

REFERENCE: B-5783

PROJECT: 45738

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5783	1	17

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LINE	STATION	PLAN	CROSS SECTIONS
-EL-	5+25.17 - 32+84.39	4-6	7-II

**CROSS SECTIONS**

LINE	STATION	SHEETS
-EL-	11+00.00	7
-EL-	13+00.00	7
-EL-	15+00.00	7
-EL-	16+00.00 - 19+00.00	8,9
-EL-	23+00.00	9
-EL-	25+00.00	10
-EL-	27+00.00	10
-EL-	28+50.00	10
-EL-	30+00.00	11
-EL-	32+00.00	11

**APPENDICES**

APPENDIX	TITLE	SHEETS
A	LABORATORY TEST RESULTS	12-14

# ROADWAY SUBSURFACE INVESTIGATION

COUNTY DAVIDSON  
PROJECT DESCRIPTION REPLACE BRIDGE NO.164  
AND BRIDGE NO.168 ON US 29 /US 70 OVER  
NORFOLK SOUTHERN RAILWAY

## INVENTORY

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 CONTRACTOR 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 THE 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.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  2. 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.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY HILL, M.J.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JUNE 2022



DocuSigned by:  
W. Scott Hunsberger 06/22/2022

5A469AC80FC0D49E SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

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

# SUBSURFACE INVESTIGATION

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																	
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>																																								<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>																																								<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>																																								<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT 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, SUCH 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 THAT 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 DISLOADED FROM PARENT MATERIAL.  <b>FLOOD PLAIN (FP)</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 (MOT.)</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 (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  <b>ROCK QUALITY DESIGNATION (ROD)</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 THAT 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, THAT 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  <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 (SROD)</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 (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																							
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b>										<b>WEATHERED ROCK (WR)</b>										<b>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>																																																																																																																																	
<p>GENERAL CLASS. GRANULAR MATERIALS (&lt;= 35% PASSING #200) SILT-CLAY MATERIALS (&gt; 35% PASSING #200) ORGANIC MATERIALS</p>										<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>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.</p>										<p>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.</p>																																																																																																																																	
<b>MINERALOGICAL COMPOSITION</b>										<b>COMPRESSION</b>										<b>WEATHERING</b>										<b>CRUSTALLINE ROCK (CR)</b>																																																																																																																																	
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL &lt; 31          MODERATELY COMPRESSIBLE LL = 31 - 50          HIGHLY COMPRESSIBLE LL &gt; 50</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>										<p>VERY SLIGHT (IV SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p>																																																																																																																																	
<b>PERCENTAGE OF MATERIAL</b>										<b>GROUND WATER</b>										<b>MODERATE (MOD.)</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>																																																																																																																																	
<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p> <p>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 &gt; 10% &gt; 20% HIGHLY 35% AND ABOVE</p>										<p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING          STATIC WATER LEVEL AFTER 24 HOURS          PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA          SPRING OR SEEP</p>										<p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL</p>										<p>SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</p>																																																																																																																																	
<b>CONSISTENCY OR DENSENESS</b>										<b>MISCELLANEOUS SYMBOLS</b>										<b>SEVERE (SEV.)</b>										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>																																																																																																																																	
<p>PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION          SOIL SYMBOL          ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT          INFERRED SOIL BOUNDARY          INFERRED ROCK LINE          ALLUVIAL SOIL BOUNDARY</p>										<p>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES          SPT DMT TEST BORING          AUGER BORING          CORE BORING          MONITORING WELL          PIEZOMETER INSTALLATION          SLOPE INDICATOR INSTALLATION          CONE PENETROMETER TEST          SOUNDING ROD          TEST BORING WITH CORE          SPT N-VALUE</p>										<p>VERY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL</p>																																																																																																																																	
<b>TEXTURE OR GRAIN SIZE</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>VERY HARD</b>										<b>CRUSTALLINE ROCK (CR)</b>																																																																																																																																	
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270          4.75 2.00 0.42 0.25 0.075 0.053</p>										<p>UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL          SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p>										<p>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.</p>																																																																																																																																	
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>ABBREVIATIONS</b>										<b>MODERATELY HARD</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>																																																																																																																																	
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p>										<p>AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST          BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED          CL. - CLAY MOD. - MODERATELY UNIT WEIGHT          CPT - CLAY CONE PENETRATION TEST NP - NON PLASTIC % - DRY UNIT WEIGHT          CSE. - COARSE ORG. - ORGANIC PMT - PRESSUREMETER TEST          DMT - DILATOMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY          DPT - DYNAMIC PENETRATION TEST SL. - SILTY, SILTY          e - VOID RATIO FOSS. - FOSSILIFEROUS SLI. - SLIGHTLY          F - FINE FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL          HI. - HIGHLY FRAG. - FRAGMENTS w - MOISTURE CONTENT          V - VERY</p>										<p>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.</p>										<p>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.</p>																																																																																																																																	
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<p>NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC</p>										<p>DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:</p>										<p>CAN BE GROUDED OR GOUGED 0.05 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.</p>										<p>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.</p>																																																																																																																																	
<b>COLOR</b>										<b>FRACATURE SPACING</b>										<b>VERY SOFT</b>										<b>SOFT</b>																																																																																																																																	
<p>DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>VERY WIDE MORE THAN 10 FEET          WIDE 3 TO 10 FEET          MODERATELY CLOSE 1 TO 3 FEET          CLOSE 0.16 TO 1 FOOT          VERY CLOSE LESS THAN 0.16 FEET</p>										<p>FRAGMENTS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>										<p>FRAGMENTS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>																																																																																																																																	
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**CONTRACT: TIP PROJECT: B-5783**

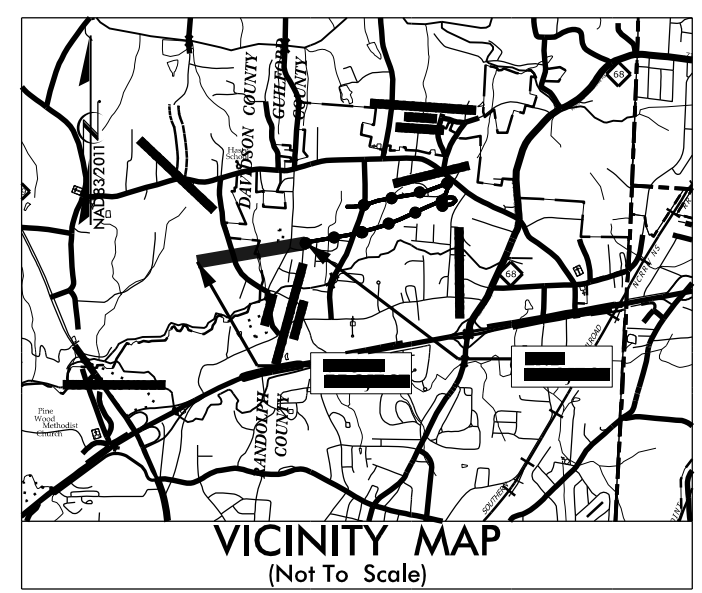
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**DAVIDSON COUNTY**

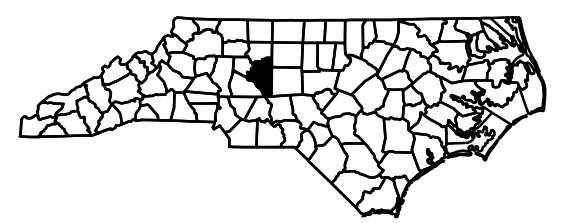
LOCATION: BRIDGE NO. 164 AND NO. 168 ON US 29 /US 70  
OVER NORFOLK SOUTHERN RAILROAD

