

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

| STATE | STATE PROJECT EXPERIENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|------------------------------|-----------|--------------|
| N.C. | I-5711 | 1 | 12 |

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CHECKED BY HAMM, J.

SUBMITTED BY FALCON

DATE DECEMBER 2020

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY ALAMANCE
PROJECT DESCRIPTION INTERCHANGE IMPROVEMENTS
AT I-40/I-85 AND SR 1007 (MEBANE OAKS RD) IN
MEBANE - Y4A ALIGNMENT

INVENTORY - ADDENDUM

CONTENTS

| LINE | STATION | PLAN | PROFILE |
|-------|------------------|------|---------|
| -Y4A- | 10+00 - 14+00.56 | 4 | 5 |

CROSS SECTIONS

| LINE | STATION | SHEETS |
|-------|---------------|--------|
| -Y4A- | 10+00 - 13+50 | 6-7 |

APPENDICES

| APPENDIX | TITLE | SHEETS |
|----------|------------------|--------|
| A | DCP TEST RESULTS | 8-9 |

REFERENCE: I-5711

PROJECT: 50401



DocuSigned by:
Stephen C. Crockett 12/2/2020
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
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 (ASTM T 208, 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, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

SOIL LEGEND AND AASHTO CLASSIFICATION

| GENERAL CLASS. | GRANULAR MATERIALS (< 35% PASSING #200) | | | | | | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | | | | | | ORGANIC MATERIALS | | | |
|--------------------------------|---|-------------|---------------------------------|-------------|--------------|-------------|-------------|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---|----------------------|------------|
| GROUP CLASS. | A-1 | A-1-b | A-2 | A-2-4 | A-2-5 | A-2-6 | A-2-7 | A-4 | A-5 | A-6 | A-7 | A-1, A-2 | A-3 | A-4, A-5 | A-6, A-7 | | | |
| SYMBOL | | | | | | | | | | | | | | | | | | |
| % PASSING #10 #40 #200 | 50 MX 30 MX 15 MX | 50 MX 25 MX | 51 MN 35 MX 35 MX | 40 MX 10 MX | 41 MN 10 MX | 42 MN 11 MN | 43 MN 11 MN | 40 MX 10 MX | 41 MN 10 MX | 42 MN 11 MN | 43 MN 11 MN | 40 MX 10 MX | 41 MN 10 MX | 42 MN 11 MN | 43 MN 11 MN | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT |
| MATERIAL PASSING #40 LL PI | - | - | 40 MX 41 MN 42 MN 43 MN | 10 MX 11 MN | 11 MN | 11 MN | 11 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | 40 MX 41 MN 42 MN 43 MN | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | HIGHLY ORGANIC SOILS | |
| GROUP INDEX | 0 | 0 | 0 | 4 MX | 8 MX | 12 MX | 16 MX | NO MX | NO MX | NO MX | NO MX | NO MX | NO MX | NO MX | NO MX | | | |
| USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. OF GRAVEL AND SAND | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | SILTY SOILS | CLAYEY SOILS | | | | | | | | | | | | | |
| GEN. RATING AS SUBGRADE | EXCELLENT TO GOOD | | | | | | | FAIR TO POOR | | | | FAIR TO POOR | POOR | UNSATURABLE | | | | |

PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

| PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) |
|--|--|--|--|
| GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | < 4 4 TO 10 10 TO 30 30 TO 50 > 50 | N/A |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | < 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30 | < 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4 |

TEXTURE OR GRAIN SIZE

| 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 |
| BOULDER (BLDR.) | COBBLE (COB.) | GRAVEL (GR.) | COARSE SAND (CS.SD.) | FINE SAND (F.SD.) | SILT (SL.) | CLAY (CL.) |
| GRAIN SIZE | MM 305 IN. 12 | 75 3 | 2.0 | 0.25 | 0.05 | 0.005 |

SOIL MOISTURE - CORRELATION OF TERMS

| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION |
|--|----------------------------|---|
| LL PLASTIC RANGE (PI) PL | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE |
| | - WET - (W) | SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE |
| | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE |
| OM SL | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE |

PLASTICITY

| NON PLASTIC | PLASTICITY INDEX (PI) | | DRY STRENGTH |
|--------------------|-----------------------|--|--------------|
| SLIGHTLY PLASTIC | 0-5 | | VERY LOW |
| MODERATELY PLASTIC | 6-15 | | SLIGHT |
| HIGHLY PLASTIC | 16-25 | | MEDIUM |
| | 26 OR MORE | | HIGH |

