

PROJECT: 34979.1.1 ID: U-3816

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34979.1.1 I.D. NO. U-3816
F.A. PROJECT STP-0831(2)
COUNTY HOKE
PROJECT DESCRIPTION PALMER ST. EXTENSION
FROM NC 211 AT SR 1149 (McLEAN RD.) TO
NC 20 AT SR 1403 (PROSPECT AVE.)
SITE DESCRIPTION BRIDGE OVER ABERDEEN
AND ROCKFISH R.R. ON SR 1244 BETWEEN
NC 211 AND NC 20

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3816	1	27
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34979.1.1	STP-0831(2)	P.E.	
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CAUTION NOTICE

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

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

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

For Letting

INVESTIGATED BY <u>F&R, Inc.</u>	PERSONNEL <u>C. BALDWIN</u>
CHECKED BY <u>E. HOWEY, P.E., L.G.</u>	<u>P. ALTON</u>
SUBMITTED BY <u>F&R, Inc.</u>	<u>D. TIGNOR</u>
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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.

DRAWN BY: D. RACEY



Elizabeth C. Howey
SIGNATURE: ELIZABETH C. HOWEY, P.E., L.G.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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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 (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6				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. 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: WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.				ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																											
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th colspan="2">A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="3"></th> </tr> <tr> <th>SYMBOL</th> <td></td> </tr> <tr> <th>% PASSING</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>35 MX 10 MX 5 MX</td> </tr> <tr> <th>LIQUID LIMIT PLASTIC INDEX</th> <td>6 MX</td> <td>N.P.</td> <td>40 MX 10 MX</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>20 MX</td> <td>24 MX</td> <td>28 MX</td> <td>32 MX</td> <td>36 MX</td> <td>40 MX</td> <td>44 MX</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS. GRAVEL AND SAND</td> <td>FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td colspan="3">MUCK, PEAT</td> </tr> <tr> <th>GEN. RATING AS A SUBGRADE</th> <td colspan="4">EXCELLENT TO GOOD</td> <td colspan="4">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="4">UNSATURABLE</td> </tr> <tr> <td colspan="14" style="text-align: center;">P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30</td> </tr> </table>				GENERAL CLASS.	GRANULAR MATERIALS (35% PASSING #200)				SILT-CLAY MATERIALS (35% PASSING #200)				ORGANIC MATERIALS				GROUP CLASS.	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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 > 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 < 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.			
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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.																																																																																																																																																						



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January 12, 2007

Mr. Njoroge Wainaina, P.E.
 State Geotechnical Engineer
 NCDOT-Geotechnical Engineering Unit
 1589 Mail Service Center
 Raleigh, NC 27699-1589

Re: Bridge and Retaining Wall Foundation Investigation
 Project No.: 34979.1.1
 TIP No.: U-3816
 FA No.: STO-0831(2)
 County: Hoke
 Description: Raeford – Palmer Street Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)
 F&R Project: H66-180G

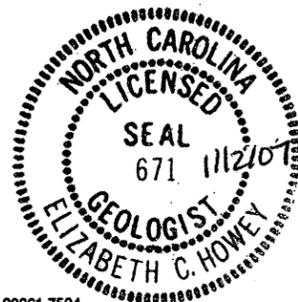
Dear Mr. Wainaina:

The Raleigh, North Carolina office of Froehling & Robertson, Inc. (F&R) is pleased to submit the accompanying Bridge and Retaining Wall Foundation Investigation Report. The work was performed in general accordance with F&R's Proposal 0766-136G dated December 19, 2006. Please contact us at your earliest convenience to discuss any comments regarding this report or our services in general.

Sincerely,

Christopher R. Baldwin
 Staff Geologist

Elizabeth C. Howey, L.G., P.E.
 Project Geotechnical Engineer



HEADQUARTERS: 3015 DUMBARTON ROAD • BOX 27524 • RICHMOND, VA 23261-7524
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 HICKORY, NC • RALEIGH, NC • ROANOKE, VA • STERLING, VA



SITE DESCRIPTION

Palmer Street is proposed to be extended on new location between NC 211 and NC 20 across an area of woods and farm fields. A bridge is proposed over the Aberdeen and Rockfish Railroad. The proposed structure will contain 2 spans of 140 and 110 feet for an overall length of 250 feet. The proposed skew angle is approximately 71 degrees. It is our understanding that the retaining walls shown at each end bent location may be partially or completely eliminated; however, borings were advanced along the proposed walls at locations shown on the attached plan view. Borings W1-1 to W1-4 will only be submitted as a Roadway Addendum while boring W1-5 will be shown in both reports.

METHOD OF EXPLORATION

A subsurface investigation was conducted in December, 2006 and January, 2007. F&R advanced eight bridge borings at the site consisting of two borings at each of the three proposed bent locations and one boring near the centerline approximately 50 feet behind each end bent (NB-1 and NB-2, see attached plan view) to address the potential lengthening of the bridge and elimination of the abutment retaining walls. Borings B1-A and B1-B were offset due to large trees/roots. The bridge borings were advanced to depths of 70 to 100 feet. Six borings were advanced along the proposed retaining wall at the beginning of the bridge (W1-1 to W1-6) while two borings were advanced at the ends of the retaining wall proposed at the end of the bridge (W2-1 and W2-2). The retaining wall borings were advanced to depths of 20 to 35 feet. Note that borings W1-1 to W1-4 will be submitted as a Roadway Addendum; boring W1-5 will be shown in both reports.

The borings were advanced with a CME-55 track-mounted drill rig with a 140-pound automatic hammer, utilizing mud rotary drilling techniques. Standard Penetration Tests (SPT) were performed, in general accordance with ASTM D-1586, at all borings to aid in foundation analysis. Representative soil samples were obtained for visual classification in the field and returned to our office for potential laboratory analysis. Ten samples of soil were selected and subjected to grain size and Atterberg Limits testing in accordance with AASHTO T-87, T-88, T-89, and T-90 as modified by NCDOT.



A handheld GPS unit (GEO-XT) was utilized to locate the borings in the field prior to mobilization. Points on the baseline survey were then utilized to survey boring collar elevations, cross sections, and profiles. BL-106 was designated as TBM 1, BL-108 as TBM 2, and BL-107 as TBM 3.

GEOLOGY

Based on review of the *Geologic Map of North Carolina* (1985), the project site is situated in an area of Coastal Plain deposits mapped as the Middendorf Formation. The Middendorf Formation is described as sand, sandstone, and mudstone which is gray to light gray with an orange cast. The soils encountered in borings advanced across the site generally consist of sand and sandy clay which are mostly gray in color but contain some brown, orange, and yellow. The soils encountered exhibit the characteristics of the Middendorf unit.

STRATIGRAPHY

Borings advanced across the site encountered Coastal Plain Middendorf Formation soils from the ground surface to the boring termination depths. A surficial layer of fine sandy silt (A-4) was encountered in some of the borings. However, the soils generally consist of fine to coarse sand (A-1-b) and silty and/or clayey fine to coarse sand (A-2-4, A-2-6) interlayered with fine to coarse sandy clay (A-6, A-7-5, A-7-6). The consistencies range from very loose/very soft to very dense/hard. A 5 to 10 foot thick layer of dark gray, very loose to loose, fine to coarse sand (A-2-4) and clayey fine to coarse sand (A-2-6) was encountered consistently near elevation 185 across the site. The bridge borings encountered soils that are generally dense to very dense or hard below approximate elevation 170 feet.

GROUND WATER

Ground water was not measured in the borings immediately after drilling due to the mud rotary drilling techniques utilized. The 24 hour water measurements taken indicated water was present at depths of 3.0 to 9.0 feet (elevation 225.0 to 230.3 feet). In addition, the recovered samples were consistently wet below a depth of approximately 8 feet in all borings. A water surface was measured at elevation 225.7 feet in the wetland area during our field investigation