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

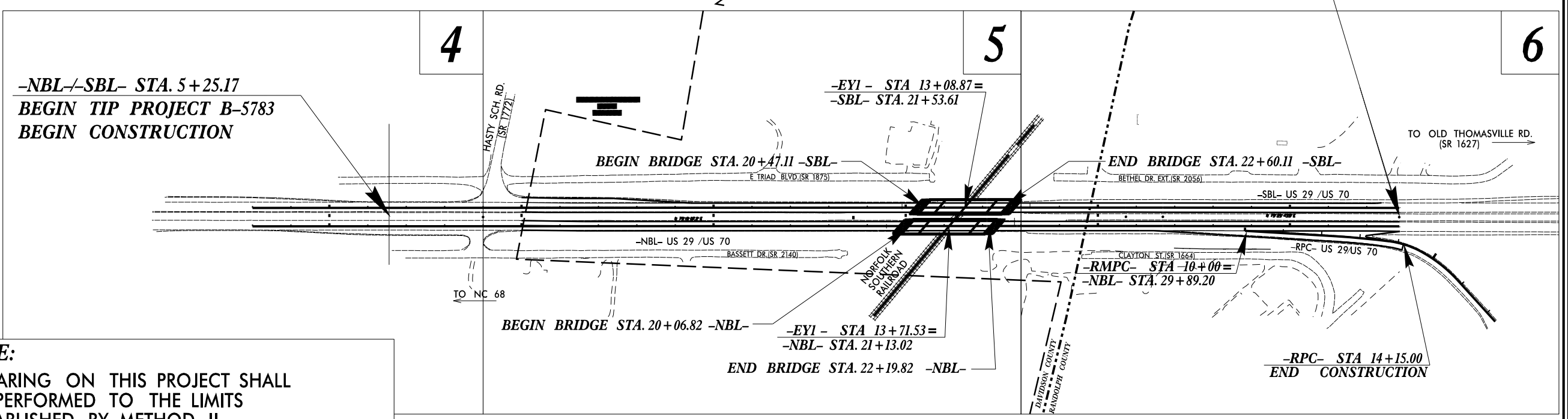
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5783	2A	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45738.1.2	N/A	PE	



65% PLAN SUBMITTAL



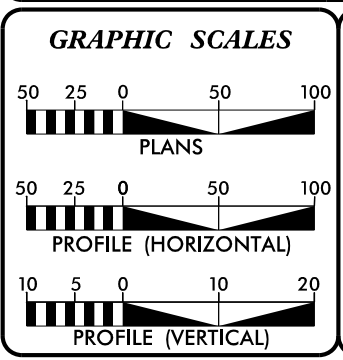
OFF SITE DETOUR



**NOTE:**

- CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II
- A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THOMASVILLE

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION  
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

ADT (2016) =	24,600
ADT (2040) =	28,300
K =	10 %
D =	65 %
T =	12 % *
V =	60 MPH
* TTST = 4	DUAL = 8
FUNC CLASS =	RURAL MINOR ARTERIAL

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-5783 =	0.484 MILES
LENGTH STRUCTURE TIP PROJECT B-5783 =	0.081 MILES
TOTAL LENGTH OF TIP PROJECT B-5783 =	0.565 MILES

Prepared for the North Carolina Department of Transportation in the Office of:

**DAVENPORT**  
2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: **JANUARY 25, 2022**

LETTING DATE: **MAY 16, 2023**

NCDOT CONTACT: **RYAN C. NEWCOMB, PE**  
DIVISION PROJECT ENGINEER

EDITH G. PETERS, PE  
PROJECT ENGINEER

ALAN MORRISON, PE  
PROJECT DESIGN ENGINEER

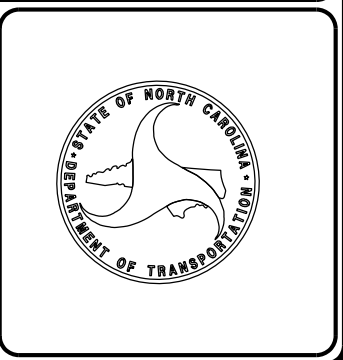
RYAN C. NEWCOMB, PE  
DIVISION PROJECT ENGINEER

**HYDRAULICS ENGINEER**

\_\_\_\_\_  
SIGNATURE: P.E.

**ROADWAY DESIGN ENGINEER**

\_\_\_\_\_  
SIGNATURE: P.E.





## Roadway Subsurface Investigation Report - Inventory

**TIP No.:** B-5783  
**COUNTY:** Davidson  
**DESCRIPTION:** Replace Bridge No. 164 and No. 168 on US 29/70 Over Norfolk Southern Railway  
**SUBJECT:** Roadway Subsurface Investigation – Inventory

### PROJECT DESCRIPTION

This project consists of the replacement of the two bridges on US29/70 over the Norfolk Southern Rail line in High Point, NC. The project will also include widening and improvements to US 29/70 leading up to the new bridges.

The investigation was conducted on March 28<sup>th</sup>, 2022 in general accordance with our Proposal to Provide Geotechnical Engineering Services. The information provided in this report is based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of ten (10) Standard Penetration Test (SPT) borings and one (1) hand auger boring were advanced for the project. All mechanical borings were drilled using a CME-550X ATV mounted drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers, and SPT testing was performed with an automatic hammer. Representative soil samples, collected with a split-barrel sampler were selected for laboratory testing to verify visual field classifications. In addition, two bulk samples were collected for standard Proctor compaction and California Bearing Ratio (CBR) testing.

**Replace Bridge No. 164 and No. 168 on US 29/70 Over Norfolk Southern Railway**  
**High Point, North Carolina**  
**Falcon Project No.: G22013.00**

**Prepared for:**  
N. C. Department of Transportation  
Geotechnical Engineering Unit  
1589 Mail Service Center  
Raleigh, NC 27699

Submitted by:  
Falcon Engineering, Inc.  
1210 Trinity Road, Suite 110  
Cary, North Carolina 27513  
(919) 871-0800  
www.falconengineers.com

June 17, 2022



Portions of the following alignment, totaling approximately 0.484 miles were investigated. Other ramp alignments are included on the project but improvements are not anticipated to be significant enough to warrant investigation.

<u>Alignment</u>	<u>Station (ft)</u>
-SBL-/-NBL- (US 29/US 70)	5+25.17 to 32+84.39

## AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. The following locations encountered highly plastic (PI greater than 36) within 4 feet of the ground surface:

<u>Alignment</u>	<u>Station (ft)</u>	<u>Offset</u>
-L-	17+07	51' RT
-L-	18+80	53' LT

- II. The following locations encountered shallow groundwater within 6 feet of the ground surface:

<u>Alignment</u>	<u>Station (ft)</u>	<u>Offset</u>
-L-	13+01	5' LT

## PHYSIOGRAPHY AND GEOLOGY

According to the *Geologic Map of North Carolina* (1985), the site is located in the Charlotte Belt. Specifically, rocks at the site are noted as the Metamorphosed Granitic Rock (**CZg**), consisting of Metamorphosed Granitic Rock - megacrystic, well foliated, locally contains hornblende; Fountain intrusive.

The project corridor is located in southwest High Point. Existing site topography slopes generally downward from east to west, peaking at the bridges over the Norfolk Southern Railroad. The existing corridor is developed with commercial buildings, with small areas of undeveloped land throughout the corridor. The Norfolk Southern Railroad runs northeast and southwest. The bridges will be replaced. That investigation and recommendations will be provided by others.

## SOIL PROPERTIES

A variety of soils were encountered along the project, including existing Roadway Embankment fill, Residual soils and Weathered and Crystalline Rock.