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION
WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: **ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.**

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL

| ORGANIC MATERIAL | GRANULAR SOILS | SILT - CLAY SOILS | OTHER MATERIAL |
|-------------------------|----------------|-------------------|----------------------|
| TRACE OF ORGANIC MATTER | 2 - 3% | 3 - 5% | TRACE 1 - 10% |
| LITTLE ORGANIC MATTER | 3 - 5% | 5 - 12% | LITTLE 10 - 20% |
| MODERATELY ORGANIC | 5 - 10% | 12 - 20% | SOME 20 - 35% |
| HIGHLY ORGANIC | > 10% | > 20% | HIGHLY 35% AND ABOVE |

GROUND WATER

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING

STATIC WATER LEVEL AFTER 24 HOURS

PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA

SPRING OR SEEP

MISCELLANEOUS SYMBOLS

| | | |
|--|--|------------------------------|
| ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION | DIP & DIP DIRECTION OF ROCK STRUCTURES | SLOPE INDICATOR INSTALLATION |
| SOIL SYMBOL | TEST BORING | CONE PENETROMETER TEST |
| ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT | AUGER BORING | SOUNDING ROD |
| INFERRERD SOIL BOUNDARY | CORE BORING | TEST BORING WITH CORE |
| INFERRERD ROCK LINE | MONITORING WELL | PIEZOMETER INSTALLATION |
| ALLUVIAL SOIL BOUNDARY | PIEZOMETER INSTALLATION | SPT N-VALUE |

RECOMMENDATION SYMBOLS

| | | |
|------------------|--|--|
| UNDERCUT | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK |
| SHALLOW UNDERCUT | | |

ABBREVIATIONS

| | | |
|--------------------------------|------------------------------------|--------------------------------|
| AR - AUGER REFUSAL | ME. - MEDIUM MICA - MICACEOUS | VST - VANE SHEAR TEST |
| BT - BORING TERMINATED | MOD. - MODERATELY NP - NON PLASTIC | WEA. - WEATHERED |
| CL. - CLAY | ORG. - ORGANIC | U - UNIT WEIGHT |
| CPT - CONE PENETRATION TEST | PMT - PRESSUREMETER TEST | D - DRY UNIT WEIGHT |
| CSE. - COARSE | SAP. - SAPROLITIC | SAMPLE ABBREVIATIONS |
| DMT - DILATOMETER TEST | SD. - SAND, SANDY | S - BULK |
| DPT - DYNAMIC PENETRATION TEST | SL. - SILTY, SILTY | SS - SPLIT SPOON |
| e - VOID RATIO | SLI. - SLIGHTLY | ST - SHELBY TUBE |
| F - FINE | TRC. - TRICONE REFUSAL | RS - ROCK |
| FOSS. - FOSSILIFEROUS | u - MOISTURE CONTENT | RT - RECOMPACTED TRIAXIAL |
| FRAC. - FRACTURED, FRACTURES | V - VERY | CBR - CALIFORNIA BEARING RATIO |
| FRAGS. - FRAGMENTS | | |
| HI. - HIGHLY | | |

EQUIPMENT USED ON SUBJECT PROJECT

| | | |
|--|--|--|
| <input type="checkbox"/> DRILL UNITS: | <input type="checkbox"/> ADVANCING TOOLS: | <input type="checkbox"/> HAMMER TYPE: |
| <input type="checkbox"/> CME-45C | <input type="checkbox"/> CLAY BITS | <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL |
| <input type="checkbox"/> CME-55 | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | <input type="checkbox"/> CORE SIZE: |
| <input type="checkbox"/> CME-55B | <input type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B <input type="checkbox"/> -H |
| <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> HARD FACED FINGER BITS | <input type="checkbox"/> -N |
| <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> HAND TOOLS: |
| <input type="checkbox"/> | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | <input type="checkbox"/> POST HOLE DIGGER |
| <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ * STEEL TEETH | <input checked="" type="checkbox"/> HAND AUGER |
| <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ * TUNG-CARB. | <input type="checkbox"/> SOUNDING ROD |
| <input type="checkbox"/> | <input type="checkbox"/> CORE BIT | <input type="checkbox"/> VANE SHEAR TEST |
| <input type="checkbox"/> | | <input checked="" type="checkbox"/> KESSLER DCP |

ROCK DESCRIPTION
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRERD 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 WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. |
| 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 (CPI) | COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. |

WEATHERING

FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.

