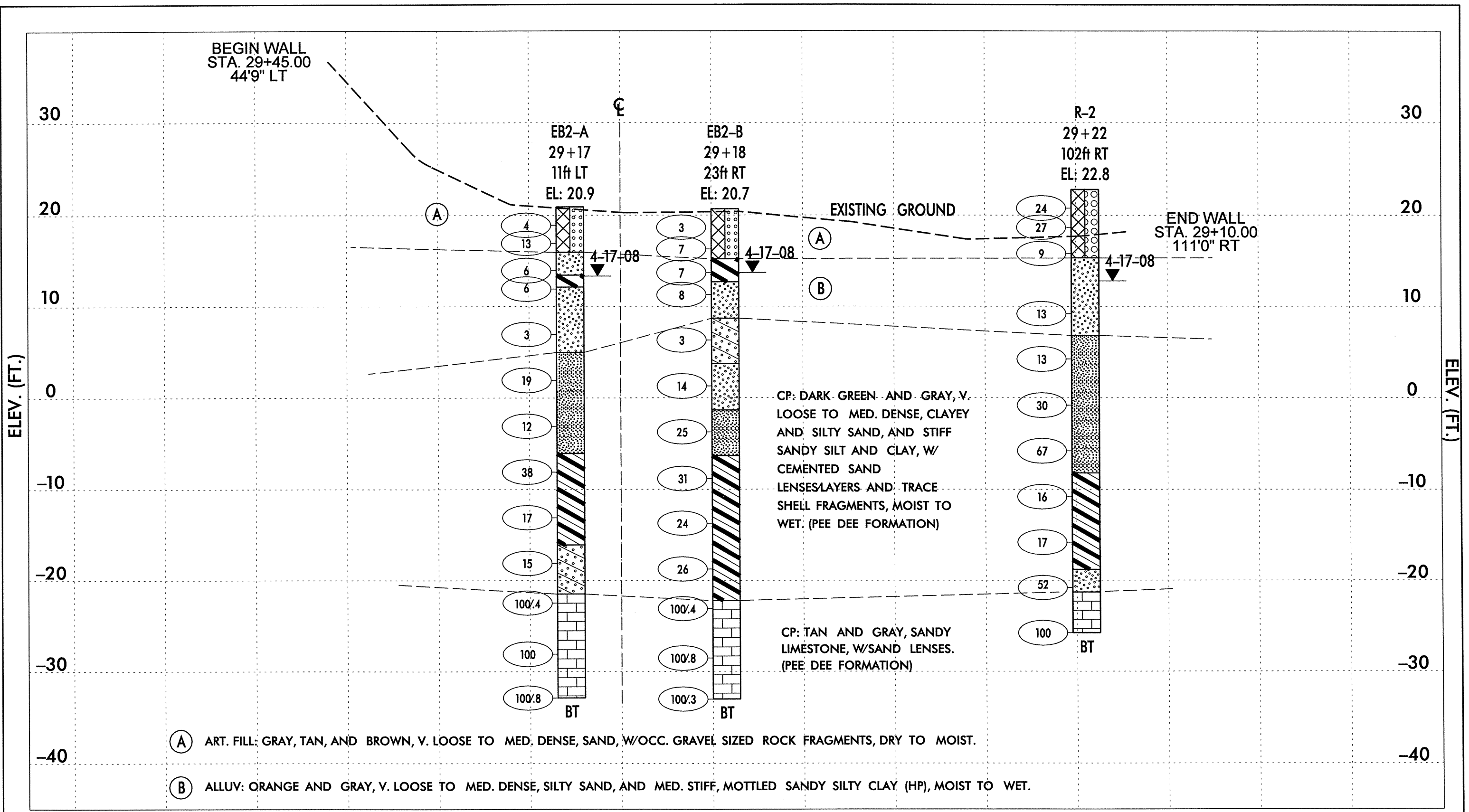


**PROFILE ALONG WALL 1 (WEST)**

BRIDGE #26 OVER CSXT ON US 117-NC133  
 NEW HANOVER CO., NC  
 NCDOT T.J.P. NO. B-3881 NCDOT PROJECT NO. 33323.1.1  
 TIERRA PROJECT NO. 6211-08-005