Roadway Embankment soils were encountered at the ground surface adjacent to or beneath existing roadways. These soils consist of 2 to 10 feet of moist, soft to medium stiff, sandy and clayey silt and silty clay (A-4, A-5, A-7).

Residual soils were encountered at ground surface or beneath the roadway embankment fills. These soils consist of moist to wet, medium stiff to very stiff, sandy and clayey silt and sandy and silty clay (A-4, A-5, A-6, A-7) and loose to very dense, silty sand (A-2-4) with trace rock fragments.

Weathered Rock (WR) is a very hard material with properties intermediate of soil and rock. WR is classified as having an N-value of greater than 100 blows per one foot. WR encountered on the project generally consists of tan and gray weathered metamorphosed granitic rock and was encountered at two locations explored at a range varying from 867.8' to 885.9', msl.

Crystalline Rock (CR), in the form of metamorphosed granitic rock, was encountered beneath WR at one location at approximately 884.4 ft, msl. CR is classified as material that yields auger refusal or SPT refusal (blow count of 60/0.0 or 60/0.1 feet.)



## GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion and after a waiting period of 24 hours. All borings drilled in close proximity to existing roadways were backfilled immediately after completion due to safety considerations. While no natural bodies of water or streams are located in the project corridor, a retention pond is located north of US 29/70 north of the project boundaries and Hunts Fork Creek runs parallel to the project corridor to the south.

## ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

Sample	Location	Depth (ft)	Test
BS-1	14+97, 60' LT, -L-	1.0 – 8.0	California Bearing Ratio, Standard Proctor
BS-2	10+98, 63' RT, -L-	1.0 – 11.0	California Bearing Ratio, Standard Proctor

Classification test results for the bulk samples are included in the subsurface cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in the Appendix.

## CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

### FALCON ENGINEERING, INC.

Report Prepared By:

Report Reviewed By:


W. Scott Hunsberger, PE  
*Geotechnical Engineer*

Jeremy R. Hamm, PE  
*Geotechnical Engineering Manager*

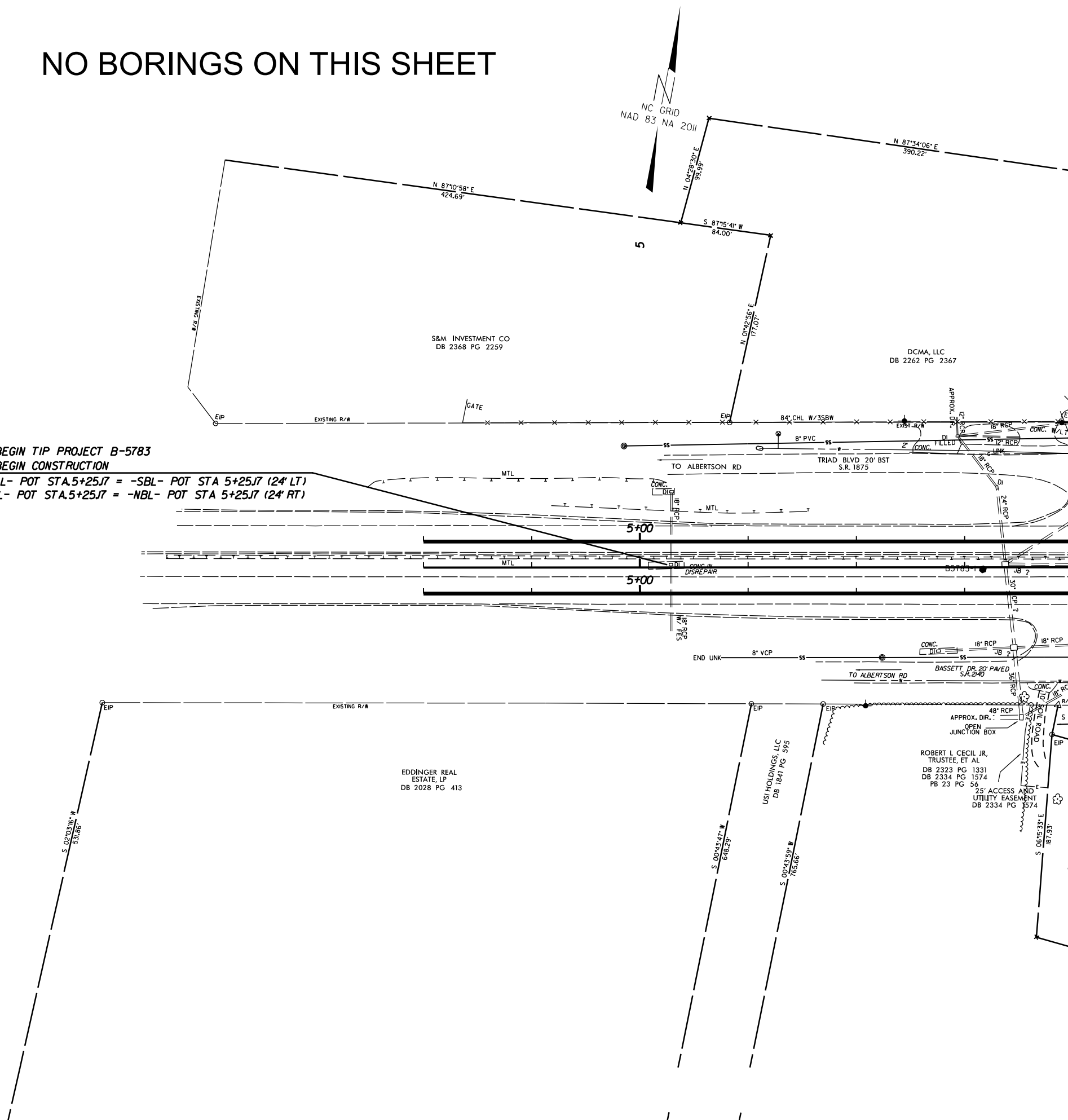




# NO BORINGS ON THIS SHEET

PROJECT REFERENCE NO. <b>B-5783</b>	SHEET NO. <b>4</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
 <b>DAVENPORT</b> HOME OFFICE 119 BROOKSTOWN AVE, SUITE PH1 WINSTON-SALEM, NC 27101 336.74.1636 www.davenport.com NCELS FIRM LICENSE NO. C-2922	

**BEGIN TIP PROJECT B-5783**  
**BEGIN CONSTRUCTION**  
 -EL- POT STA.5+25.77 = -SBL- POT STA 5+25.77 (24' LT)  
 -EL- POT STA.5+25.77 = -NBL- POT STA 5+25.77 (24' RT)