VERY SLIGHT (V.SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.

SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.

MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.

MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*

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 > 100 BPF*

VERY SEVERE (V.SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*

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.

ROCK HARDNESS

VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.

HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.

MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.

MEDIUM HARD CAN BE GROUDED OR GOUGED 0.25 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.

SOFT CAN BE GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.

VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

| FRACTURE SPACING | | BEDDING | |
|------------------|---------------------|---------------------|-------------------|
| TERM | SPACING | TERM | THICKNESS |
| VERY WIDE | MORE THAN 10 FEET | VERY THICKLY BEDDED | 4 FEET |
| WIDE | 3 TO 10 FEET | THICKLY BEDDED | 1.5 - 4 FEET |
| MODERATELY CLOSE | 1 TO 3 FEET | THINLY BEDDED | 0.16 - 1.5 FEET |
| CLOSE | 0.16 TO 1 FOOT | VERY THINLY BEDDED | 0.03 - 0.16 FEET |
| VERY CLOSE | LESS THAN 0.16 FEET | THICKLY LAMINATED | 0.008 - 0.03 FEET |
| | | THINLY LAMINATED | < 0.008 FEET |

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.

MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.

INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.

EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: ELEVATIONS TAKEN FROM TIN FILE I5711_LS_TIN_I71025 DATED 10-25-17.

ELEVATION: FEET

NOTES:
HAR - HAND AUGER REFUSAL

See Sheet 1-A for Index of Sheets
See Sheet 1-B for Conventional Symbols

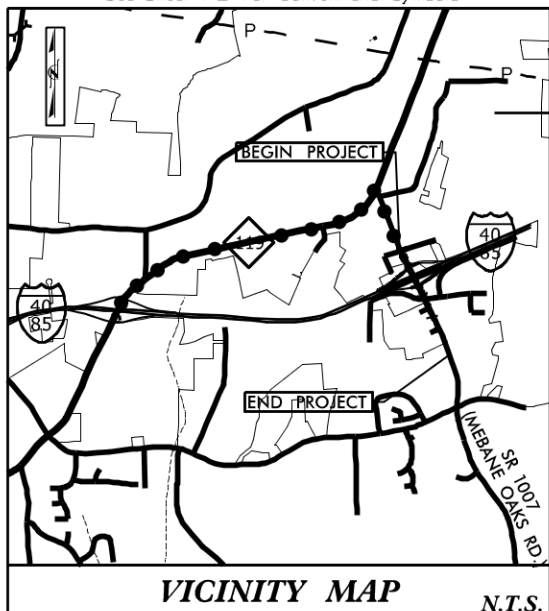
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