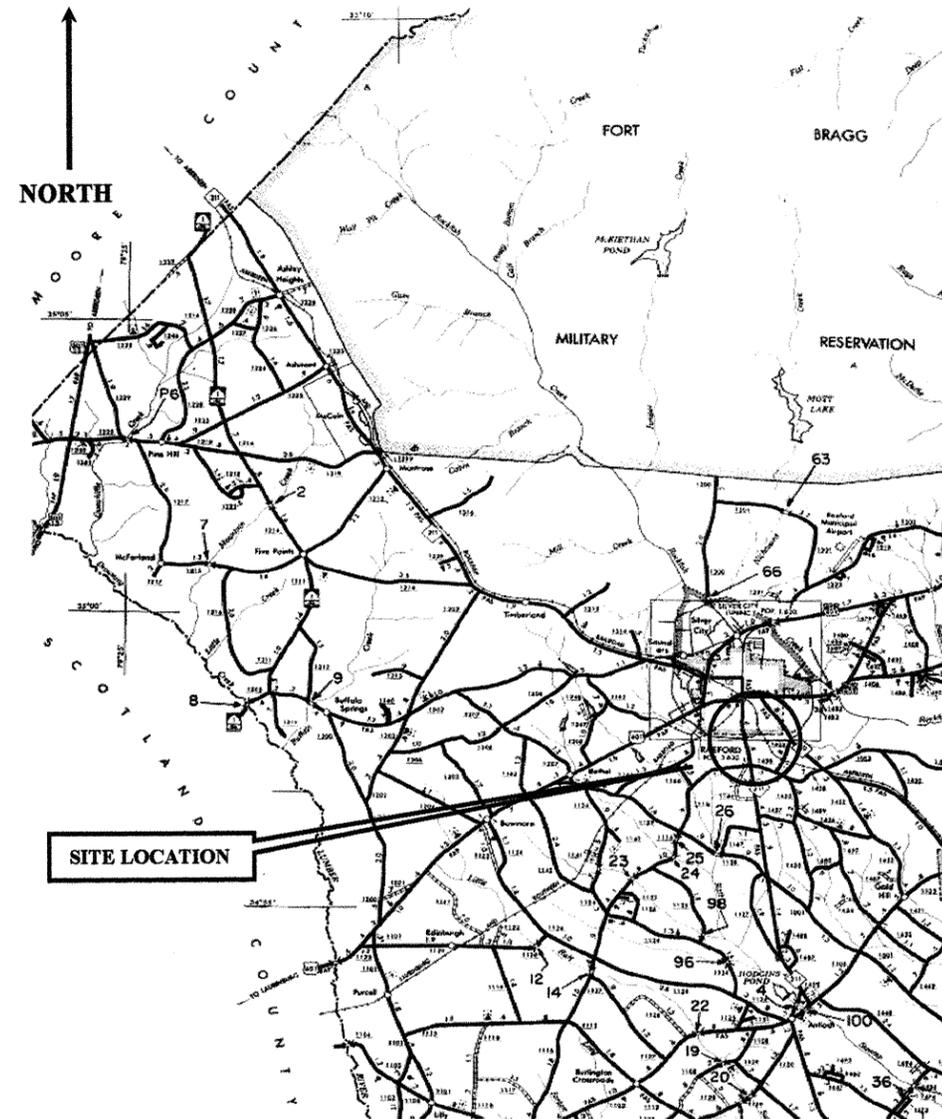


QUALIFICATIONS OF REPORT

This report has been prepared for the exclusive use of the North Carolina Department of Transportation and their assignees for specific application to the referenced property in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. The conclusions provided in this report do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations, or in unexplored areas of the site. Should such variations become apparent during construction, we reserve the right to re-evaluate our conclusions based upon an on-site observation of the conditions. In the event that changes are made in the proposed construction plans, the findings presented in this report shall not be considered valid unless reviewed by our firm and conclusions of this report modified or verified in writing.



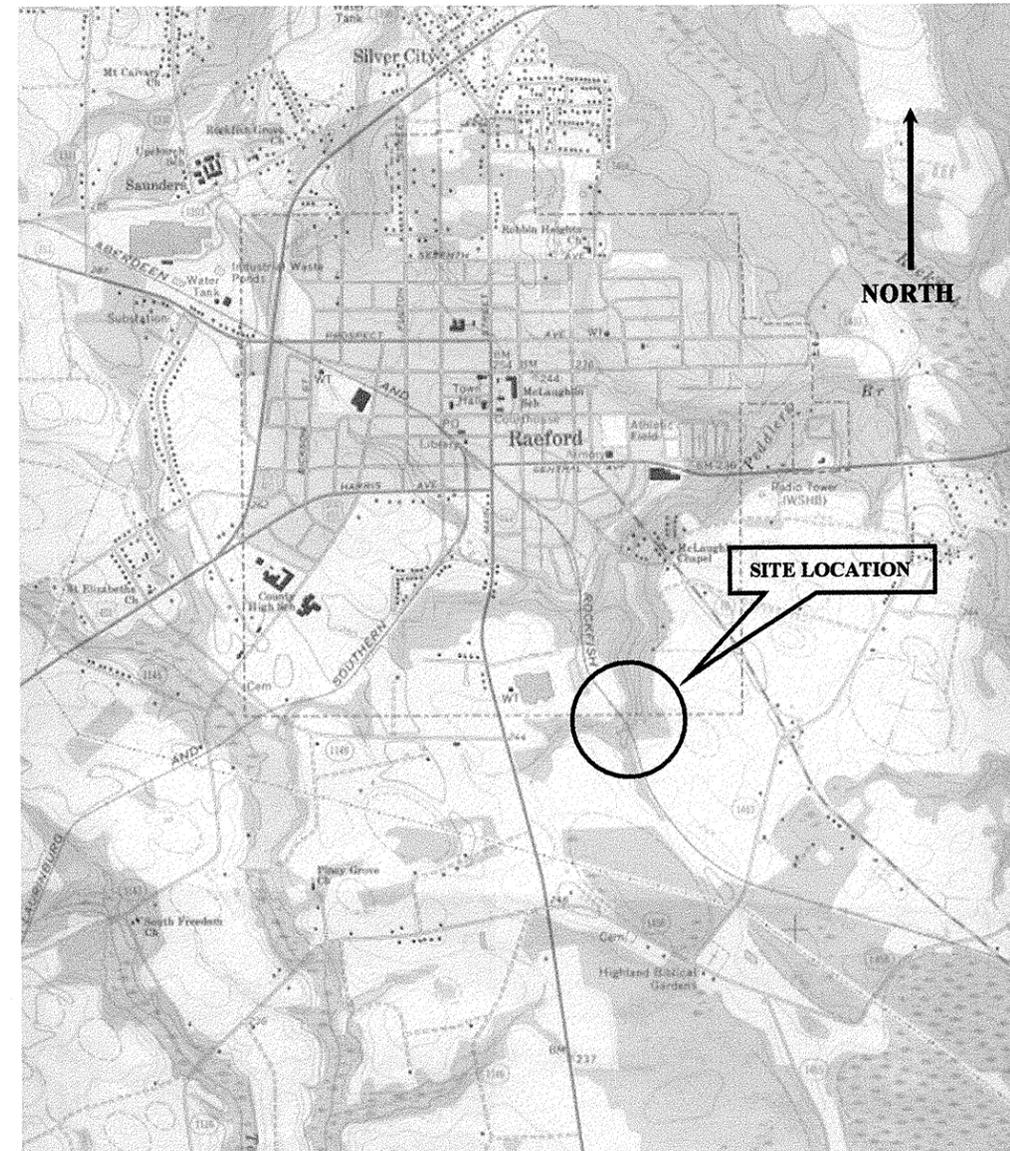
FIGURE 1



SITE VICINITY MAP

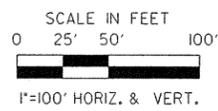
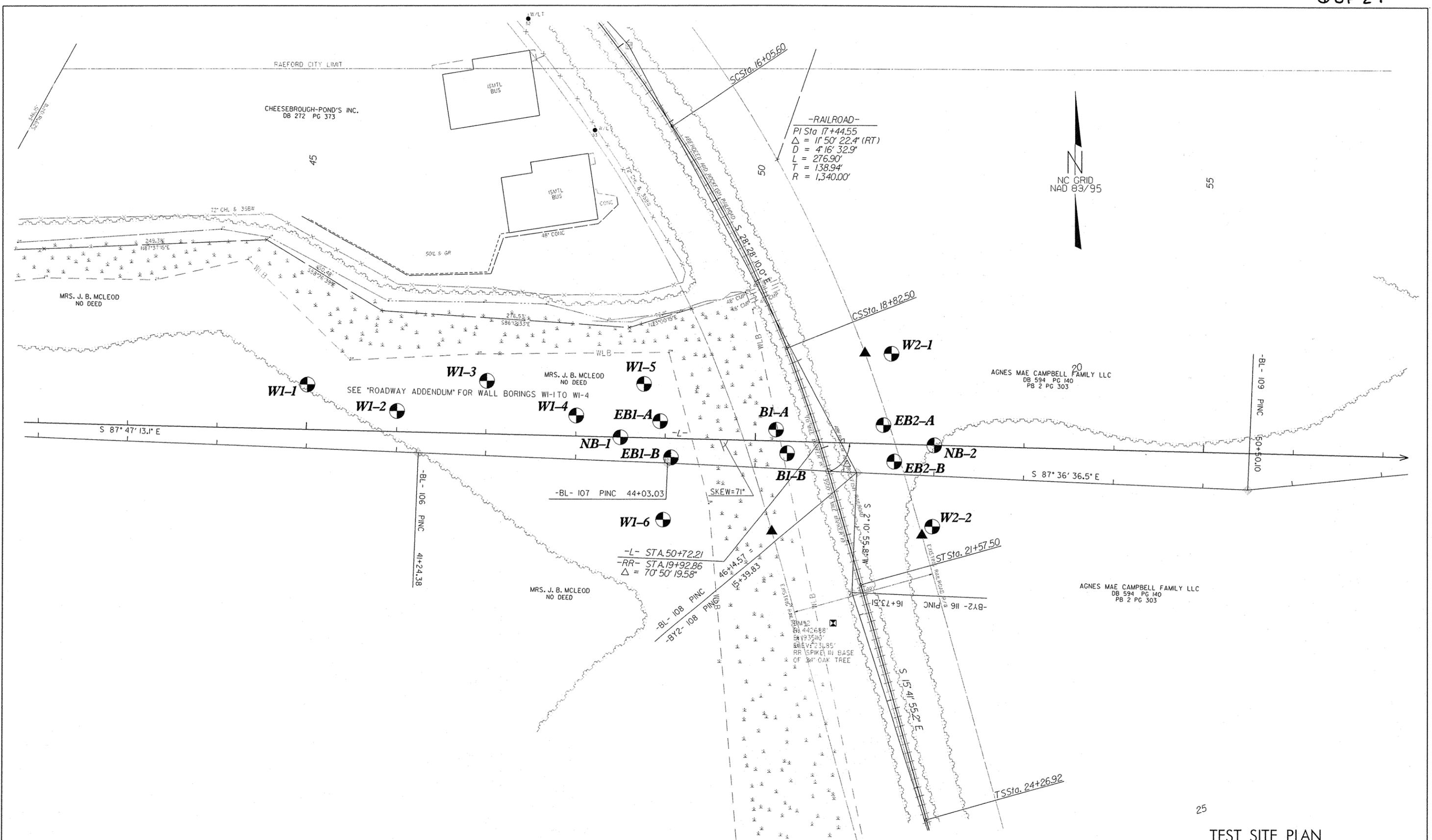
Adapted from an NCDOT Bridge Location Map of Hoke County, North Carolina, dated January 1, 1990.
Scale 1"=2.5 mi. (approx.)