MATCHLINE STA. 9+00 SHEET 5

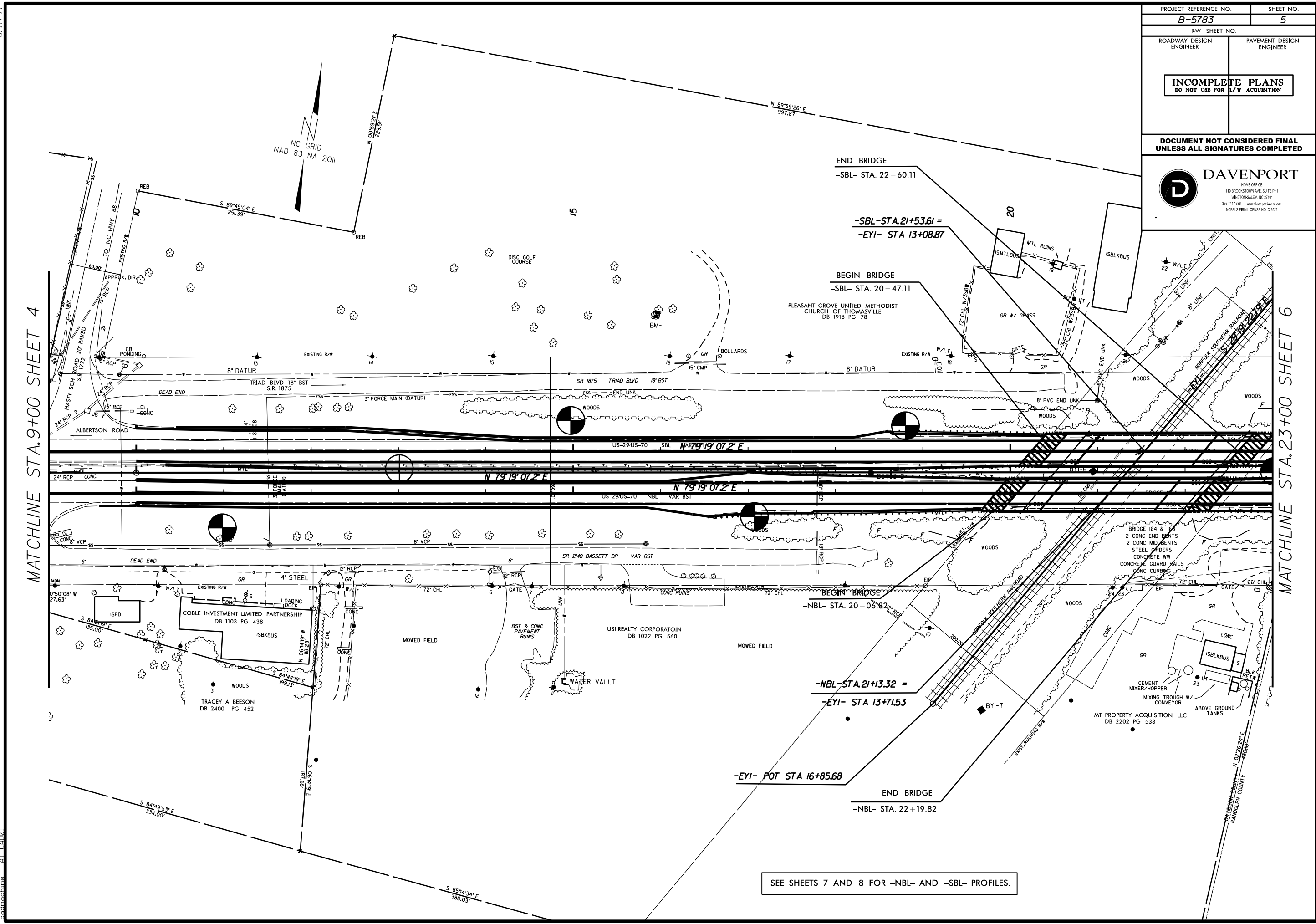
8/17/09

PROJECT REFERENCE NO. <b>B-5783</b>		SHEET NO. <b>5</b>	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER		PAVEMENT DESIGN ENGINEER	
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336.741.1636 www.davenportna.com  
NCELS FIRM LICENSE NO. C-2022

MATCHLINE STA. 9+00 SHEET 4

MATCHLINE STA. 23+00 SHEET 6



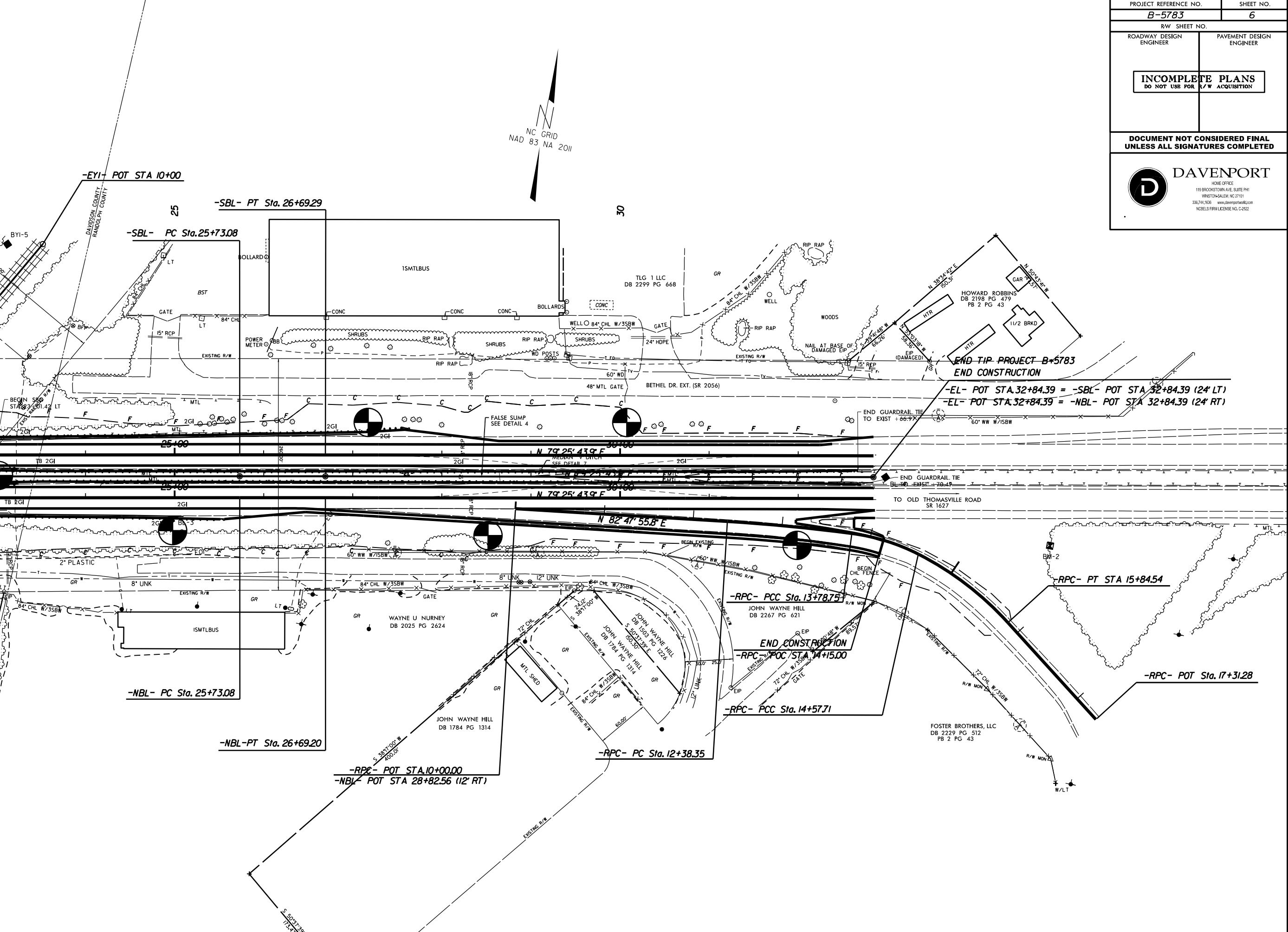
SEE SHEETS 7 AND 8 FOR -NBL- AND -SBL- PROFILES.