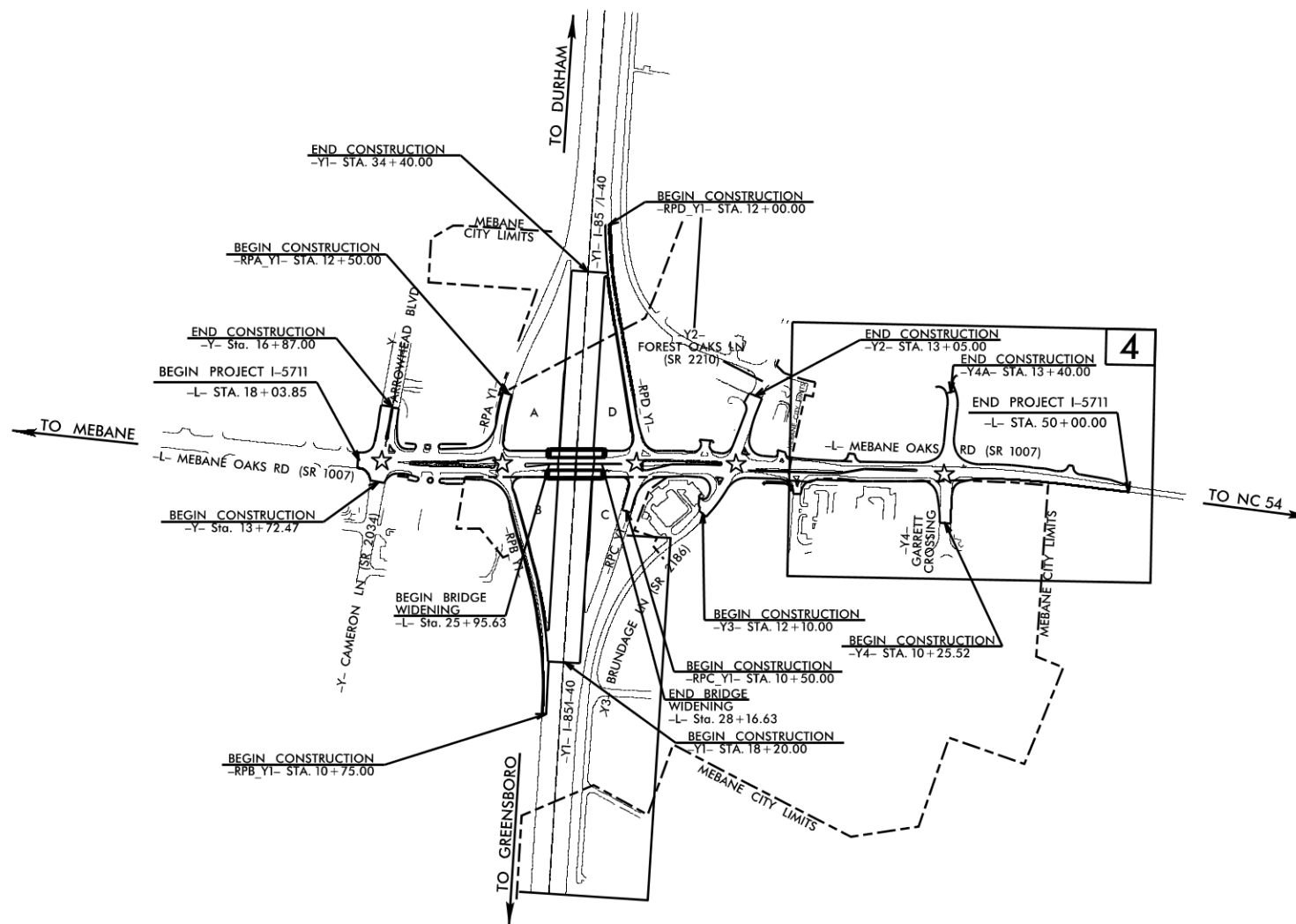
LOCATION: INTERCHANGE IMPROVEMENTS AT I-40/I-85
AND SR 1007 (MEBANE OAKS RD) IN MEBANE

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE, SIGNALS AND PAVEMENT MARKINGS

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C. | I-5711 | 3 | 12 |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 50401.1.FS1 | NHPP-040-4(161)220 | PE | |
| 50401.2.1 | NHPP-040-4(161)220 | R/W, UTIL | |
| 50401.3.GV1 | NHPP-040-4(161)220 | CONST. | |



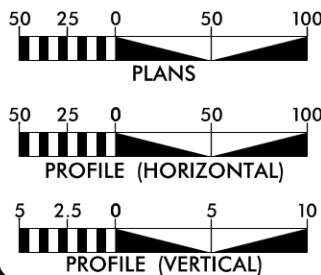
MEBANE CITY LIMITS
OFF-SITE DETOUR



THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGE

★ TRAFFIC SIGNAL DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2020 = 26,620
ADT 2040 = 30,200
K = 8 %
D = 55 %
T = 3 % *
V = 40 MPH
* TTST = 1 DUAL 2
FUNC CLASS = MAJOR COLLECTOR STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT - 0.563 mi
LENGTH BRIDGE PROJECT - 0.042 mi
TOTAL LENGTH PROJECT - 0.605 mi

Prepared In the Office of:

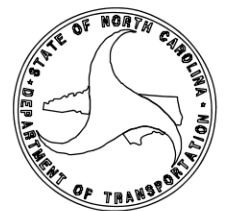
LOCHNER VHB Engineering NC, P.C. (C-3705)
2840 PLAZA PLACE, SUITE 202 940 Main Campus Drive, Suite 500
RALEIGH, NC 27612 RALEIGH, NC 27606
NC License Number F-0139

2018 STANDARD SPECIFICATIONS
RIGHT OF WAY DATE: SEPT. 28, 2018
LETTING DATE: March 16, 2021

BRIAN K. EASON, PE
PROJECT ENGINEER
RODNEY KNIGHT
PROJECT DESIGN ENGINEER
LAURA SUTTON, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

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SIGNATURE: _____
RODNEY KNIGHT
ROADWAY DESIGN ENGINEER
SEAL 25523
NORTH CAROLINA PROFESSIONAL ENGINEER
P.E.
SIGNATURE: _____



