

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.	I-5711	1	33

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 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 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

TRIGON

WEIS, J.M.

INVESTIGATED BY FALCON ENG.

DRAWN BY HILL, M. J.

CHECKED BY HUNSBERGER, W. S.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2019

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY ALAMANCE

PROJECT DESCRIPTION INTERCHANGE IMPROVEMENTS

AT I-40/I-85 AND SR 1007 (MEBANE OAKS RD)

IN MEBANE

INVENTORY

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	18+03.85 - 50+00.00	4-6	9,10
-RPA.YI-	12+50.00 - 15+70.28	5	10
-RPB.YI-	10+75.00 - 21+28.91	5,7	11

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	41+50.00 - 44+50.00	13-27

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY RESULTS	28-30

REFERENCE: I-5711

PROJECT: 50401



DocuSigned by
W. Scott Hunsberger

54499AC805CD49E...
1/11/2019





SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

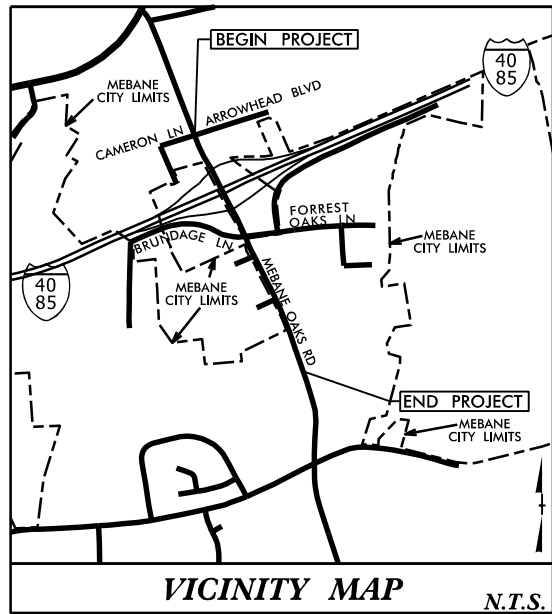
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
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>										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.										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:										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 DISLOGGED 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 (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. 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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.									
MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										COMPRESSION SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										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.									
PERCENTAGE OF MATERIAL										GROUND WATER										WEATHERING										WEATHERING									
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										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										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. SLIGHT (SLI) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> VERY SEVERE (IV 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. <i>IF TESTED, WOULD YIELD 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.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. SLIGHT (SLI) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> VERY SEVERE (IV 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. <i>IF TESTED, WOULD YIELD 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.									
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS										ROCK HARDNESS									
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-COHESSIVE) VERY LOOSE 4 TO 10 MEDIUM DENSE 10 TO 30 DENSE 30 TO 50 VERY DENSE > 50 GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT 2 TO 4 MEDIUM STIFF 4 TO 8 STIFF 8 TO 15 VERY STIFF 15 TO 30 HARD > 30										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT 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										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 GROOVED 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. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. 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.										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 (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. 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.									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS										ABBREVIATIONS									
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 (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3										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										AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED Wt - UNIT WEIGHT Wt - DRY UNIT WEIGHT S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK VST - VANE SHEAR TEST WEA. - WEATHERED Wt - UNIT WEIGHT Wt - DRY UNIT WEIGHT S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO									
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT SL - SL - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST										TERM SPACING MORE THAN 10 FEET 3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FOOT LESS THAN 0.16 FEET VERY WIDE WIDE MODERATELY CLOSE CLOSE VERY CLOSE										TERM THICKNESS 4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET 0.03 - 0.16 FEET 0.008 - 0.03 FEET < 0.008 FEET VERY THICKLY BEDDED THICKLY BEDDED THINLY BEDDED VERY THINLY BEDDED THICKLY LAMINATED THINLY LAMINATED									
PLASTICITY										FRAC. SPACING										BEDDING										FRAC. SPACING									
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 09/28/24