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MATCHLINE STA.23+00 SHEET 5

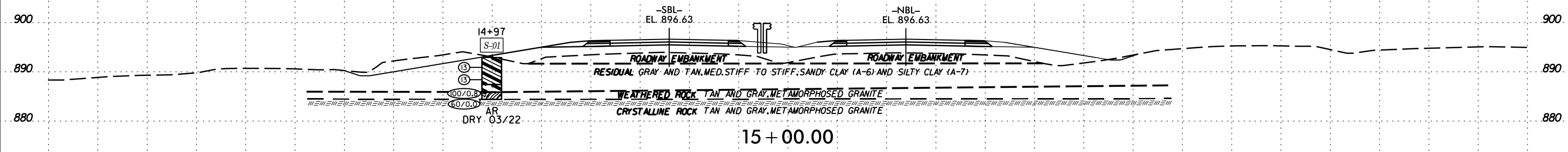


PROJECT REFERENCE NO. <b>B-5783</b>	SHEET NO. <b>6</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	
 <b>DAVENPORT</b> HOME OFFICE 119 BROOKSTOWN AVE. SUITE PH1 WINSTON-SALEM, NC 27101 336.741.1636 www.davenport.com NCELS FIRM LICENSE NO. C-2922	

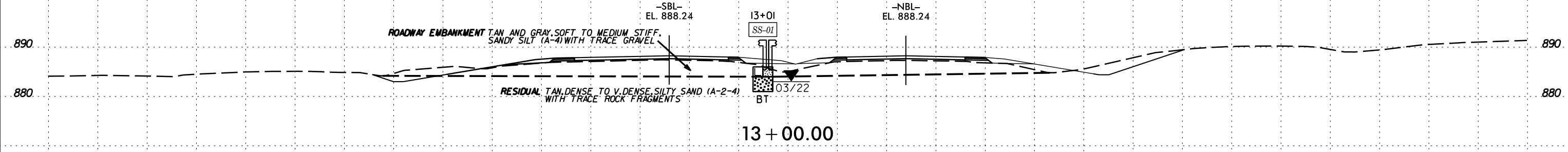


**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

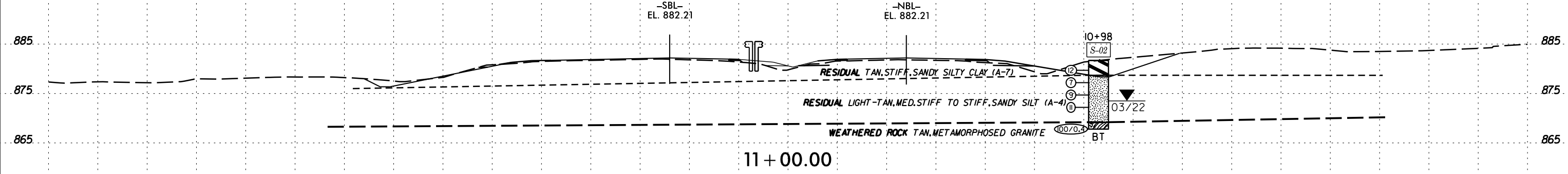
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SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-01	60 FT LT	14+97	1.0' - 8.0'	A-6	37	15	5	28	34	33	100	97	77	21	-



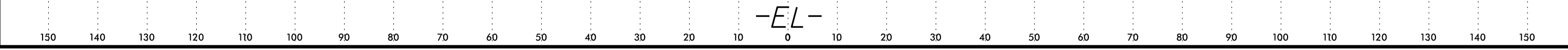
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-01	5 FT LT	13+01	0.5' - 1.5'	A-4	36	10	16	26	32	26	97	88	64	33	-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-02	63' RT	10+98	1.0' - 11.0'	A-4	35	10	8	23	38	31	100	95	77	29	-

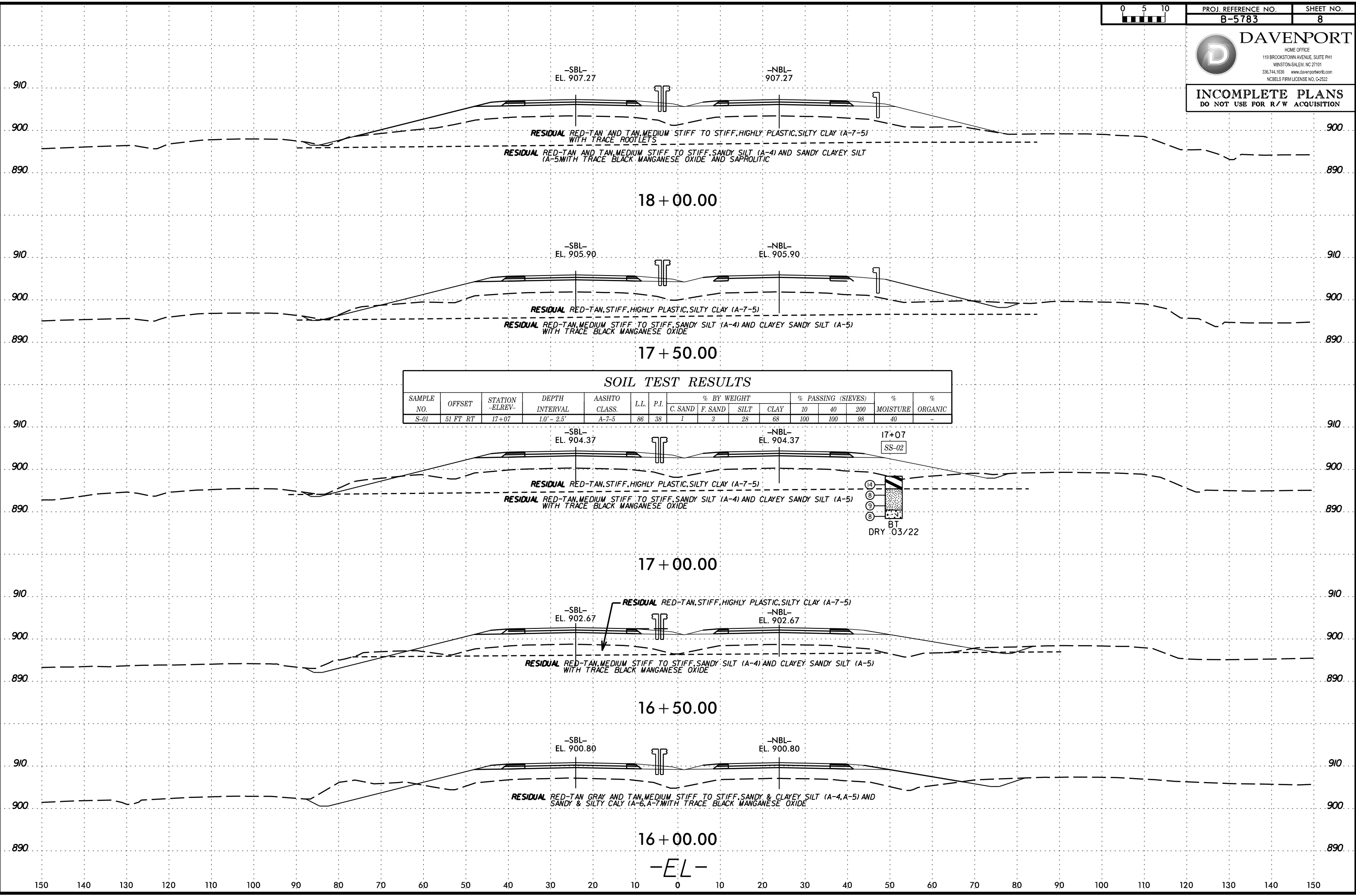


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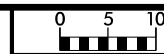