CONTRACT: C204352 TIP PROJECT: I-5711

02-DEC-2020 13:16 I:\Projects\2020\20051.00 LOCHNER I-5711\Wilson Rd Connector\I5711_GEO_RDWY\CADD_GEO\TECH\PlanProj\I-5711_GEO_RDY_TSH_3.dgn cadmachine AT CAD02



Roadway Subsurface Investigation Report – Inventory Addendum

**Interchange Improvements at I-85/I-40 and SR 1007 (Mebane Oaks Road) in
Mebane – Y4A Alignment (Wilson Road Connector)
Alamance County, North Carolina
WBS: 50401.1.FS1, TIP: I-5711
Falcon Project No.: G20051.00**

Prepared for:
Lochner
2840 Plaza Place, Suite 202
Raleigh, NC 27612

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

November 24, 2020

TIP: I-5711
WBS: 50401.1.FS1
COUNTY: Alamance
DESCRIPTION: Interchange Improvements at I-40/I-85 and SR 1007 (Mebane Oaks Road) in Mebane – Y4A Alignment (Wilson Road Connector)
SUBJECT: Addendum Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of 0.563 miles of proposed roadway improvements along SR 1007 (Mebane Oaks Road) in Alamance County. A portion of SR 1007 will be widened and/or resurfaced near the interchange with I-40/I-85. The project also includes the widening and resurfacing of a portion of I-40/I-85 and Ramp B. Resurfacing and minor modifications to short sections of other various Y-lines, interchange ramps and driveways are also included at various locations. The bridge over I-40/I-85 on SR 1007 will be widened on both sides and will match the current 4 span, 5 bent arrangement of the existing bridge. The structure investigation is included under separate cover.

This report covers the Y4A alignment (Wilson Road Connector) which is approximately 340 feet of proposed roadway connecting Mebane Oaks Road and the proposed extension of Wilson Road. The roadway investigation for the other alignments on the projects have been provided under separate cover.

The investigation was conducted on November 9th, 2020 in general accordance with our Proposal for Geotechnical Investigation and Engineering Services dated September 3rd, 2020. The information provided in this report is based solely on our site reconnaissance, soil test borings, laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of two (2) hand auger borings were performed for the proposed roadway alignment. Representative soil samples, collected with a hand auger, were selected for laboratory testing to verify visual field classifications. In addition, Dual Mass Dynamic Cone Penetrometer (DCP) testing was completed on the subgrade to correlate in-situ CBR values to depths of up to three feet below subgrade. The dual mass DCP used is manufactured by Kessler Soils Engineering Products, Inc. CBR values were estimated using software provided by the manufacturer which utilizes correlations established by the Army Corps of Engineers Waterways Experiment Station. The DCP results are provided in Appendix A of this report.





Portions of the following alignment, totaling approximately 340 feet were investigated.

| <u>Alignment</u> | <u>Station (ft)</u> |
|-------------------------------|---------------------|
| -Y4A- (Wilson Road Connector) | 10+00 – 13+40 |

AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. The following locations contain highly plastic soils with plasticity indices (PI) greater than 25 within 3 feet of proposed subgrade elevations:

| <u>Alignment</u> | <u>Station (ft)</u> |
|------------------|---------------------|
| -Y4A- | 10+43 – 13+40 |

PHYSIOGRAPHY AND GEOLOGY

The project site is in the Piedmont Physiographic Province of North Carolina. According to the *Geologic Map of North Carolina* (1985), the site is underlain by two major geologic units in the Carolina Slate Belt. The site transitions from north to south across Intermediate Metavolcanic Rock (**CZiv**) to Felsic Metavolcanic Rock (**CZfv**).

The Intermediate Metavolcanic Rock (**CZiv**) consists of metamorphosed andesitic tuffs and flows, medium to dark grayish green; minor felsic and mafic metavolcanic rock. The Felsic Metavolcanic Rock (**CZfv**) consists of metamorphosed dacitic to rhyolitic flows and tuffs, light gray to greenish gray, interbedded with mafic and intermediate metavolcanic rock, meta-argillite, and metamudstone.