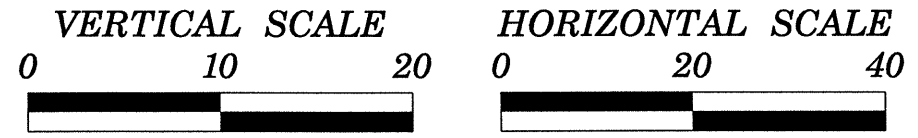
**TIERRA**  
 GEOTECHNICAL - MATERIALS  
 2736 ROSELAND RD.  
 RALEIGH, NC 27615  
 Phone: 919-871-0800  
 Fax: 919-871-0803





**NOTES:**

- GROUNDLINE SURVEYED BY TIERRA ON 4-23-08.
- ELEVATIONS BASED ON SURVEY FROM BENCHMARK BL-101: STA. 26+92.69, 39.48' LT, ELEV. 44.76'



**PROFILE ALONG WALL 2 (EAST)**

BRIDGE #26 OVER CSXT ON US 117-NC133  
NEW HANOVER CO., NC  
NCDOT T.L.P. NO. B-3881 NCDOT PROJECT NO. 33323.1.1  
TIERRA PROJECT NO. 6211-08-005

**TIERRA**  
2736 RICHMOND RD.  
RALEIGH, NC 27615  
PHONE: (919) 870-0800  
FAX: (919) 870-0803

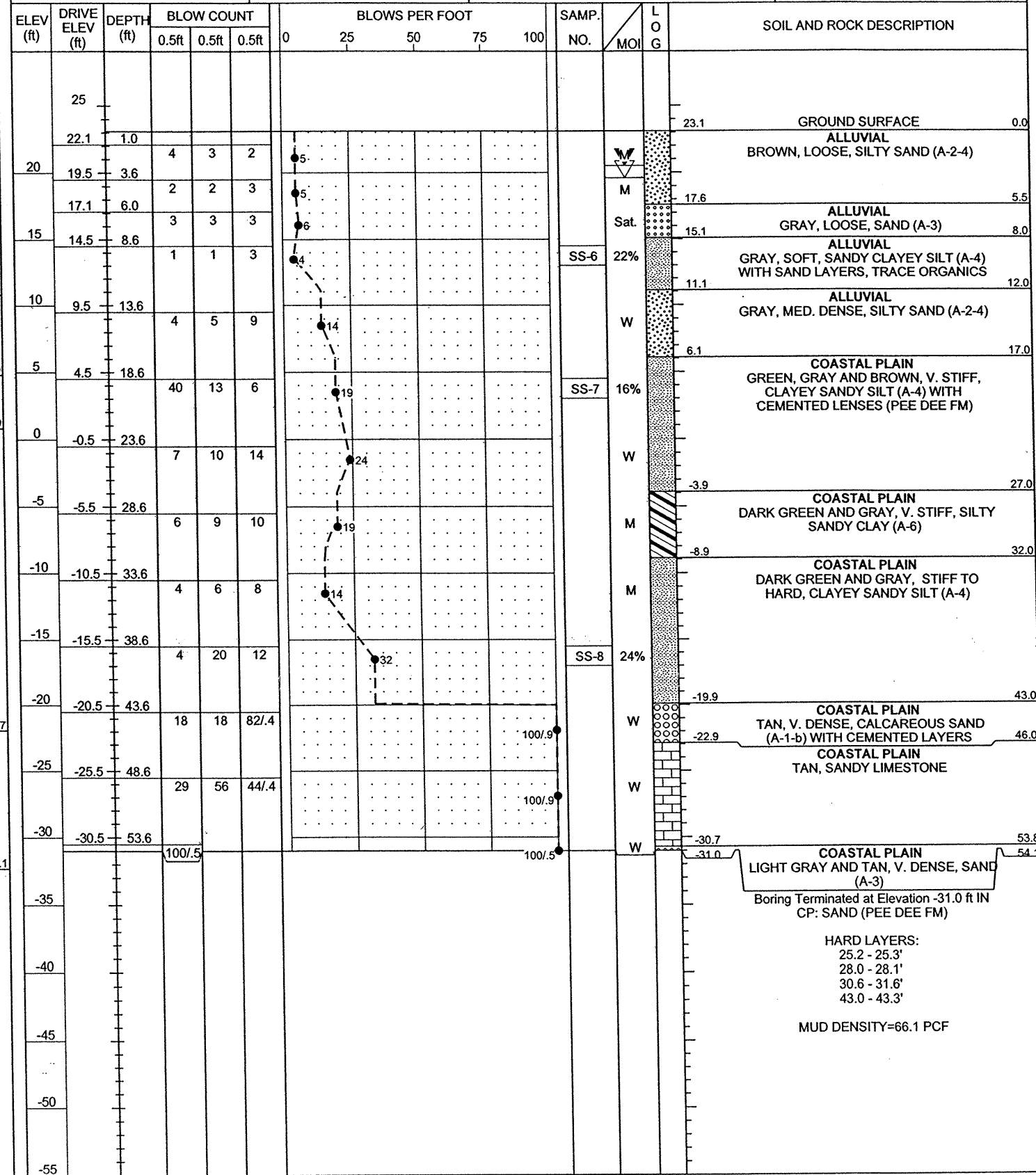
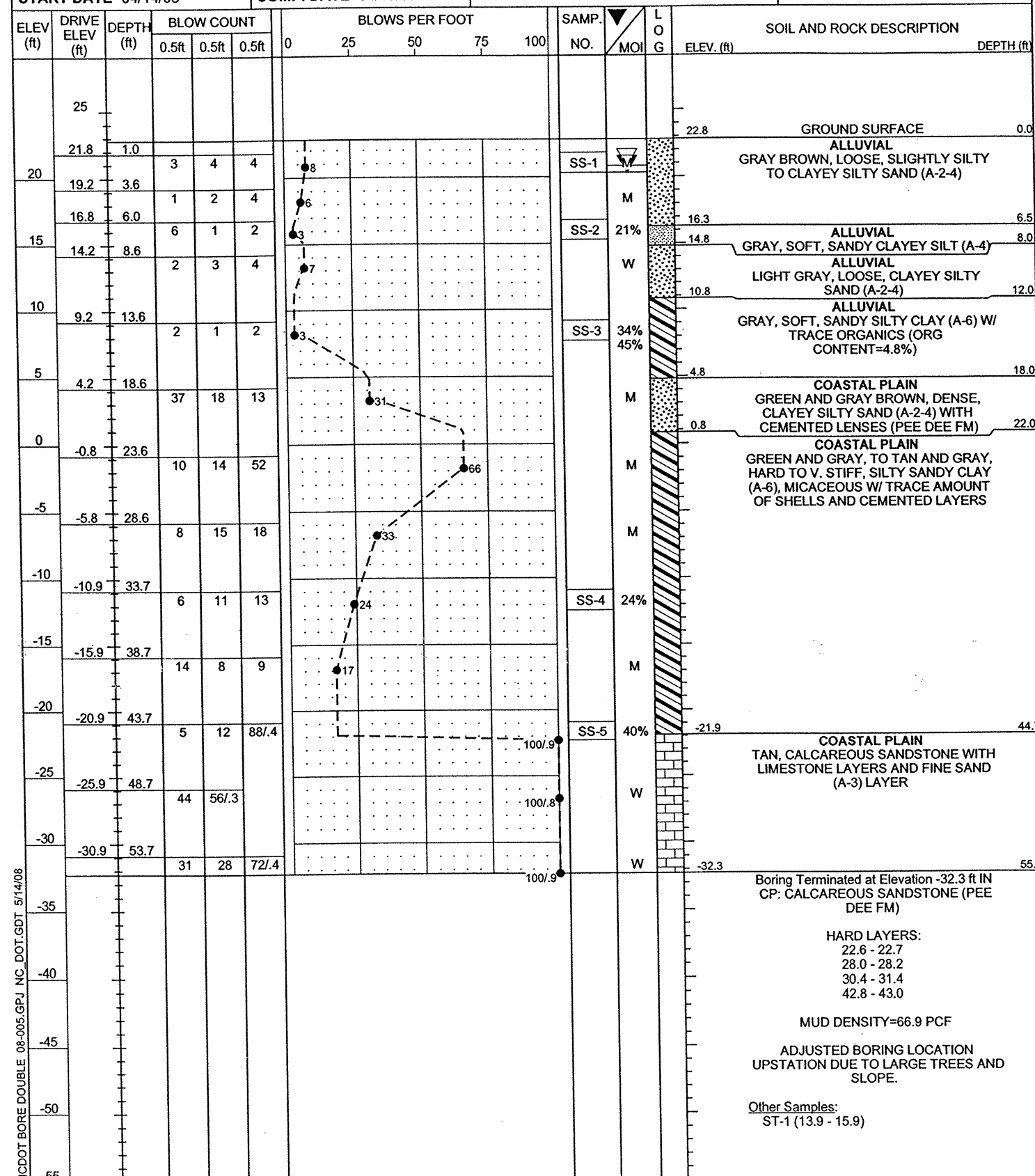