**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

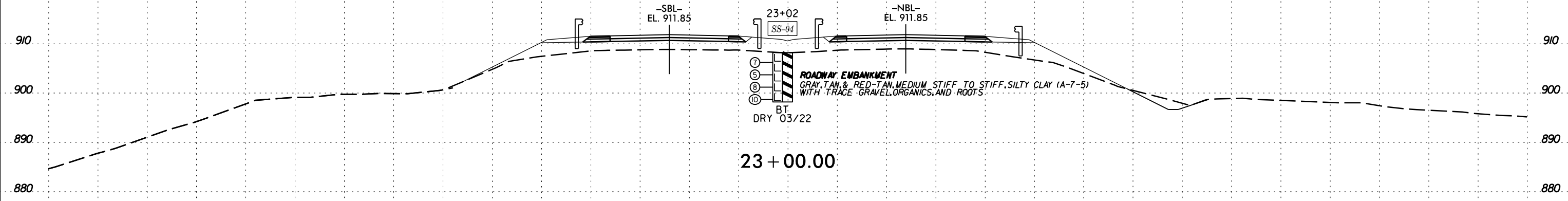


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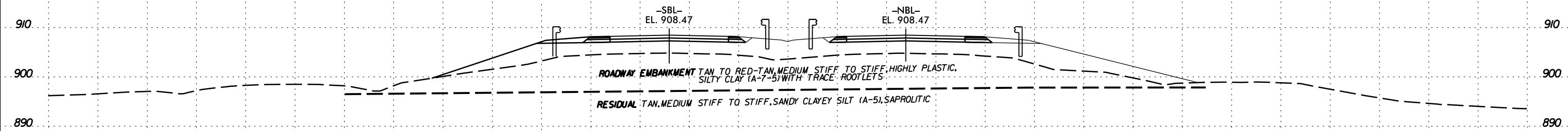
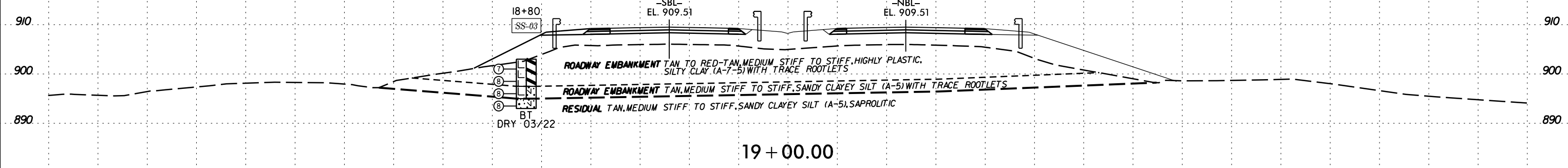


**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
SS-04	1 FT LT	23+02	3.5' - 5.0'	A-7-5	53	20	17	11	29	43	99	40	86	74	32	-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-03	53 DT LT	18+80	3.5' - 5.0'	A-7-5	71	39	3	13	26	58	100	99	89	34	-



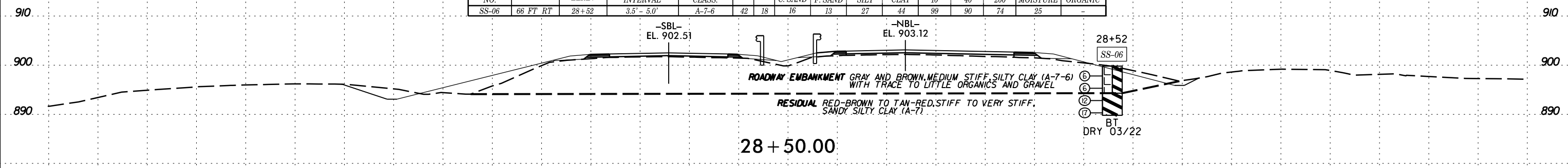
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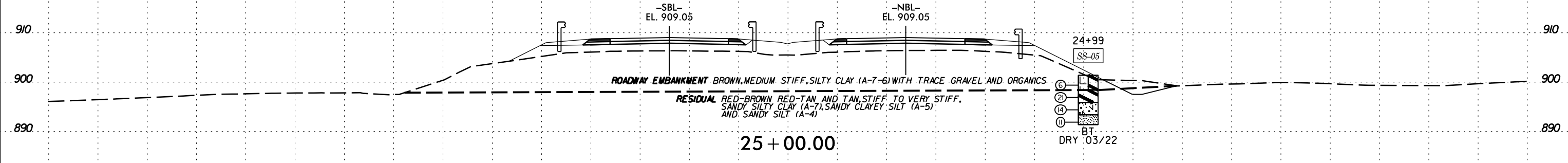


**INCOMPLETE PLANS**  
 DO NOT USE FOR R/W ACQUISITION

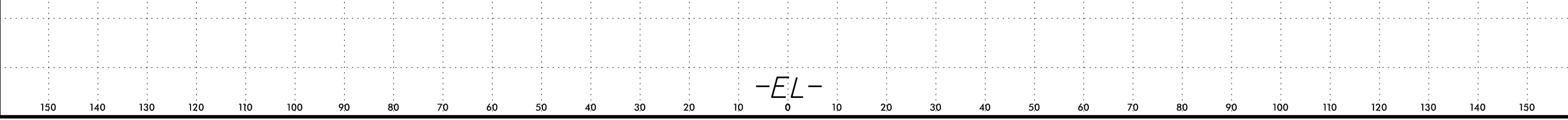
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-06	66 FT RT	28+52	3.5' - 5.0'	A-7-6	42	18	16	13	27	44	99	90	74	25	-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-05	61 FT RT	24+99	1.0' - 2.5'	A-7-6	45	21	16	16	23	45	98	87	72	20	-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-05	61 FT RT	24+99	1.0' - 2.5'	A-7-6	45	21	16	16	23	45	98	87	72	20	-

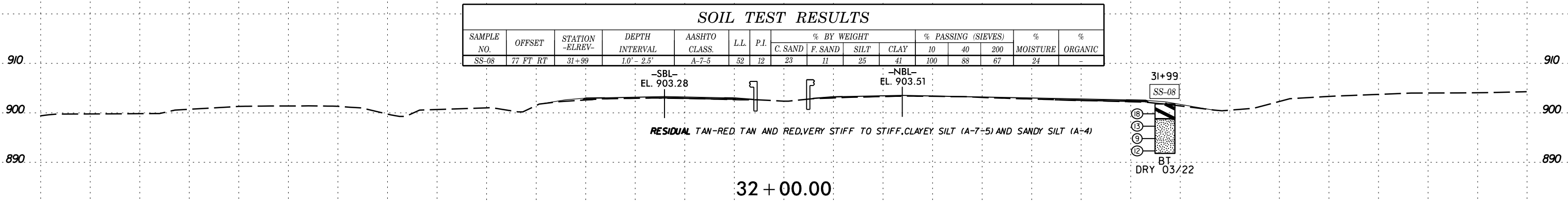


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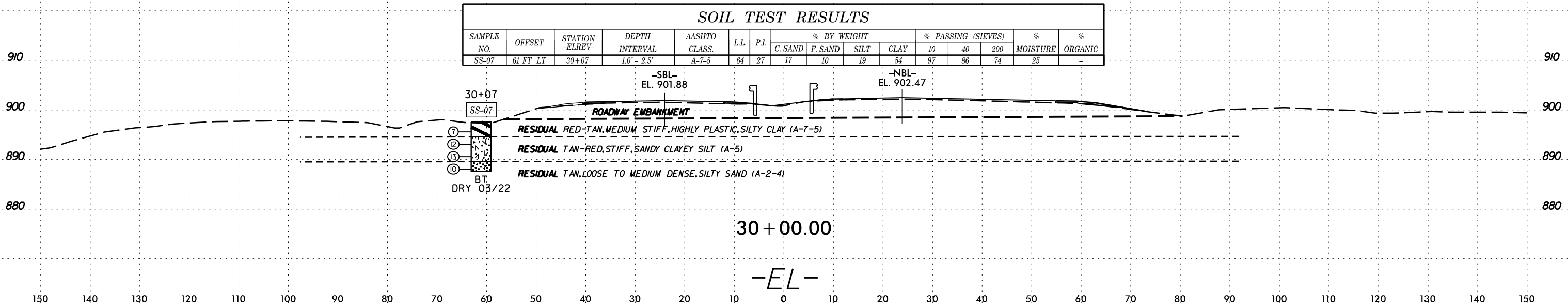