TIP PROJECT: I-5711

CONTRACT: 50401



25% PLANS

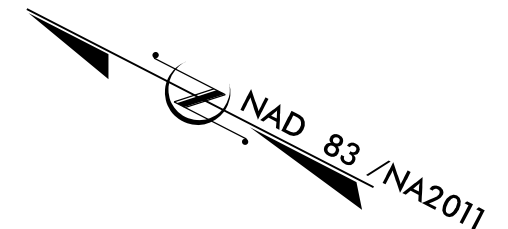
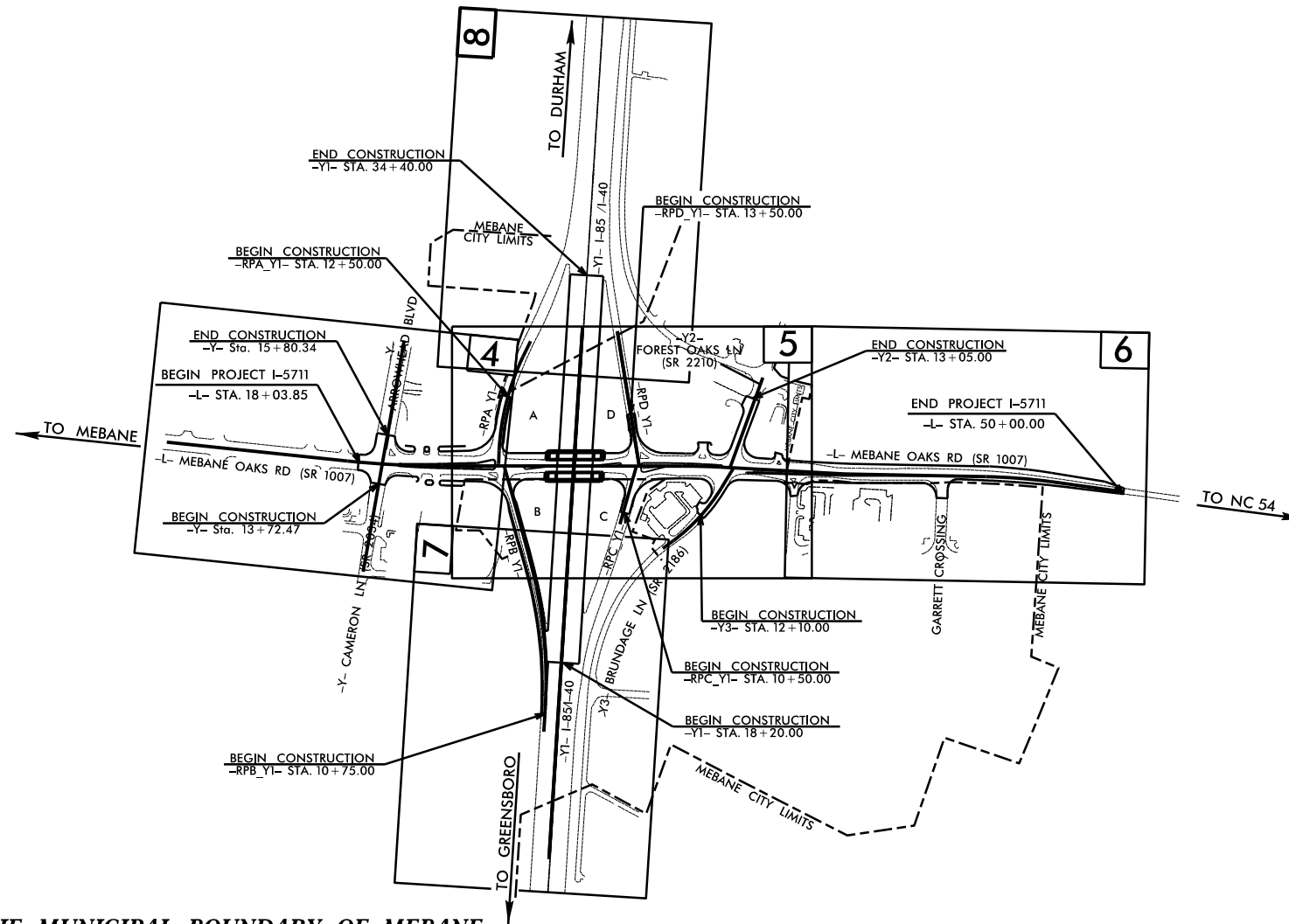
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

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

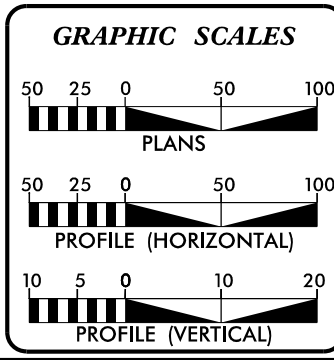
TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, SIGNALS AND PAVEMENT MARKINGS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5711	2A	33
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50401.1.FS1	NHPP-040-4(161)220	PE	



PORTIONS OF THIS PROJECT ARE WITHIN THE MUNICIPAL BOUNDARY OF MEBANE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD _____

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



DESIGN DATA

ADT 2019 =	26,440
ADT 2039 =	30,020
K =	8 %
D =	55 %
T =	3 % *
V =	40 MPH
* TTST =	1 DUAL 2
FUNC CLASS =	MAJOR COLLECTOR
STATEWIDE TIER	STATEWIDE TIER