FIGURE 2



SITE LOCATION PLAN

Adapted from a USGS Quadrangle 7.5 min. Topographic Map of Raeford, North Carolina, dated 1972.
Scale 1"=2000' (approx.)



F&R SINCE 1951

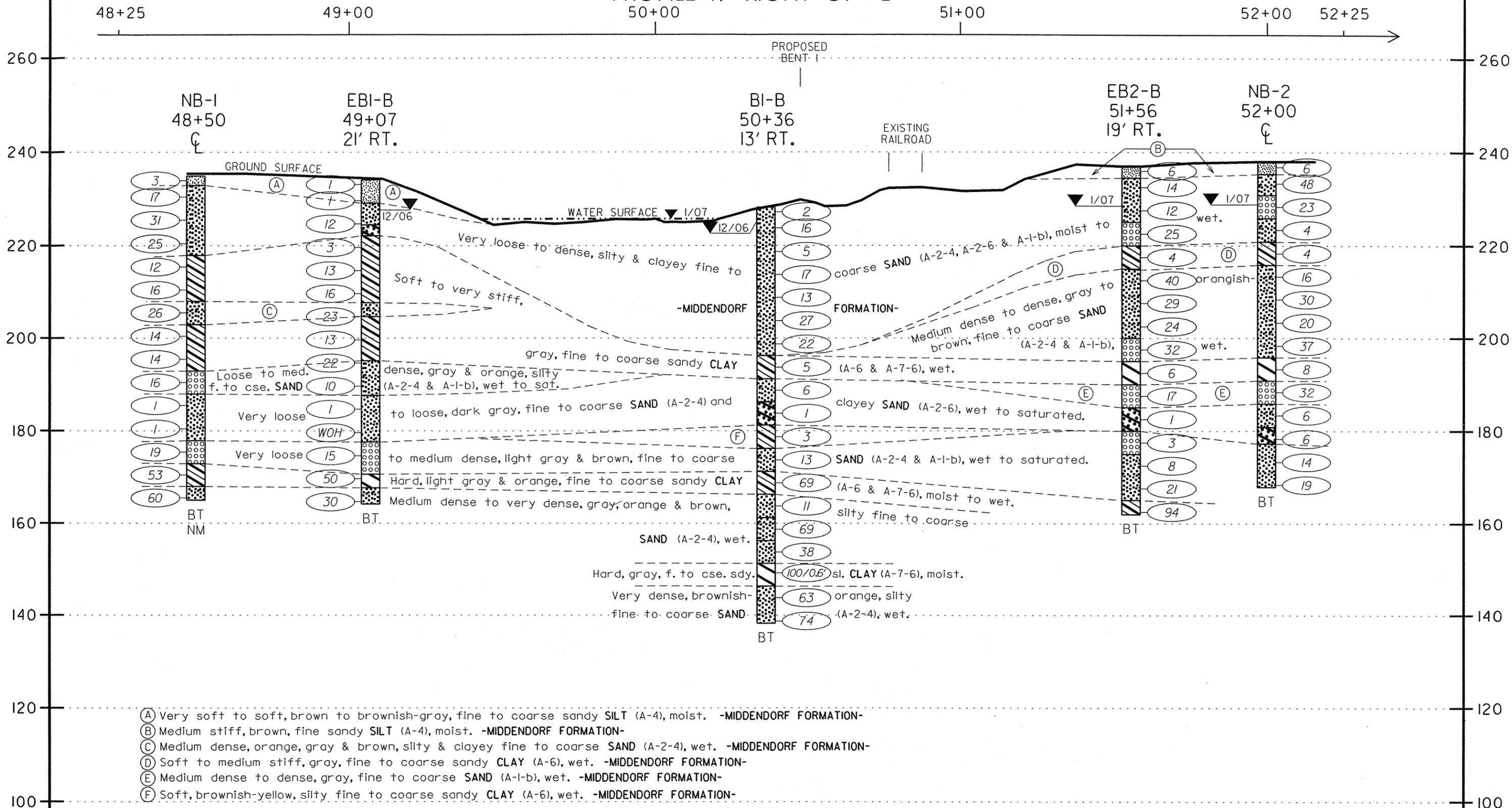
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CLIENT: N.C. Department of Transportation	
LOCATION: Palmer St. Ext. from NC 211 at SR 1149 to NC 20 at SR 1403	
PROJECT No.: 34979.1J	COUNTY: Hoke
TIP No.: U-3816	FA No.: STP-083(K2)
DATE: 1/07	SCALE: 1"=100' HORIZ. & VERT. DRAWING No.: 1

25

TEST SITE PLAN

PROFILE 19' RIGHT OF -L-



* 0 hr. groundwater not measured due to mud rotary drilling techniques.

NM: 24 hr. groundwater not measured.



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	PROJECT No.: 34979.1.1	COUNTY: Hoke		
	TIP No.: U-3816	FA No.: STP-0831(2)		
	DATE: 1/07	SCALE: 1"=30' HORIZ.; 1"=20' VERT.	DRAWING No.: 2	

SECTION THROUGH PROPOSED END BENT 1

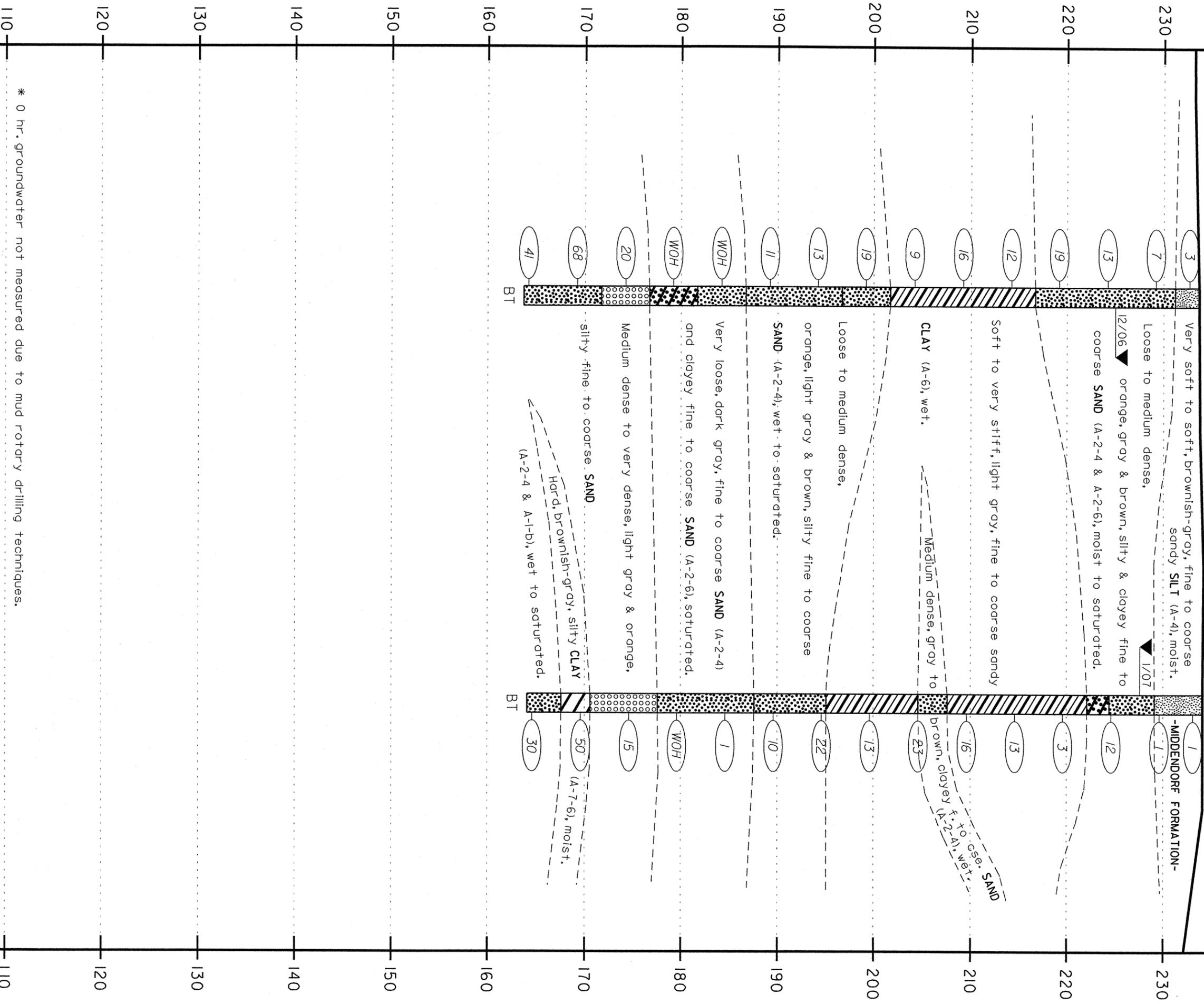
EBI-A
48+94
19' LT.