**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-08	77 FT RT	31+99	1.0' - 2.5'	A-7-5	52	12	23	11	25	41	100	88	67	24	-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION -ELREV-	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-07	61 FT LT	30+07	1.0' - 2.5'	A-7-5	64	27	17	10	19	54	97	86	74	25	-



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

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***SUBSURFACE INVESTIGATION***

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*APPENDIX A  
LABORATORY TEST RESULTS*

***REFERENCE: B-5783***

***PROJECT: 45738***

INITIALS

DATE



FALCON ENGINEERING, INC.  
1210 TRINITY ROAD, SUITE 110  
CARY, NC 27513

PHONE: 919.871.0800  
www.falconengineers.com

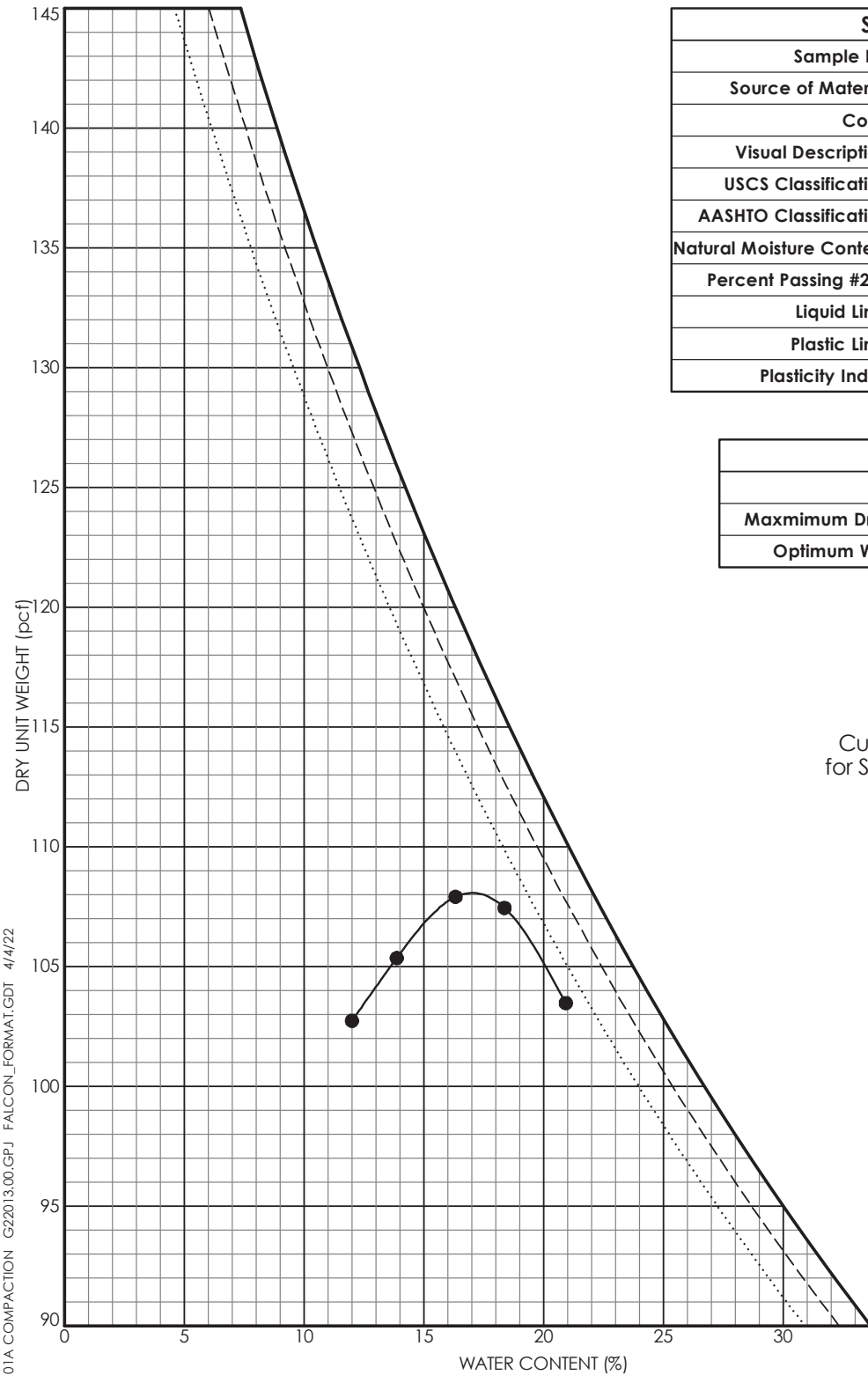
**LABORATORY COMPACTION TEST RESULTS**

PAGE 1 OF 2

Project No.: G22013.00  
Project Name: B-5783 Roadway Investigation  
Project Location: Thomasville, NC

SPECIMEN DATA	
Sample No:	BS-01
Source of Material:	1500_75LT
Color:	Yellowish Brown
Visual Description:	
USCS Classification:	LEAN CLAY with SAND(CL)
AASHTO Classification:	A-6
Natural Moisture Content:	21.4 %
Percent Passing #200:	77.1 %
Liquid Limit:	37
Plastic Limit:	22
Plasticity Index:	15

TEST RESULTS	
Test Method:	ASTM D698 Method A
Maximum Dry Unit Weight:	108.1 pcf
Optimum Water Content:	17.0 %



01A COMPACTION G22013.00.GPJ FALCON\_FORMAT.GDT 4/14/22

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**CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL**

AASHTO T-193 / ASTM D-1883

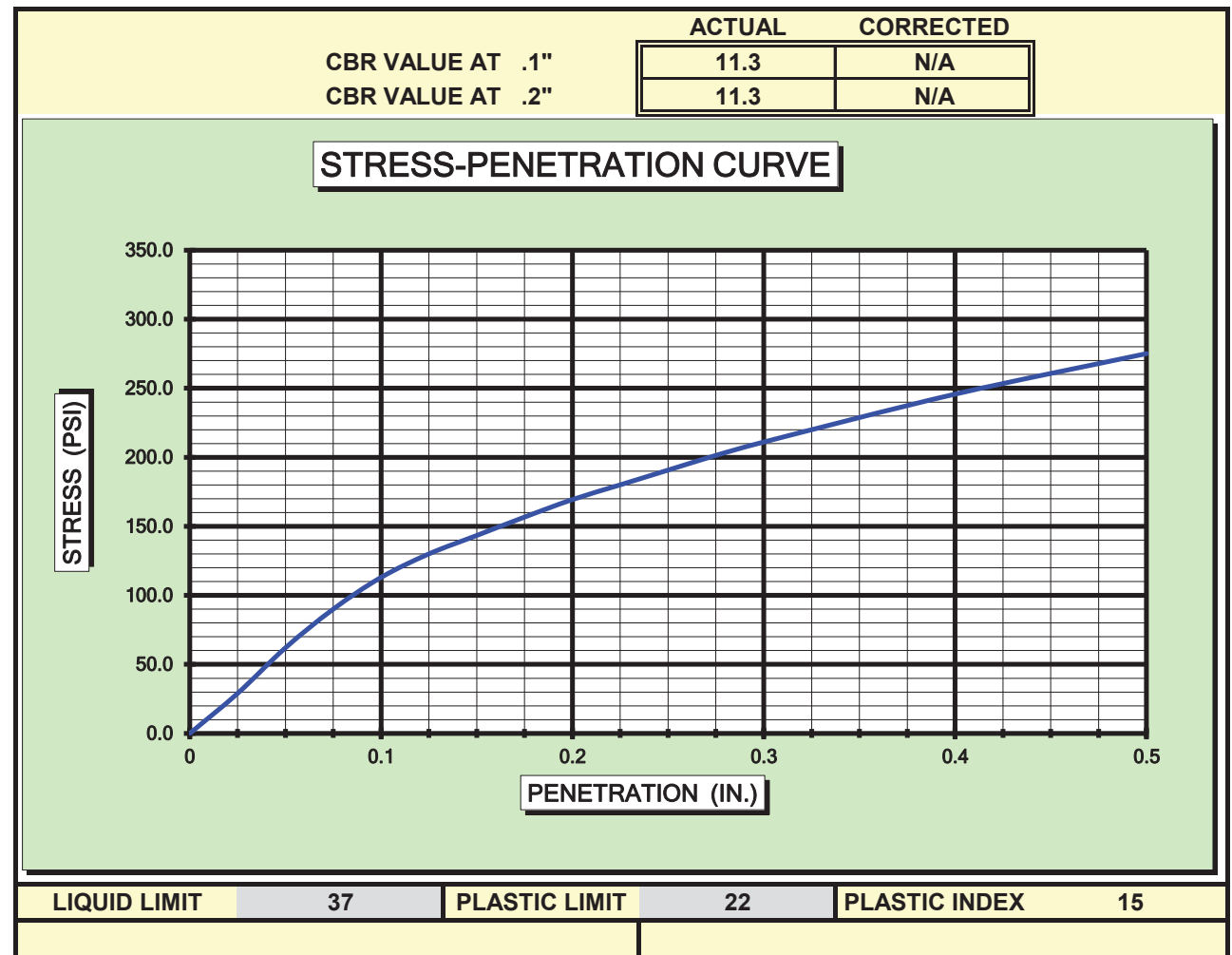
PROJECT #: G22013.00 TEST PERFORMED BY: C. Sullivan DATE: 4/8/2022