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 27+33	OFFSET 10ft LT	ALIGNMENT -L-
COLLAR ELEV. 22.8 ft	TOTAL DEPTH 55.1 ft	NORTHING 185,620	EASTING 2,319,366
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/14/08	COMP. DATE 04/15/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 44.7 ft

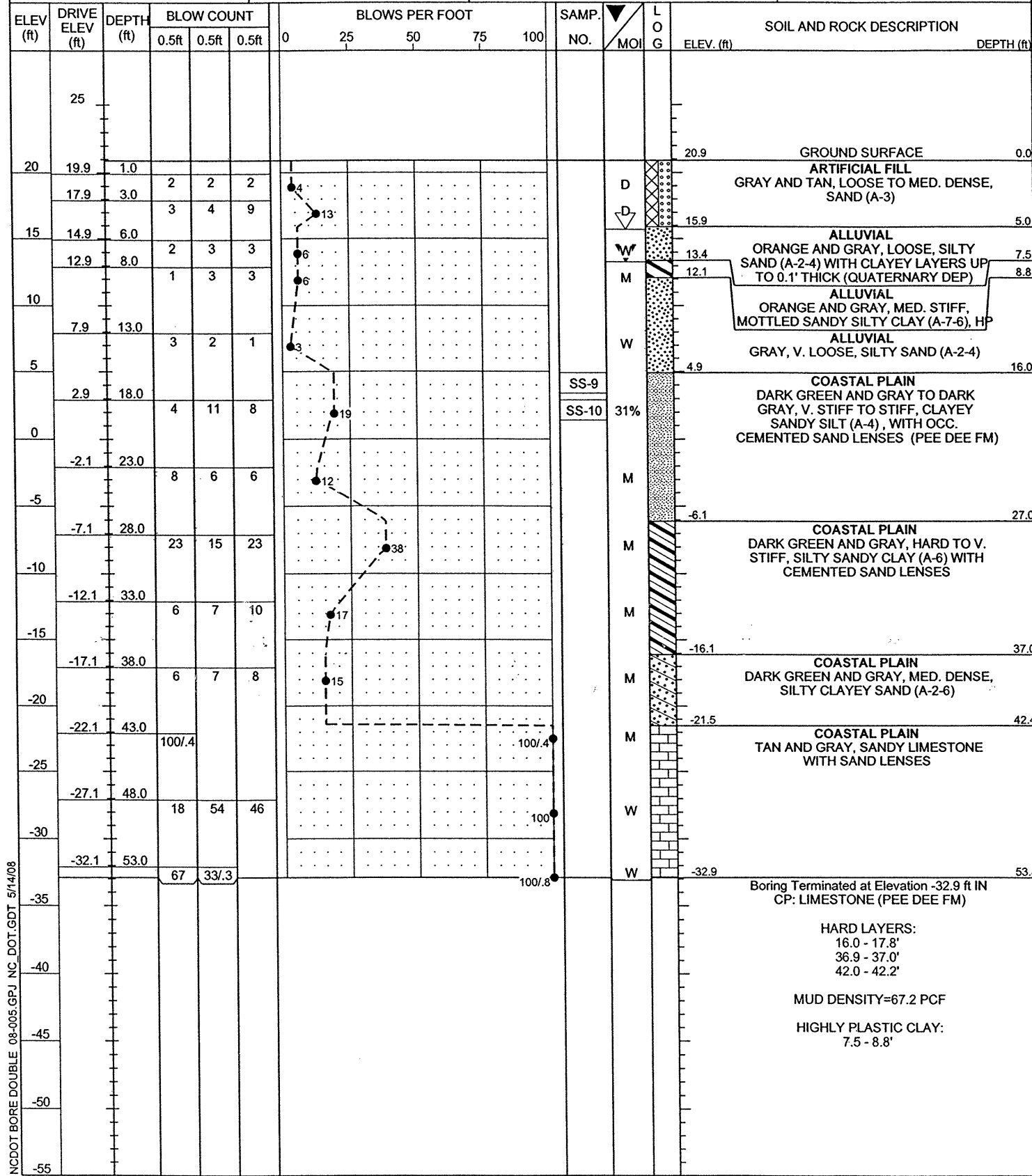
PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 27+26	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 23.1 ft	TOTAL DEPTH 54.1 ft	NORTHING 185,588	EASTING 2,319,373
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/15/08	COMP. DATE 04/15/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 46.0 ft