EBI-B
49+07
21' RT.

CL SURVEY

-L-

GROUND SURFACE



SCALE IN FEET
0 5' 10'
1"=10' HORIZ. & VERT.



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CLIENT: N.C. Department of Transportation	COUNTY: Hoke
LOCATION: Palmer St. Ext. from NC 211 at SR 1149 to NC 20 at SR 1403	FA No.: STP-0831(2)
PROJECT No.: 34979.1.1	DRAWING No.: 3
TIP No.: U-3816	
DATE: 1/07	SCALE: 1"=10' HORIZ. & VERT.

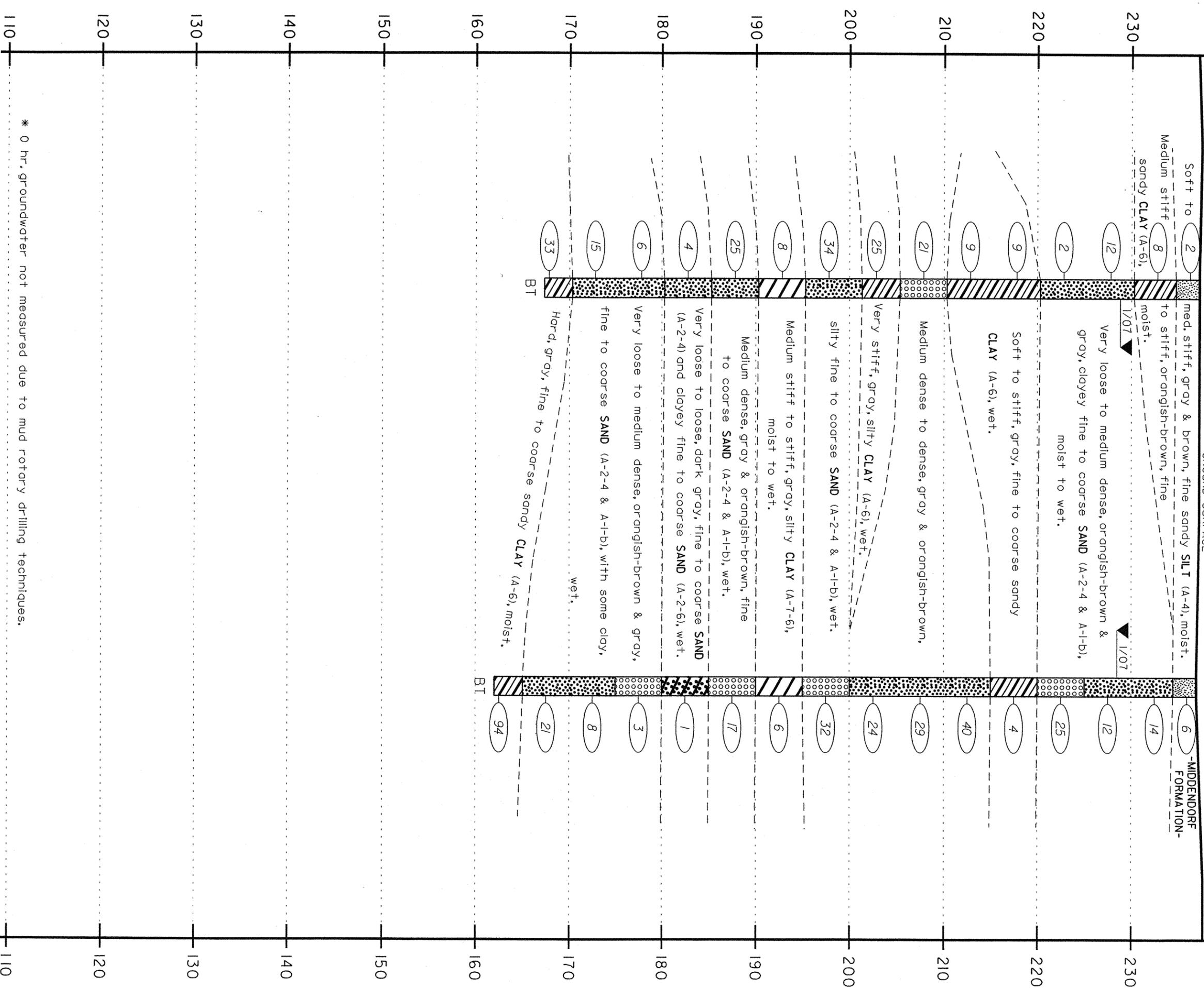
SECTION THROUGH PROPOSED END BENT 2

☐ SURVEY
-L-

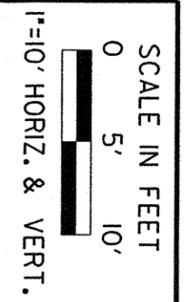
EB2-A
51+43
21' LT.

EB2-B
51+56
19' RT.

GROUND SURFACE



* 0 hr. groundwater not measured due to mud rotary drilling techniques.

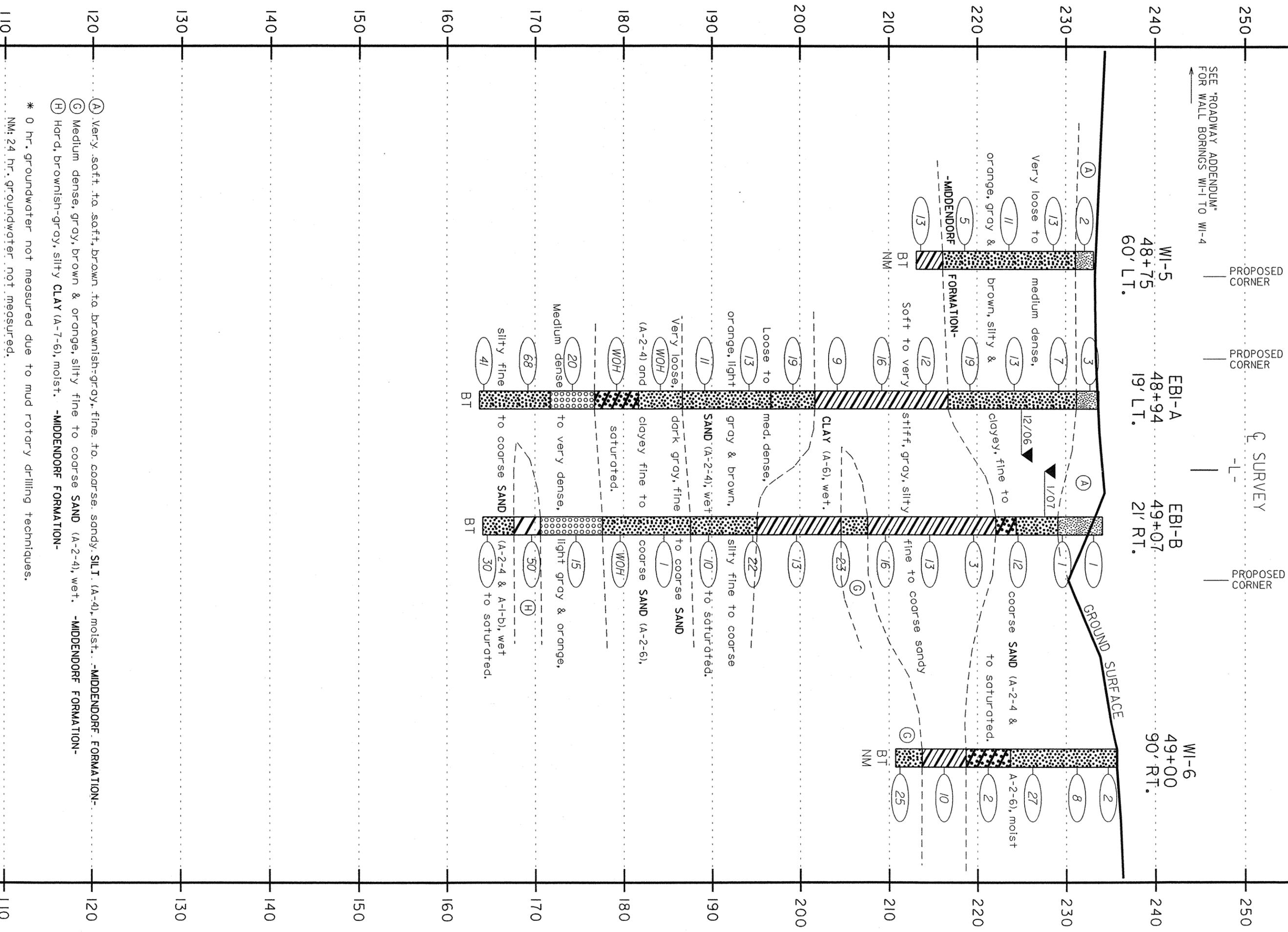


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LOCATION: Palmer St. Ext. from NC 211 at SR 149 to NC 20 at SR 1403	
PROJECT No.: 34979.1.1	COUNTY: Hoke
TIP No.: U-3816	FA No.: STP-0831(2)
DATE: 1/07	SCALE: 1"=10' HORIZ. & VERT. DRAWING No.: 5