PROJECT NAME: B5783 Roadway Investigation

BORING #: 1500\_75LT SAMPLE #: BS-01 DEPTH: 1.0-8.0

SOIL DESCRIPTION: Yellowish Brown Lean Clay with Sand (CL) | A-6

COMPACTION METHOD	ASTM D698 A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	108.1 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	17.0%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	106.1 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	16.8%	FINAL MOISTURE CONTENT	23.6%
PERCENT COMPACTION	98.2%	SWELL	0.95%





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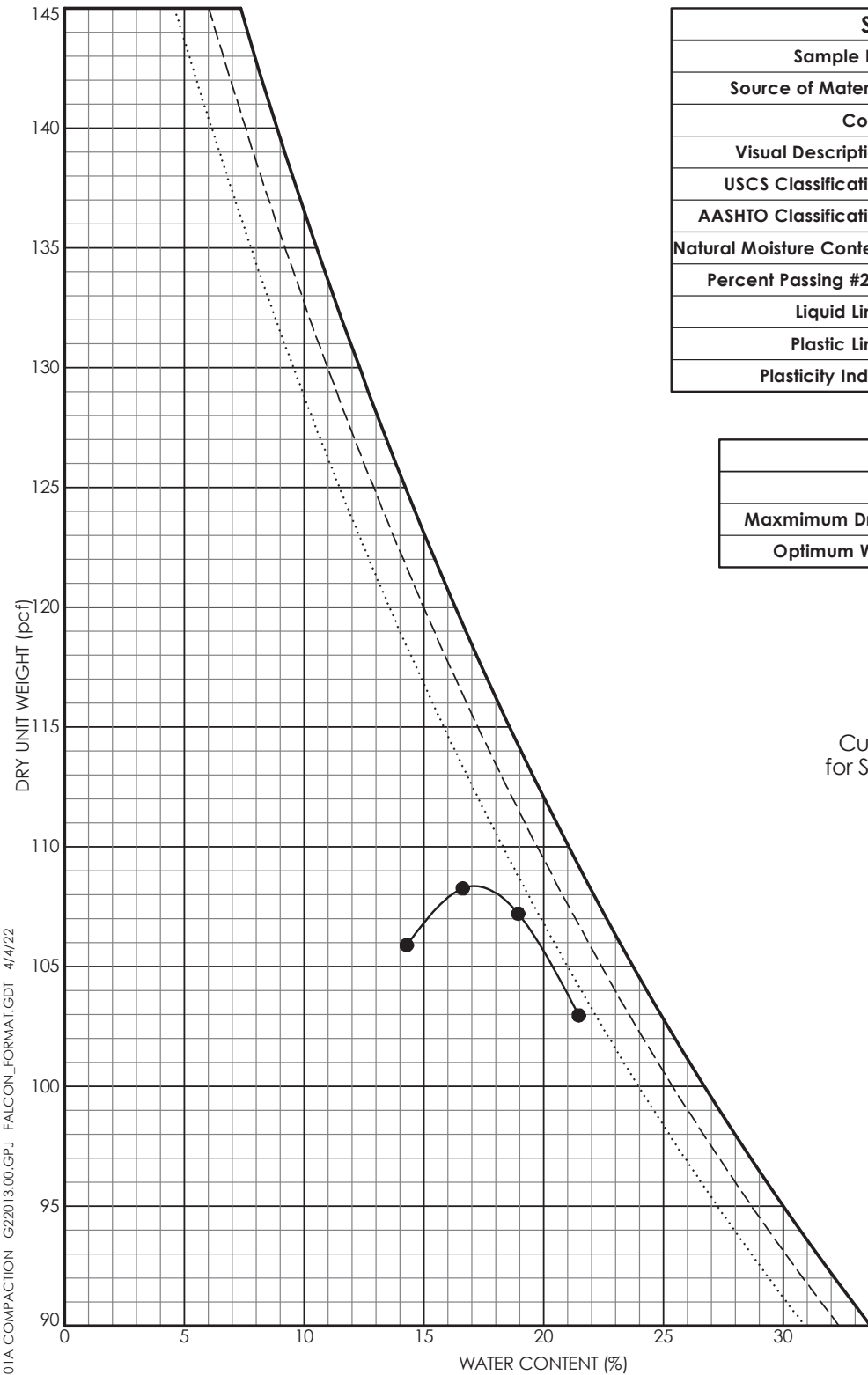
**LABORATORY COMPACTION TEST RESULTS**

PAGE 2 OF 2

Project No.: G22013.00  
Project Name: B-5783 Roadway Investigation  
Project Location: Thomasville, NC

SPECIMEN DATA	
Sample No:	BS-02
Source of Material:	1100_65RT
Color:	Yellowish Brown
Visual Description:	
USCS Classification:	SILT with SAND(ML)
AASHTO Classification:	A-4
Natural Moisture Content:	29.0 %
Percent Passing #200:	76.5 %
Liquid Limit:	35
Plastic Limit:	25
Plasticity Index:	10

TEST RESULTS	
Test Method:	ASTM D698 Method A
Maximum Dry Unit Weight:	108.4 pcf
Optimum Water Content:	17.1 %



01A COMPACTION G22013.00.GPJ FALCON\_FORMAT.GDT 4/14/22

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**CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL**

AASHTO T-193 / ASTM D-1883

PROJECT #: G22013.00 TEST PERFORMED BY: C. Sullivan DATE: 4/8/2022

PROJECT NAME: B5783 Roadway Investigation

BORING #: 1100\_65RT SAMPLE #: BS-02 DEPTH: 1.0-11.0

SOIL DESCRIPTION: Yellowish Brown Silt with Sand (ML) | A-4

COMPACTION METHOD	ASTM D698 A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	108.4 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	17.1%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	106.4 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	16.9%	FINAL MOISTURE CONTENT	21.9%
PERCENT COMPACTION	98.2%	SWELL	0.48%