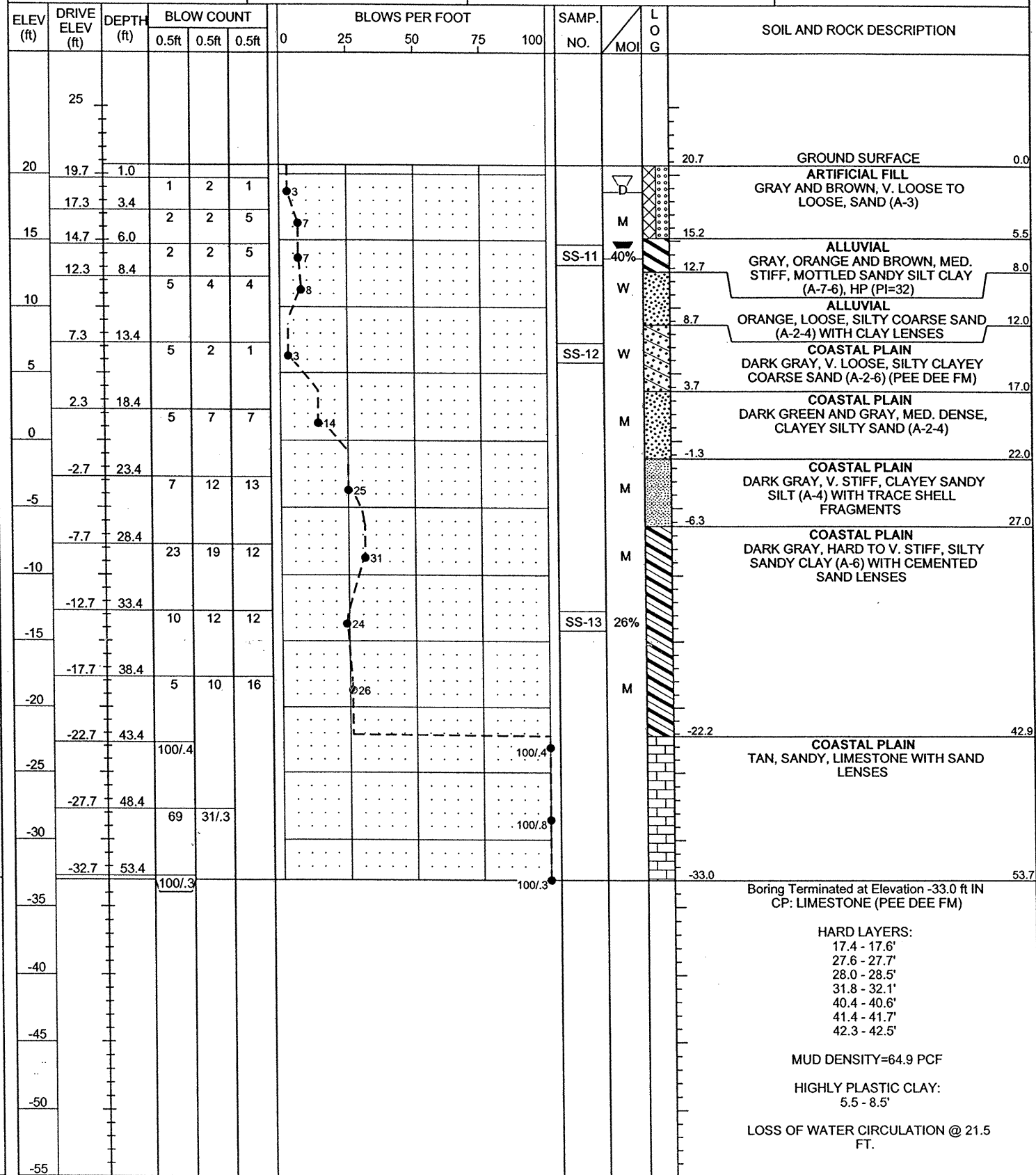
NCDOT BORE DOUBLE 08-005.GPJ NC\_DOT\_GDT\_5/14/08



PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 29+17	OFFSET 11ft LT	ALIGNMENT -L-
COLLAR ELEV. 20.9 ft	TOTAL DEPTH 53.8 ft	NORTHING 185,696	EASTING 2,319,533
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/16/08	COMP. DATE 04/16/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 42.4 ft