PROFILE ALONG PROPOSED RETAINING WALL 1



SCALE IN FEET
 1"=30'
 1"=10'
 HORIZ. 0 5' 10'
 VERT. 0 5' 10'

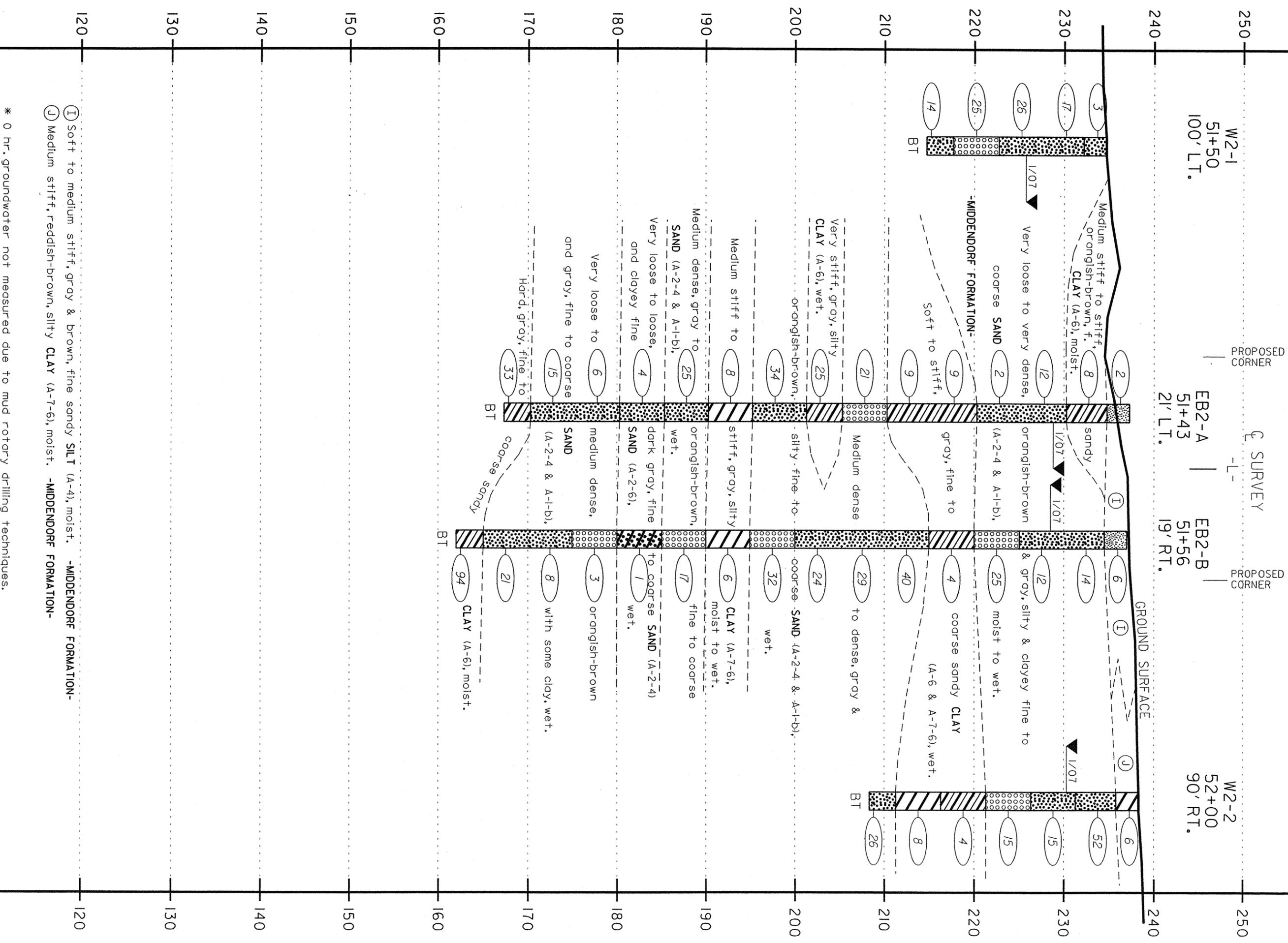
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CLIENT: N.C. Department of Transportation
 LOCATION: Palmer St. Ext. from NC 211 at SR 1149 to NC 20 at SR 1403
 PROJECT No.: 34979.1.1
 COUNTY: Hoke
 TIP No.: U-3816
 FA No.: STP-0831(2)
 DATE: 1/07
 SCALE: 1"=30' HORIZ.; 1"=10' VERT.
 DRAWING No.: 6

* 0 hr. groundwater not measured due to mud rotary drilling techniques.
 NM: 24 hr. groundwater not measured.

- (A) Very soft to soft, brown to brownish-gray, fine to coarse sandy SILT (A-4), moist. -MIDDENDORF FORMATION-
- (G) Medium dense, gray, brown & orange, silty fine to coarse SAND (A-2-4), wet. -MIDDENDORF FORMATION-
- (H) Hard, brownish-gray, silty CLAY (A-7-6), moist. -MIDDENDORF FORMATION-

PROFILE ALONG PROPOSED RETAINING WALL 2



W2-1
51+50
100' LT.

EB2-A
51+43
21' LT.

EB2-B
51+56
19' RT.

W2-2
52+00
90' RT.

PROPOSED CORNER

SURVEY

PROPOSED CORNER

GROUND SURFACE

- Ⓘ Soft to medium stiff, gray & brown, fine sandy SILT (A-4), moist. -MIDDENDORF FORMATION-
- Ⓙ Medium stiff, reddish-brown, silty CLAY (A-7-6), moist. -MIDDENDORF FORMATION-

* 0 hr. groundwater not measured due to mud rotary drilling techniques.

SCALE IN FEET
 1"=30' 0 15' 30'
 HORIZ. 0 5' 10'
 1"=10' 0 5' 10'
 VERT.



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CLIENT: N.C. Department of Transportation
 LOCATION: Palmer St. Ext. from NC 211 at SR 1149 to NC 20 at SR 1403
 PROJECT No.: 34979.11 COUNTY: Hoke
 TIP No.: U-3816 FA No.: STP-0831(2)
 DATE: 1/07 SCALE: 1"=30' HORIZ.; 1"=10' VERT. DRAWING No.: 7



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 BORING LOG

SHEET 1 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. NB-1		BORING LOCATION 48+50		OFFSET 0ft CL		ALIGNMENT -L-								
COLLAR ELEV. 234.9 ft		NORTHING 442,895		EASTING 1,934,872		0 HR. N/A*								
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		24 HR. NM								
DATE STARTED 12/15/06		COMPLETED 12/15/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100				
234.9												Ground Surface		
234.9	0.0	1	1	2								M	-MIDDENDORF FORMATION- Brown, fine to coarse sandy SILT (A-4).	
													M	Grayish-brown to gray, silty fine to coarse SAND (A-2-4).
231.4	3.5	4	6	11									W	
226.4	8.5	12	15	16									W	
221.4	13.5	10	12	13									W	
216.4	18.5	3	5	7									W	Gray, fine to coarse sandy silty CLAY (A-6).
211.4	23.5	4	6	10									W	
206.4	28.5	12	12	14									W	Orange & light gray, clayey silty fine to coarse SAND (A-2-4).
201.4	33.5	1	6	8									W	Dark gray & gray, fine to coarse sandy CLAY (A-6(3)), with little silt.
													SS-8	19.7%

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07



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 BORING LOG **13 OF 27**

SHEET 2 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. NB-1		BORING LOCATION 48+50		OFFSET 0ft CL		ALIGNMENT -L-								
COLLAR ELEV. 234.9 ft		NORTHING 442,895		EASTING 1,934,872		0 HR. N/A*								
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		24 HR. NM								
DATE STARTED 12/15/06		COMPLETED 12/15/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100				
197.5												Continued from previous page		
196.4	38.5	4	5	9								W	Dark gray & gray, fine to coarse sandy CLAY (A-6(3)), with little silt. (continued)	
191.4	43.5	5	7	9								W	Gray & orange, fine to coarse SAND (A-1-b).	
186.4	48.5	1	0	1								Sat.	Dark gray, fine SAND (A-2-4), with little clay.	
181.4	53.5	0	0	1								Sat.		
176.4	58.5	5	7	12								W	Light gray, fine to coarse SAND (A-1-b).	
171.4	63.5	9	20	33								W	Light gray & orange, fine sandy silty CLAY (A-6).	
166.4	68.5	19	29	31								W	Orange, silty fine to coarse SAND (A-2-4).	
														Boring Terminated at Elevation 164.9 ft in silty SAND (MIDDENDORF FORMATION)
														NOTES: * Groundwater not measured due to mud rotary drilling techniques.