The corridor is highly developed with commercial properties north of I-40/I-85 and both commercial and residential properties to the south of the interchange. The site generally slopes down from north to south, elevating in the center to cross over I-40/I-85. Vegetation along the corridor consists largely of roadside grasses with intermittent landscaping, heavy and unmaintained brush, and in some locations mature forested lands or landscaped lawns. Surrounding land throughout the corridor is highly developed. Drainage along the roadways and developed properties is facilitated by a mixture of confined systems and roadside swales and ditches which direct drainage outside of the project limits. No standing water or natural drainage features were noted within the project limits.





SOIL PROPERTIES

A variety of soils were encountered along the -Y4A- alignment including topsoil and residual soils.

Topsoil was encountered in both borings on the order of 0.2 feet.

Residual soils were encountered beneath the topsoil. These soils consist of most, sandy silt and silty clay (A-4, A-7-5). Tested samples have a PI value range from 30 to 60.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and after a waiting period of at least 24 hours.

Shallow groundwater was not encountered in the areas explored.

LABORATORY TESTING

The following grab samples were tested for soil classification:

| <u>Sample</u> | <u>Location</u> | <u>Depth (ft)</u> |
|---------------|--------------------|-------------------|
| S-1 | 10+92, 3' LT, Y4A- | 2.0-3.0 |
| S-2 | 13+03, 2' RT -Y4A- | 0.5-1.0 |

Classification test results for grab samples are included in the subsurface profiles and cross sections.

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:

Stephen C. Crockett, PE
Geotechnical Engineer

Jeremy R. Hamm, PE
Geotechnical Engineering Manager



5/28/99

-Y4A-
WILSON ROAD CONNECTOR

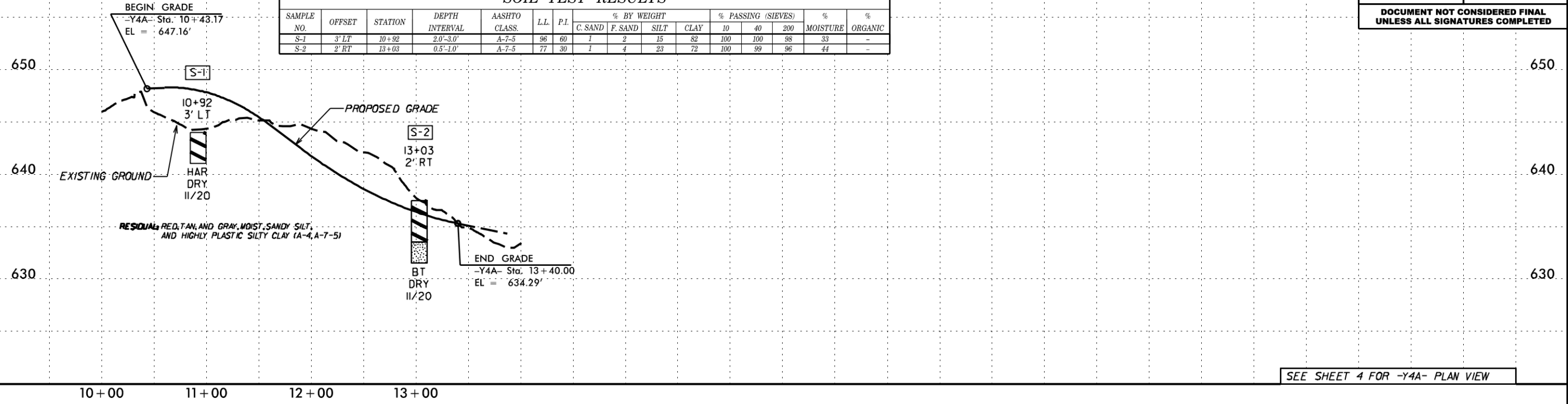
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2840 PLAZA PLACE, SUITE 202
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(919) 571-7111

NC License
Number F-0159

vhb
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940 Main Campus Drive, Suite 500
Raleigh, NC 27606

| | |
|--|------------------------|
| PROJECT REFERENCE NO. 1-5711 | SHEET NO. 5 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED | |

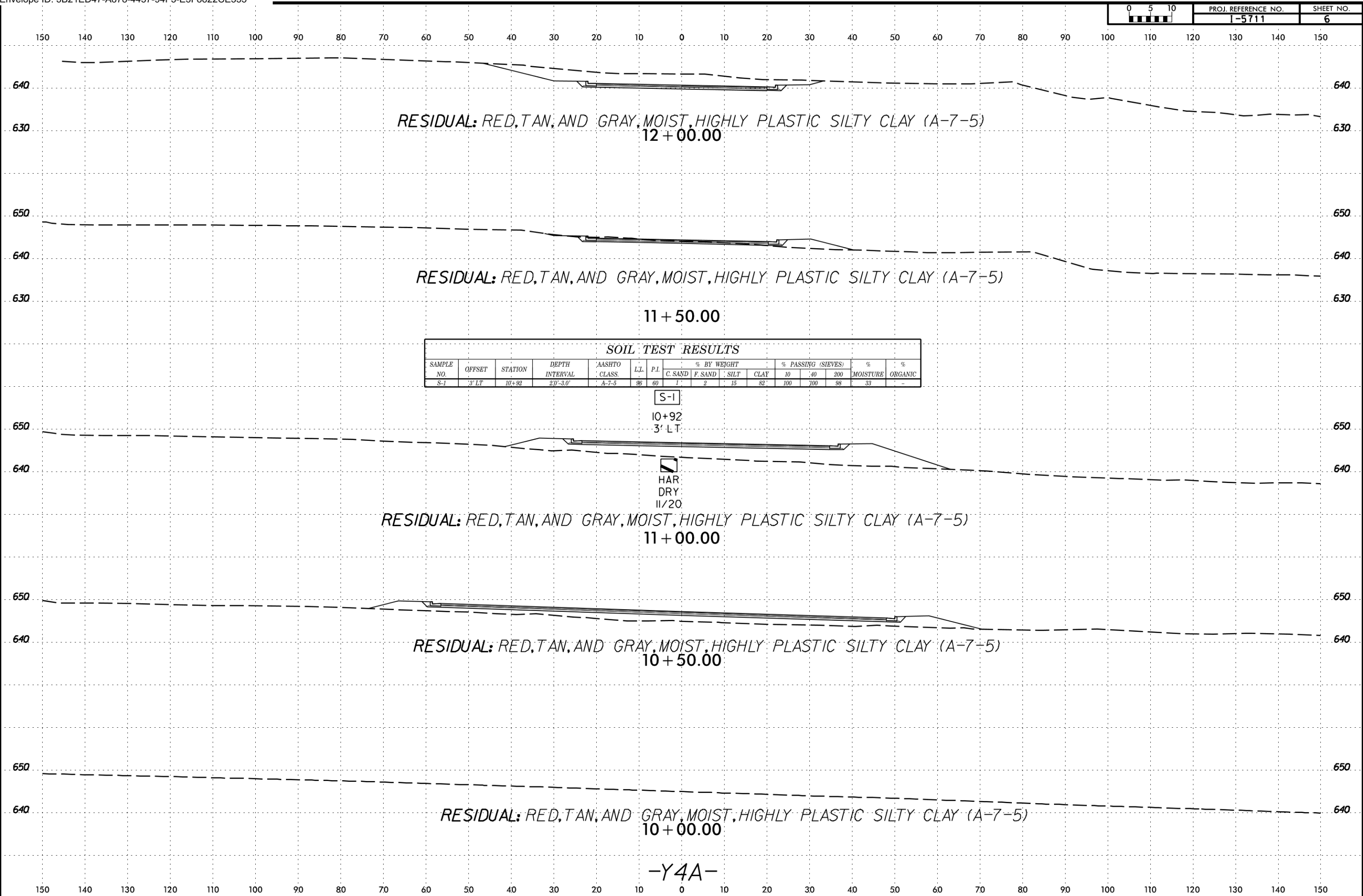
| SOIL TEST RESULTS | | | | | | | | | | | | | | | |
|-------------------|--------|---------|----------------|---------------|------|------|-------------|---------|------|------|--------------------|-----|-----|------------|-----------|
| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
| | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| S-1 | 3' LT | 10+92 | 2.0'-3.0' | A-7-5 | 96 | 60 | 1 | 2 | 15 | 82 | 100 | 100 | 98 | 33 | - |
| S-2 | 2' RT | 13+03 | 0.5'-1.0' | A-7-5 | 77 | 30 | 1 | 4 | 23 | 72 | 100 | 99 | 96 | 44 | - |