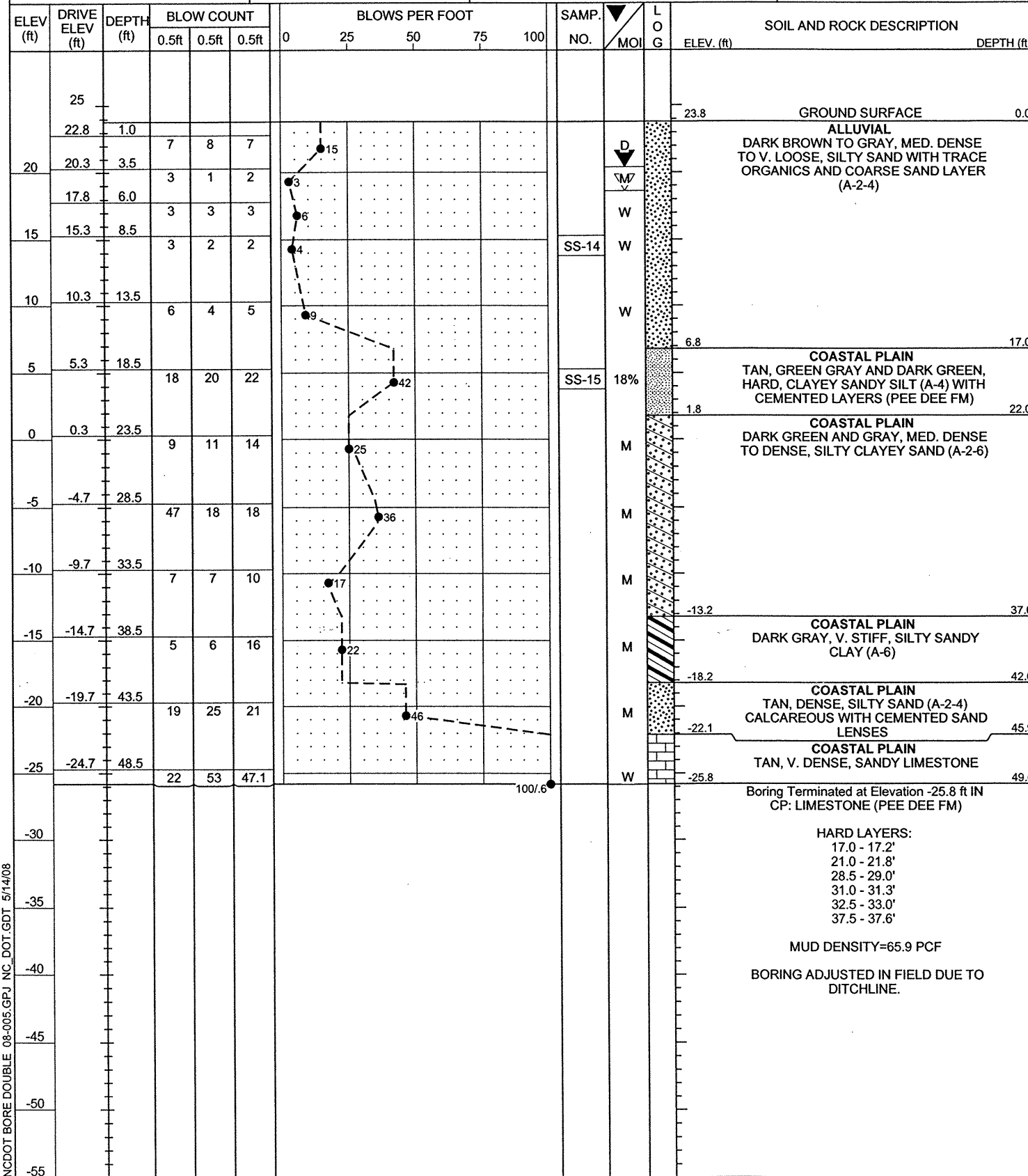
PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 29+18	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 20.7 ft	TOTAL DEPTH 53.7 ft	NORTHING 185,666	EASTING 2,319,548
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/16/08	COMP. DATE 04/16/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 42.9 ft