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 BORING LOG

SHEET 1 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton											
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)							GROUND WATER (ft)										
BORING NO. EB1-A		BORING LOCATION 48+94		OFFSET 19ft LT	ALIGNMENT -L-		0 HR. N/A*										
COLLAR ELEV. 233.7 ft		NORTHING 442,913		EASTING 1,934,917		24 HR. 8.7											
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DATE STARTED 12/14/06		COMPLETED 12/14/06		SURFACE WATER DEPTH N/A													
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION					
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100				
233.7													Ground Surface	233.7	0.0		
233.7	0.0	1	1	2								M	-MIDDENDORF FORMATION- Brownish-gray, fine sandy SILT (A-4), with trace organics.	231.2	2.5		
230.2	3.5	3	3	4								M	Orange & light gray, fine to coarse SAND (A-2-4(0)), with little clay.				
225.2	8.5	7	4	9								SS-3	W				
220.2	13.5	7	9	10								W					
215.2	18.5	2	5	7								SS-5	18.6%	Light gray, fine to coarse sandy CLAY (A-6(6)).	216.7	17.0	
210.2	23.5	4	6	10								W					
205.2	28.5	6	3	6								W					
200.2	33.5	2	8	11								W		Light gray, fine to coarse SAND (A-2-4), with some clay.	201.7	32.0	
												W				196.7	37.0

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 BORING LOG

14 OF 27

SHEET 2 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton									
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)							GROUND WATER (ft)								
BORING NO. EB1-A		BORING LOCATION 48+94		OFFSET 19ft LT	ALIGNMENT -L-		0 HR. N/A*								
COLLAR ELEV. 233.7 ft		NORTHING 442,913		EASTING 1,934,917		24 HR. 8.7									
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DATE STARTED 12/14/06		COMPLETED 12/14/06		SURFACE WATER DEPTH N/A											
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100		
196.3													Continued from previous page		
195.2	38.5	8	4	9								W	Orange & light gray, silty fine to coarse SAND (A-2-4), with layers of clay. (continued)		
190.2	43.5	4	5	6								W			
186.7	47.0											W			
185.2	48.5	1	WOH	WOH								Sat.	Dark gray, fine to coarse SAND (A-2-4), with little clay.	186.7	47.0
181.7	52.0											Sat.			
180.2	53.5	WOH	WOH	WOH								SS-12	Dark gray, clayey fine to coarse SAND (A-2-6(0)).	181.7	52.0
176.7	57.0											Sat.			
175.2	58.5	6	11	9								SS-13	Light gray, fine to coarse SAND (A-1-b(0)), with little clay.	176.7	57.0
171.7	62.0											W			
170.2	63.5	8	14	54								W	Light gray & orange, fine to coarse SAND (A-2-4), with layers of clay.	171.7	62.0
165.2	68.5	17	19	22								W			
163.7	70.0											W			
													Boring Terminated at Elevation 163.7 ft in SAND (MIDDENDORF FORMATION)		

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/12/07

NOTES:
 * Groundwater not measured due to mud rotary drilling techniques.



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 BORING LOG

SHEET 1 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST D. Racey/P. Alton							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. EB1-B		BORING LOCATION 49+07		OFFSET 21ft RT		ALIGNMENT -L-							
COLLAR ELEV. 234.1 ft		NORTHING 442,872		EASTING 1,934,929		0 HR. N/A*							
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/13/06		COMPLETED 12/14/06		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
234.1	0.0	WOH	1	0									Ground Surface
230.6	3.5												-MIDDENDORF FORMATION- Brownish-gray, fine to coarse sandy SILT (A-4(0)), with some clay, trace organics in surface sample.
225.6	8.5												Gray-tan-orange, silty fine to coarse SAND (A-2-4).
220.6	13.5												Light gray, fine to coarse sandy CLAY (A-6).
215.6	18.5												Gray & orange, clayey SAND (A-2-6).
210.6	23.5												Gray, silty fine to coarse sandy CLAY (A-6).
205.6	28.5												Gray to brown, clayey fine to coarse SAND (A-2-4), with some silt.
200.6	33.5												Gray, silty fine to coarse sandy CLAY (A-6).

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/12/07



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 BORING LOG

15 OF 27

SHEET 2 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST D. Racey/P. Alton							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. EB1-B		BORING LOCATION 49+07		OFFSET 21ft RT		ALIGNMENT -L-							
COLLAR ELEV. 234.1 ft		NORTHING 442,872		EASTING 1,934,929		0 HR. N/A*							
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/13/06		COMPLETED 12/14/06		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
196.7													Continued from previous page
195.6	38.5												Gray, silty fine to coarse sandy CLAY (A-6). (continued)
190.6	43.5												Light brown with orange, silty fine to coarse SAND (A-2-4), with some clay.
185.6	48.5												Dark gray, fine to coarse SAND (A-2-4(0)), with little clay.
180.6	53.5												Light gray, fine to coarse SAND (A-1-b), with little clay.
175.6	58.5												Brownish-gray, silty CLAY (A-7-6), with trace fine sand.
170.6	63.5												Gray-orange-brown, silty fine to coarse SAND (A-2-4).
165.6	68.5												Boring Terminated at Elevation 164.1 ft in silty SAND (MIDDENDORF FORMATION)

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/12/07

NOTES:
 1) Geologist indicated strata breaks in split spoon at depths of 9.7', 29.5' & 39.0'.
 * Groundwater not measured due to mud rotary drilling techniques.



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 BORING LOG

SHEET 1 OF 3

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. B1-A		BORING LOCATION 50+23		OFFSET 13ft LT		ALIGNMENT -L-								
COLLAR ELEV. 225.9 ft		NORTHING 442,903		EASTING 1,935,046		0 HR. N/A*								
TOTAL DEPTH 100.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/27/06		COMPLETED 12/28/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
225.9													Ground Surface	
225.9	0.0	WOH	1	1								W	-MIDDENDORF FORMATION- Gray & orange, silty, fine to coarse SAND (A-2-4), with little clay, trace organics in upper 2 samples.	
222.4	3.5		2	4								W		
217.4	8.5		2	1								W		
212.4	13.5		2	6								W		
207.4	18.5		9	8								W		
202.4	23.5		3	3								W		
197.4	28.5		14	23								W		
192.4	33.5	WOH	1	4								W		
												W		Gray, fine to coarse sandy CLAY (A-6), with trace fine sand.
												W		

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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG 16 OF 27

SHEET 2 OF 3

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. B1-A		BORING LOCATION 50+23		OFFSET 13ft LT		ALIGNMENT -L-								
COLLAR ELEV. 225.9 ft		NORTHING 442,903		EASTING 1,935,046		0 HR. N/A*								
TOTAL DEPTH 100.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/27/06		COMPLETED 12/28/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
188.5													Continued from previous page	
187.4	38.5		3	3								W	Gray to orange-brown, fine to coarse SAND (A-2-4(0)), with little clay. (continued)	
182.4	43.5	WOH	1	1							SS-10	W		
177.4	48.5		1	4								W		
172.4	53.5		10	11								W		
167.4	58.5		33	45								W		
162.4	63.5		21	33								M		
157.4	68.5		12	14								W		
152.4	73.5		5	6								W		
												W		Tan & orange, fine to coarse SAND (A-1-b).
												W		Orange & gray, silty fine sandy CLAY (A-6), with trace mica.
												W	Light gray to orange & gray, clayey silty fine to coarse SAND (A-2-4).	

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PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)							GROUND WATER (ft)						
BORING NO. B1-A		BORING LOCATION 50+23		OFFSET 13ft LT		ALIGNMENT -L-							
COLLAR ELEV. 225.9 ft		NORTHING 442,903		EASTING 1,935,046		0 HR. N/A*							
TOTAL DEPTH 100.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		24 HR. NM							
DATE STARTED 12/27/06		COMPLETED 12/28/06		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				
151.1					Continued from previous page								
147.4	78.5	22	22	33								M	Light gray to orange & gray, clayey silty fine to coarse SAND (A-2-4). (continued)
142.4	83.5	12	13	19								W	Gray & orange, silty fine to coarse sandy CLAY (A-6).
137.4	88.5	7	22	23								W	Light gray & orange, silty fine to coarse SAND (A-2-4), with trace clay.
132.4	93.5	14	24	30								M	Gray, silty fine to coarse sandy CLAY (A-7-5), with trace mica.
127.4	98.5	12	23	36								M	Boring Terminated at Elevation 125.9 ft in sandy CLAY (MIDDENDORF FORMATION)
													NOTES: * Groundwater not measured due to mud rotary drilling techniques.