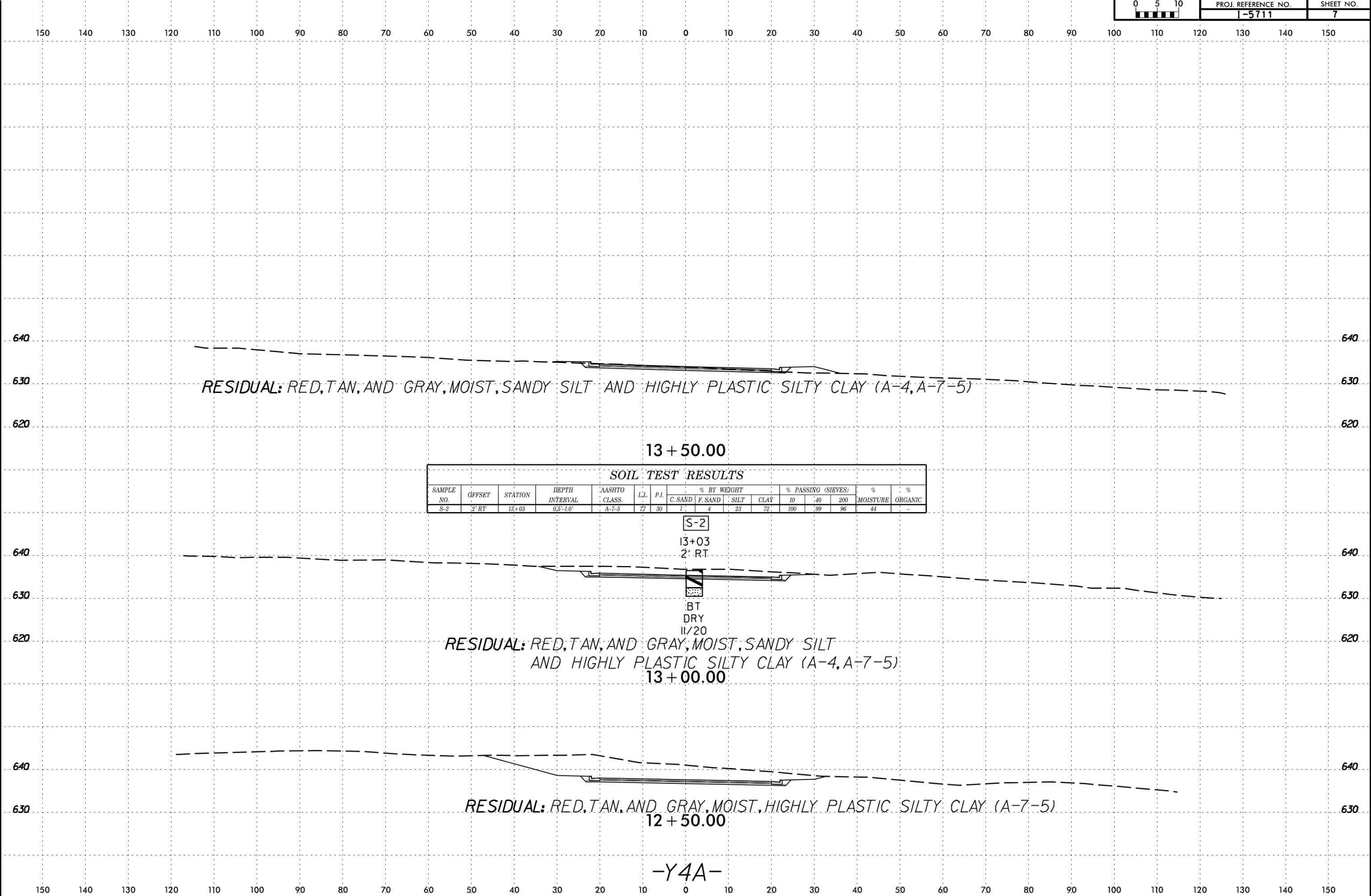
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 LOCHNER



6/23/16
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6/23/16
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CADWATERS
AT 10/25



SOIL TEST RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
|------------|--------|---------|----------------|---------------|------|------|-------------|---------|------|------|--------------------|----|-----|------------|-----------|
| | | | | | | | C. SAND | F. SAND | SILT | CLAY | 10 | 40 | 200 | | |
| S-2 | 2' RT | 13+03 | 0.5'-1.0' | A-7-5 | 77 | 30 | 1 | 4 | 23 | 72 | 100 | 99 | 96 | 44 | - |

S-2
13+03
2' RT

BT
DRY
11/20

13 + 50.00

13 + 00.00

12 + 50.00

-Y4A-

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5711 | 8 |

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROADWAY

SUBSURFACE INVESTIGATION

DYNAMIC CONE PENETROMETER TEST RESULTS

REFERENCE: I-5711

PROJECT: 50401