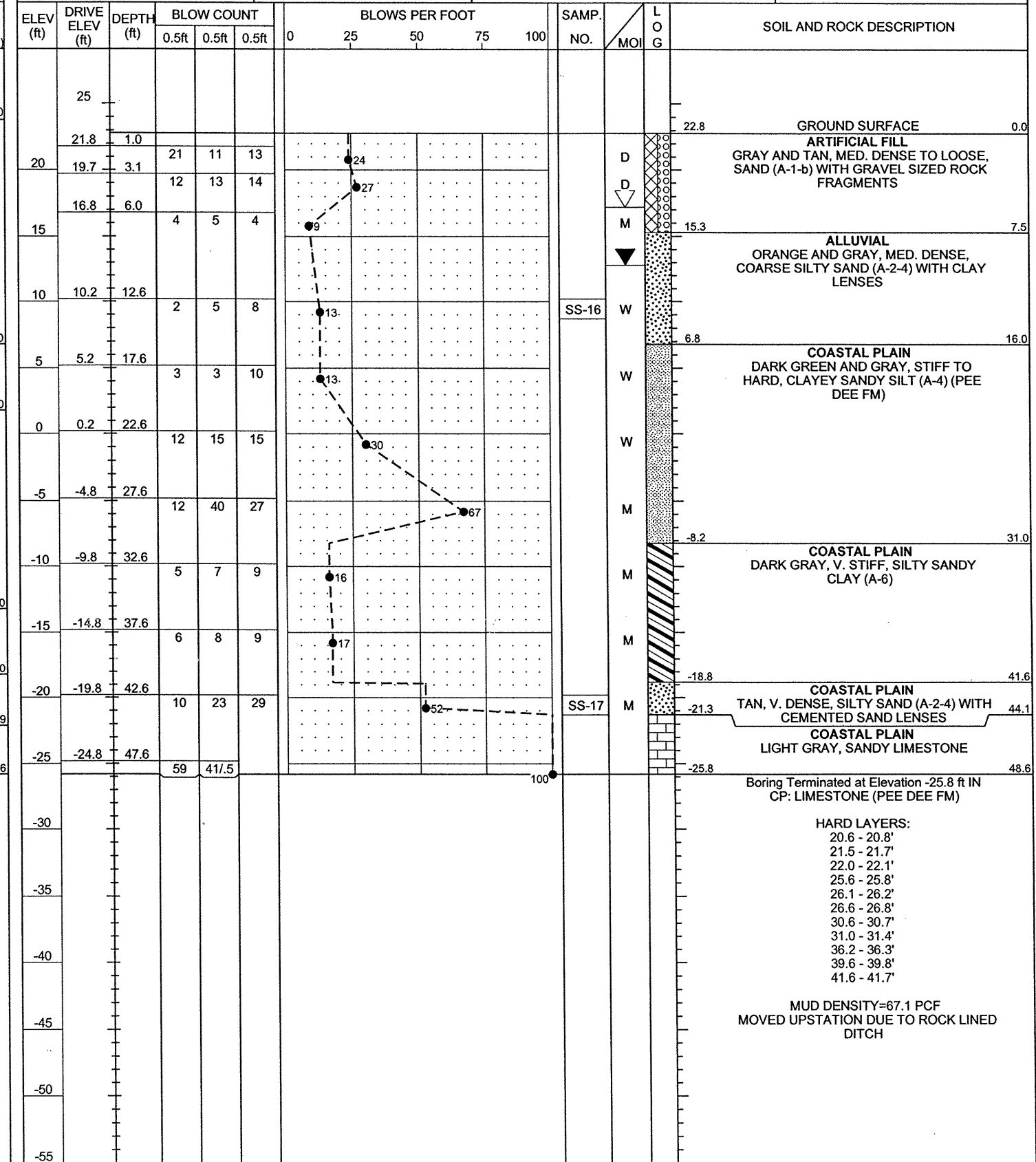
NCDOT BORE DOUBLE 08-005.GPJ NC DOT.GDT 5/14/08



PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. R-1	STATION 27+12	OFFSET 98ft RT	ALIGNMENT -L-
COLLAR ELEV. 23.8 ft	TOTAL DEPTH 49.6 ft	NORTHING 185,513	EASTING 2,319,391
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/15/08	COMP. DATE 04/15/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 45.9 ft



PROJECT NO. 33323.1.1	ID. B-3881	COUNTY NEW HANOVER	GEOLOGIST C. BRUINSMA
SITE DESCRIPTION BRIDGE #26 OVER CSXT ON US 117 - NC133 (CORNELIUS HARNETT DRIVE)			GROUND WTR (ft)
BORING NO. R-2	STATION 29+22	OFFSET 102ft RT	ALIGNMENT -L-
COLLAR ELEV. 22.8 ft	TOTAL DEPTH 48.6 ft	NORTHING 185,595	EASTING 2,319,584
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/16/08	COMP. DATE 04/16/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 44.1 ft



NCDOT BORE DOUBLE 08-005.GPJ NC\_DOT.GDT 5/14/08

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 26 OVER CSXT ON US 117-NC133 (CORNELIUS HARNETT DRIVE)