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 BORING LOG

SHEET 1 OF 3

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. B1-B		BORING LOCATION 50+36		OFFSET 13ft RT		ALIGNMENT -L-								
COLLAR ELEV. 228.2 ft		NORTHING 442,877		EASTING 1,935,058		0 HR. N/A*								
TOTAL DEPTH 90.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/20/06		COMPLETED 12/22/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
228.2													Ground Surface	
228.2	0.0	WOH	1	1									M	-MIDDENDORF FORMATION- Brown, gray & orange, silty & clayey, fine to coarse SAND (A-2-4(0)), with trace organics in surface sample.
224.7	3.5		9	8									M	
219.7	8.5		1	2									W	
214.7	13.5		2	6									W	
209.7	18.5		7	8									W	
204.7	23.5		3	11									W	
199.7	28.5		3	12									W	
194.7	33.5		2	2									W	
													W	
													W	

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 BORING LOG 18 OF 27

SHEET 2 OF 3

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)								
BORING NO. B1-B		BORING LOCATION 50+36		OFFSET 13ft RT		ALIGNMENT -L-								
COLLAR ELEV. 228.2 ft		NORTHING 442,877		EASTING 1,935,058		0 HR. N/A*								
TOTAL DEPTH 90.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/20/06		COMPLETED 12/22/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
190.8														Continued from previous page
189.7	38.5		2	2									W	Dark gray, fine SAND (A-2-4), with little clay. (continued)
184.7	43.5		1	WOH									Sat.	Dark gray, clayey fine to coarse SAND (A-2-6), with trace mica.
179.7	48.5		WOH	1									W	Brownish-yellow, silty fine to coarse sandy CLAY (A-6).
174.7	53.5		4	5									W	Light gray, silty fine to coarse SAND (A-2-4), with layers of gray clay.
169.7	58.5		13	28									W	Gray, silty CLAY (A-6(15)), with some fine to coarse sand.
164.7	63.5		6	4									W	Yellowish-brown, silty fine to coarse SAND (A-2-4), with trace clay.
159.7	68.5		24	31									W	Tan, silty fine SAND (A-2-4), with trace mica.
154.7	73.5		15	18									W	Tan, silty fine to coarse SAND (A-2-4).

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PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton								
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)							GROUND WATER (ft)							
BORING NO. B1-B		BORING LOCATION 50+36		OFFSET 13ft RT		ALIGNMENT -L-								
COLLAR ELEV. 228.2 ft		NORTHING 442,877		EASTING 1,935,058		0 HR. N/A*	24 HR. 3.0							
TOTAL DEPTH 90.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/20/06		COMPLETED 12/22/06		SURFACE WATER DEPTH N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
153.4					Continued from previous page									
													Tan, silty fine to coarse SAND (A-2-4). (continued)	
149.7	78.5	80	20/0.1'									M	151.2 77.0	Gray, fine to coarse sandy silty CLAY (A-7-6), with trace mica.
144.7	83.5	19	26	37								W	146.2 82.0	Brownish-orange, silty fine to coarse SAND (A-2-4), with trace clay.
139.7	88.5	14	32	42								W	138.2 90.0	Boring Terminated at Elevation 138.2 ft in silty SAND (MIDDENDORF FORMATION)
NOTES: * Groundwater not measured due to mud rotary drilling techniques.														

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 BORING LOG

SHEET 1 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. EB2-A		BORING LOCATION 51+43		OFFSET 21ft LT		ALIGNMENT -L-							
COLLAR ELEV. 237.3 ft		NORTHING 442,909		EASTING 1,935,166		0 HR. N/A*							
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/3/07		COMPLETED 1/3/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
237.3	0.0	WOH	1	1									Ground Surface
237.3	0.0											M	-MIDDENDORF FORMATION- Gray, fine sandy SILT (A-4).
233.8	3.5		3	4								M	Orangish-brown, fine sandy CLAY (A-6).
228.8	8.5		9	6								W	Orangish-brown to gray, clayey fine to coarse SAND (A-2-4).
223.8	13.5		3	1								W	
218.8	18.5		6	4								W	Gray, fine sandy CLAY (A-6).
213.8	23.5		3	4								W	
208.8	28.5		6	10								W	Gray, fine to coarse SAND (A-1-b).
203.8	33.5		10	9								W	Gray, silty CLAY (A-6), with some fine to coarse sand.

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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG **20 OF 27**

SHEET 2 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. EB2-A		BORING LOCATION 51+43		OFFSET 21ft LT		ALIGNMENT -L-							
COLLAR ELEV. 237.3 ft		NORTHING 442,909		EASTING 1,935,166		0 HR. N/A*							
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/3/07		COMPLETED 1/3/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
199.9													Continued from previous page
198.8	38.5		10	14								W	Gray & orangish-brown, silty fine to coarse SAND (A-2-4). (continued)
193.8	43.5		3	3								M	Gray, silty CLAY (A-7-6).
188.8	48.5		10	11								W	Gray & orangish-brown, silty fine to coarse SAND (A-2-4).
183.8	53.5		2	1								W	Dark gray, fine SAND (A-2-4).
178.8	58.5		1	4								W	Orangish-brown, silty fine to coarse SAND (A-2-4), with some clay.
173.8	63.5		1	3								W	
168.8	68.5		9	13								M	Gray, fine to coarse sandy CLAY (A-6), with trace mica.
													Boring Terminated at Elevation 167.3 ft in sandy CLAY (MIDDENDORF FORMATION)

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07

NOTES:
 * Groundwater not measured due to mud rotary drilling techniques.



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PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin						
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)							GROUND WATER (ft)					
BORING NO. EB2-B		BORING LOCATION 51+56		OFFSET 19ft RT		ALIGNMENT -L-						
COLLAR ELEV. 237.0 ft		NORTHING 442,868		EASTING 1,935,178		0 HR. N/A*						
TOTAL DEPTH 75.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		24 HR. 8.5						
DATE STARTED 1/4/07		COMPLETED 1/4/07		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION
		0.5ft	0.5ft	0.5ft	0	20	40	60	80			
162.2					Continued from previous page							
												162.0 Boring Terminated at Elevation 162.0 ft in silty CLAY (MIDDENDORF FORMATION) 75.0
												NOTES: * Groundwater not measured due to mud rotary drilling techniques.

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07



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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG

SHEET 1 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. NB-2		BORING LOCATION 52+00		OFFSET 0ft CL	ALIGNMENT -L-	0 HR. N/A*	24 HR. 9.0						
COLLAR ELEV. 237.8 ft		NORTHING 442,886		EASTING 1,935,222									
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/4/07		COMPLETED 1/4/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
237.8	0.0	WOH	2	4	Ground Surface						M		237.8 0.0
234.3	3.5		21	24							M	-MIDDENDORF FORMATION- Brown, fine sandy SILT (A-4).	235.3 2.5
229.3	8.5		8	11							W	Orangish-brown, silty fine SAND (A-2-4).	230.8 7.0
224.3	13.5		2	1							W	Orangish-brown, fine to coarse SAND (A-1-b).	225.8 12.0
219.3	18.5		1	2							W	Light gray & orange, silty fine SAND (A-2-4), with some clay.	220.8 17.0
214.3	23.5		2	6							W	Gray, fine to coarse sandy CLAY (A-6).	215.8 22.0
209.3	28.5		8	14							W	Orangish-brown to gray, silty fine to coarse SAND (A-2-4).	
204.3	33.5		6	5							W		

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 BORING LOG 23 OF 27

SHEET 2 OF 2

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. NB-2		BORING LOCATION 52+00		OFFSET 0ft CL	ALIGNMENT -L-	0 HR. N/A*	24 HR. 9.0						
COLLAR ELEV. 237.8 ft		NORTHING 442,886		EASTING 1,935,222									
TOTAL DEPTH 70.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/4/07		COMPLETED 1/4/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
200.4		Continued from previous page											
199.3	38.5		12	18							W	Orangish-brown to gray, silty fine to coarse SAND (A-2-4). (continued)	195.8 42.0
194.3	43.5		2	4							W	Gray, silty CLAY (A-7-6).	190.8 47.0
189.3	48.5		11	13							W	Gray, fine to coarse SAND (A-1-b).	185.8 52.0
184.3	53.5		2	2							W	Dark gray, silty fine to coarse SAND (A-2-4).	180.8 57.0
179.3	58.5		WOH	WOH	6						W	Dark gray, clayey fine to coarse SAND (A-2-6).	177.3 60.5
174.3	63.5		3	6							W	Orangish-brown, clayey fine to coarse SAND (A-2-4).	
169.3	68.5		8	9							W		
													167.8 70.0

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/12/07

Boring Terminated at Elevation 167.8 ft in clayey SAND (MIDDENDORF FORMATION)

NOTES:
 1) Driller indicated harder drilling at a depth of 60.5'.
 * Groundwater not measured due to mud rotary drilling techniques.



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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG

SHEET 1 OF 1

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. W1-5		BORING LOCATION 48+75		OFFSET 60ft LT		ALIGNMENT -L-							
COLLAR ELEV. 233.1 ft		NORTHING 442,954		EASTING 1,934,899		0 HR. N/A*							
TOTAL DEPTH 20.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/29/06		COMPLETED 12/29/06		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
233.1													Ground Surface
233.1	0.0	1	1	1								M	-MIDDENDORF FORMATION- Brown, fine to coarse sandy SILT (A-4).
													231.1
229.6	3.5	2	6	7								M	Tan to light gray & grayish-brown, silty fine to coarse SAND (A-2-4), with trace clay.
224.6	8.5	2	4	7								W	
219.6	13.5	4	3	2								W	
214.6	18.5	3	5	8								W	Gray, silty fine to coarse sandy CLAY (A-6).
													213.1
Boring Terminated at Elevation 213.1 ft in sandy CLAY (MIDDENDORF FORMATION)													
NOTES: * Groundwater not measured due to mud rotary drilling techniques.													

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07



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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG 24 OF 27

SHEET 1 OF 1

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST P. Alton							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. W1-6		BORING LOCATION 49+00		OFFSET 90ft RT		ALIGNMENT -L-							
COLLAR ELEV. 235.7 ft		NORTHING 442,803		EASTING 1,934,920		0 HR. N/A*							
TOTAL DEPTH 25.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/29/06		COMPLETED 12/29/06		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
235.7													Ground Surface
235.7	0.0	WOH	1	1								M	-MIDDENDORF FORMATION- Brown, silty fine to coarse SAND (A-2-4).
													231.1
232.2	3.5	4	4	4								M	
227.2	8.5	7	11	16								W	
222.2	13.5	1	1	1								W	Gray & orange, silty clayey fine to coarse SAND (A-2-6).
													218.7
217.2	18.5	2	5	5								W	Gray, silty fine to coarse sandy CLAY (A-6).
													213.7
212.2	23.5	11	14	11								W	Light gray & orange, silty fine to coarse SAND (A-2-4), with trace clay.
													210.7
Boring Terminated at Elevation 210.7 ft in silty SAND (MIDDENDORF FORMATION)													
NOTES: * Groundwater not measured due to mud rotary drilling techniques.													

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07



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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG

SHEET 1 OF 1

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. W2-1		BORING LOCATION 51+50		OFFSET 100ft LT		ALIGNMENT -L-							
COLLAR ELEV. 234.7 ft		NORTHING 442,987		EASTING 1,935,175		0 HR. N/A*							
TOTAL DEPTH 20.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/3/07		COMPLETED 1/3/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
234.7	0.0	WOH	2	1									Ground Surface
234.7	0.0											M	-MIDDENDORF FORMATION- Gray, silty fine SAND (A-2-4), with some clay.
231.2	3.5		6	8	9							M	Gray & brown, silty fine to coarse SAND (A-2-4), with some clay.
226.2	8.5		8	11	15							W	Orangish-brown to gray, fine to coarse SAND (A-1-b), with trace clay.
221.2	13.5		8	14	11							W	Gray, fine to coarse SAND (A-2-4), with trace clay.
216.2	18.5		6	7	7							W	Gray, fine to coarse SAND (A-2-4), with trace clay.
													Boring Terminated at Elevation 214.7 ft in SAND (MIDDENDORF FORMATION)
													NOTES: * Groundwater not measured due to mud rotary drilling techniques.

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07



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N.C.D.O.T. GEOTECHNICAL UNIT
 BORING LOG 25 OF 27

SHEET 1 OF 1

PROJECT NO. 34979.1.1		ID. U-3816		COUNTY Hoke		GEOLOGIST C. Baldwin							
SITE DESCRIPTION Palmer St. Extension from NC 211 at SR 1149 (McLean Rd.) to NC 20 at SR 1403 (Prospect Ave.)						GROUND WATER (ft)							
BORING NO. W2-2		BORING LOCATION 52+00		OFFSET 90ft RT		ALIGNMENT -L-							
COLLAR ELEV. 238.3 ft		NORTHING 442,796		EASTING 1,935,220		0 HR. N/A*							
TOTAL DEPTH 30.0 ft		DRILL MACHINE CME 55 Track		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DATE STARTED 1/3/07		COMPLETED 1/3/07		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
238.3	0.0												Ground Surface
238.3	0.0		1	2	4							M	-MIDDENDORF FORMATION- Reddish-brown, silty CLAY (A-7-6).
234.8	3.5		23	24	28							M	Yellowish-brown & orangish-brown, silty fine SAND (A-2-4).
229.8	8.5		6	7	8							W	Orangish-brown, silty fine to coarse SAND (A-2-4).
224.8	13.5		6	7	8							W	Gray, fine to coarse SAND (A-1-b), with some gravel & clay.
219.8	18.5		2	2	2							W	Gray, fine to coarse SAND (A-2-4), with trace clay.
214.8	23.5		2	4	4							W	Gray, silty CLAY (A-7-6), with little fine to coarse sand.
209.8	28.5		6	11	15							W	Gray, silty fine to coarse SAND (A-2-4).
													Boring Terminated at Elevation 208.3 ft in SAND (MIDDENDORF FORMATION)
													NOTES: * Groundwater not measured due to mud rotary drilling techniques.

NCDOT BORE SINGLE H66-180G.GPJ NC_DOT.GDT 1/11/07

North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: U-3816
 DESCRIPTION: Palmer Avenue Extension from NC 211 at SR 1149 to NC 20 at SR 1403

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 34979.1.1	COUNTY: Hoke
DATE SAMPLED: 12/06	RECEIVED: 12/6/07
SAMPLED FROM: -L-	REPORTED: 1/10/07
SUBMITTED BY: Beth Howey	BY: Dave Jenks

TEST RESULTS

PROJ. SAMPLE NO.	EB1-A	EB1-A	EB1-A	EB1-A	EB1-B	EB1-B	B1-A	B1-B	B1-B	NB-1						
BORING NO.	SS-3	SS-5	SS-12	SS-13	SS-2	SS-11	SS-10	SS-6	SS-13	SS-8						
Retained #4 Sieve %	0.0	0.0	0.7	0.2	0.0	0.1	0.1	0.0	0.0	0.0						
Passing #10 Sieve %	99.5	99.8	91.8	96.9	99.0	99.6	99.3	99.9	99.9	99.8						
Passing #40 Sieve %	66.9	77.2	69.5	37.9	77.9	88.7	88.4	56.0	94.2	80.3						
Passing #200 Sieve %	17.2	48.4	17.1	7.8	39.9	13.0	12.8	11.1	86.3	43.1						

SOIL MORTAR - 100%																
Coarse Sand Ret - #60 %	53.1	34.7	28.1	76.5	35.1	13.5	13.7	70.1	7.2	34.2						
Fine Sand Ret - #270 %	31.0	18.8	46.2	12.2	30.7	74.7	69.9	12.2	11.8	25.4						
Silt 0.053 - 0.010 mm %	0.0	0.0	0.0	0.0	8.8	0.0	0.0	0.0	20.2	14.8						
Clay < 0.010 mm %	15.9	46.5	25.7	11.3	25.4	11.8	16.4	17.7	60.8	25.6						
L.L.	15	39	32	15	19	23	22	17	38	31						
P.L.	NP	19	19	NP	17	NP	NP	NP	20	16						
P.I.	NP	20	13	NP	2	NP	NP	NP	18	15						
AASHTO Classification	A-2-4 (0)	A-6 (6)	A-2-6 (0)	A-1-b (0)	A-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-6 (15)	A-6 (3)						
Station	48+94	48+94	48+94	48+94	49+07	49+07	50+23	50+36	50+36	48+50						
Offset	19 ft LT	19 ft LT	19 ft LT	19 ft LT	21 ft RT	21 ft RT	13 ft LT	13 ft RT	13 ft RT	CL						
Depth (ft)	8.5	18.5	53.5	58.5	3.5	48.5	43.5	23.5	58.5	33.5						
to	10.0	20.0	55.0	60.0	5.0	50.0	45.0	25.0	60.0	35.0						
Moisture Content (%)	NR	18.6	NT	NR	16.1	NR	NR	NR	18.1	19.7						

NP=Not plastic
 NR=Not reported
 NT=Not tested

E.C. Howey, L.G., P.E.
 Soils Engineer



SITE PHOTOGRAPHS



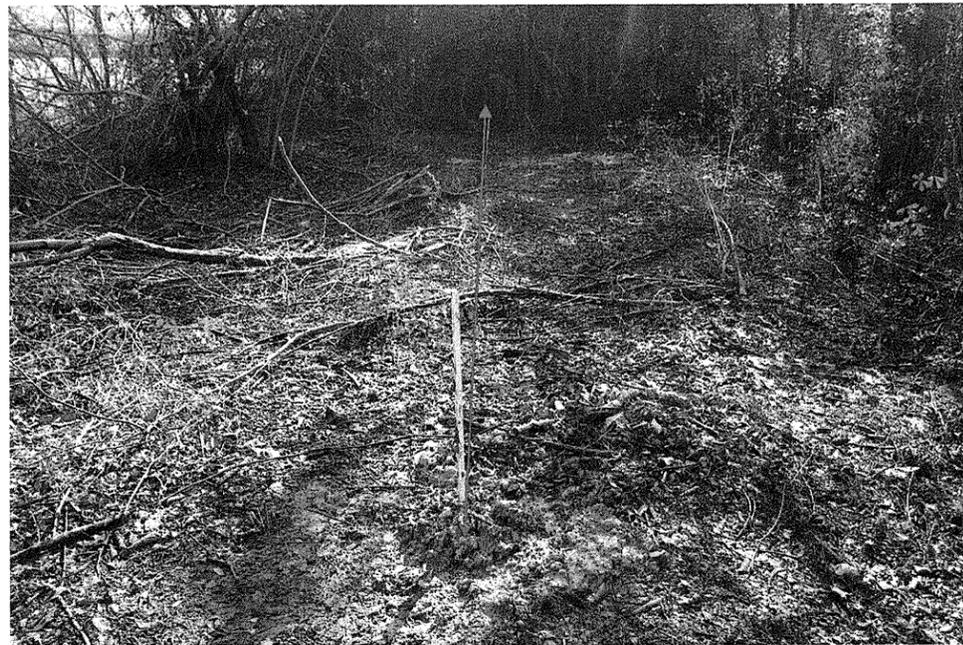
Photograph No. 1: Profile view right of -L-, looking east.



Photograph No. 3: Cross-section view of Bent 1, looking south.



Photograph No. 2: Cross-section view of End Bent 1, looking south.



Photograph No. 4: Cross-section view of End Bent 2, looking south.