NCDOT Project No: 33323.1.1 - T.I.P. No: B-3881

NEW HANOVER COUNTY, NORTH CAROLINA

TIERRA PROJECT NO: 6211-08-005

BORING #			SAMPLE #			TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limits		Moisture Content	Organic Content
AASHTO Classification			PERCENT PASSING			PERCENT RETAINED				LL		PI	%	%		
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PI	%	%			
EB1-A			SS-1			98	92	20	18	63	7	12	13	NP	-	-
A-2-4																
27+33	10' LT	1.0-2.5														
EB1-A			SS-2			99	89	66	13	30	35	22	22	7	20.8	-
A-4																
27+33	10' LT	6.0-7.5														
EB1-A			SS-3			-	-	-	-	-	-	-	-	33.9	4.8	
A-6																
27+33	10' LT	13.6-15.1														
EB1-A			SS-4			95	92	48	7	46	20	27	31	14	24.3	-
A-6																
27+33	10' LT	33.6-35.1														
EB1-A			SS-5			91	86	47	24	28	12	36	36	21	39.5	-
A-6																
27+33	10' LT	43.7-45.2														
EB1-B			SS-6			99	89	68	12	31	39	18	24	4	21.9	-
A-4																
27+26	23' RT	8.6-10.1														
EB1-B			SS-7			79	72	54	16	23	50	11	20	NP	15.8	-
A-4																
27+26	23' RT	18.6-20.1														
EB1-B			SS-8			94	88	39	12	48	18	22	25	9	23.5	-
A-4																
27+26	23' RT	38.6-40.1														
EB2-A			SS-9			100	98	33	3	74	11	12	20	NP	-	-
A-2-4																
29+17	11' LT	18.0-19.5														
EB2-A			SS-10			100	99	45	2	64	14	20	26	6	-	-
A-4																
29+17	11' LT	23.0-24.5														

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 26 OVER CSXT ON US 117-NC133 (CORNELIUS HARNETT DRIVE)

NCDOT Project No: 33323.1.1 - T.I.P. No: B-3881

NEW HANOVER COUNTY, NORTH CAROLINA

TIERRA PROJECT NO: 6211-08-005

BORING #			SAMPLE #			TOTAL SAMPLE			MINUS 2.00 mm FRACTION				Atterberg Limits		Moisture Content	Organic Content
AASHTO Classification			PERCENT PASSING			PERCENT RETAINED				LL		PI	%	%		
STATION #	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200	Coarse Sand	Fine Sand	SILT	CLAY	LL	PI	%	%			
EB2-B			SS-11			100	95	70	7	27	21	45	50	32	39.9	-
A-7-6																
29+18	23' RT	6.0-7.5														
EB2-B			SS-12			97	64	27	58	14	10	18	28	14	-	-
A-2-6																
29+18	23' RT	13.4-14.9														
EB2-B			SS-13			99	97	49	7	47	18	28	32	14	26.2	-
A-6																
29+18	23' RT	33.4-34.9														
R-1			SS-14			97	69	15	41	47	6	6	13	NP	-	-
A-2-4																
27+12	98' RT	8.5-10.0														
R-1			SS-15			96	83	55	23	23	40	14	22	5	17.5	-
A-4																
27+12	98' RT	18.5-20.0														
R-2			SS-16			97	39	14	78	9	2	11	25	9	-	-
A-2-4																
29+22	102' RT	12.6-14.1														
R-2			SS-17			79	71	22	42	31	10	17	15	NP	-	-
A-2-4																
29+22	102' RT	42.6-44.1														
EB1-A			ST-1			100	92	72	4	25	23	48	28	13	45.0	-
A-6																
27+33	10' LT	13.9-15.9														



**RETAINING WALL 1 (WESTERN SIDE) AREA LOOKING FROM EXISTING BRIDGE 26 TO THE SOUTH.  
NOTE: LARGE PILE OF CROSSTIES UPSTATION OF PROPOSED WALL.**



**RETAINING WALL 2 (EASTERN SIDE) LOOKING FROM EXISTING BRIDGE 26 TO THE SOUTH.**

**SITE PHOTOGRAPHS**

**BRIDGE #26 OVER CSXT ON US 117-NC 133  
(CORNELIUS HARNETT DRIVE)  
NEW HANOVER COUNTY, NORTH CAROLINA  
TIP NO: B-3881, STATE PROJECT NO: 33323.1.1**



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