PROJECT LENGTH

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

Prepared in the Office of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPT. 21, 2018

LETTING DATE:
SEPT. 17, 2019

BRIAN K. EASON, PE
PROJECT ENGINEER

JEFFREY HEXT
PROJECT DESIGN ENGINEER

NC HIRBA LICENSE No. P-1148
1151 SE Gary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

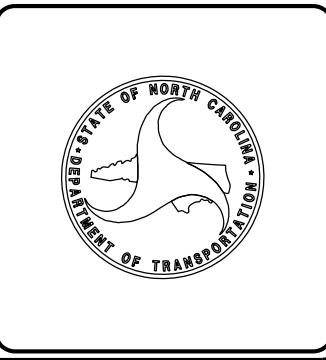
ECOLOGICAL ENGINEERING
NC License Number E-0159

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





Roadway Subsurface Investigation Report - Inventory

Interchange Improvements at I-85/I-40 and SR 1007 (Mebane Oaks Road) in Mebane

Alamance County, North Carolina

WBS: 50401.1.FS1, TIP: I-5711

Falcon Project No.: G17066.00

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

January 11, 2019

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
SUBJECT: 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 will be included under separate cover.

The investigation was conducted between June 6th and July 5th, 2018 in general accordance with our Proposal for Geotechnical Investigation and Engineering Services dated September 13, 2017. The recommendations provided in this report are based solely on our site reconnaissance, soil and pavement test borings laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of nineteen (19) Standard Penetration Test (SPT) were drilled for the proposed roadway alignments. All mechanical borings were drilled using a CME 55 ATV mounted drill rig equipped with 2 1/4-inch inside diameter hollow-stem augers, and SPT testing was performed with automatic hammers. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard Proctor compaction and California Bearing Ratio (CBR) testing. At seventeen (17) locations along the existing roadway, existing pavements were cored, measured and Dual Mass Dynamic Cone Penetrometer (DCP) testing 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 pavement investigation will be included under separate cover.





Portions of the following alignments, totaling approximately 0.86 miles were investigated. Other minor Y-lines, ramps and driveways are included on the project but improvements are not anticipated to be significant enough to warrant investigation.

<u>Alignment</u>	<u>Station (ft)</u>
-L- (Mebane Oaks Road)	18+04—50+00
-RPA_Y1- (Ramp A)	12+50—15+43
-RPB_Y1- (Ramp A)	10+75—21+28

AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. The following locations contain very soft to soft or very loose soils with an N-value less than 4 near the ground surface:

<u>Alignment</u>	<u>Station (ft)</u>
-L-	30+89, RT
-RPA_Y1-	12+88, RT

- II. 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>
-L-	43+12, LT

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 project, including existing roadway embankments and residual soils and weathered and crystalline rock.

Topsoil was encountered in grassy areas ranging in thickness from 0.1 to 0.3 feet, and typically on the order of 0.2 feet.

Roadway Embankment soils were encountered at the ground surface beneath and adjacent to existing roadways. These soils consist of up to 8 feet of dry to moist, very loose to medium dense, silty sand (A-2-4) and very soft to stiff, sandy and silty clay and clayey silt (A-5, A-6, A-7). Tested samples have a PI value range from 13 to 25.

Residual soils were encountered at the ground surface or beneath the roadway embankment fills. These soils consist of dry to wet, soft to hard, sandy and silty clay and clayey silt (A-5, A-6, A-7). Tested samples have a PI value range from 5 to 45.

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 foot. WR encountered on this project generally consists of tan and white Metavolcanic Rock. WR was encountered from elevation 623.6 ft to 662.4 ft.

Crystalline Rock, in the form of Metavolcanic Rock was encountered beneath weathered rock at various locations throughout the site. Crystalline rock is classified as material that yields auger refusal or SPT refusal (blow count of 60/0.0 or 60/0.1 feet). CR was encountered from elevation 609.5 ft to 629.2 ft.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in many cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential or commercial areas were backfilled immediately after completion due to safety considerations.

Shallow groundwater was not encountered in the areas explored.

ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

Sample	Location	Depth (ft)	Test
BS-1	43+12, 63' LT, -L-	1.0 – 5.0	California Bearing Ratio, Standard Proctor
BS-2	17+21, 68'LT, -RPB_Y1-	1.0 – 5.0	California Bearing Ratio, Standard Proctor

Classification test results for bulk samples are included in the subsurface profiles and 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

5A469AC80FCD49E...
1/11/2019

W. Scott Hunsberger, PE
Geotechnical Engineer

Jeremy R. Hamm, PE
Geotechnical Engineering Manager



8/17/09
10-JAN-2016 09:54
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REVISIONS

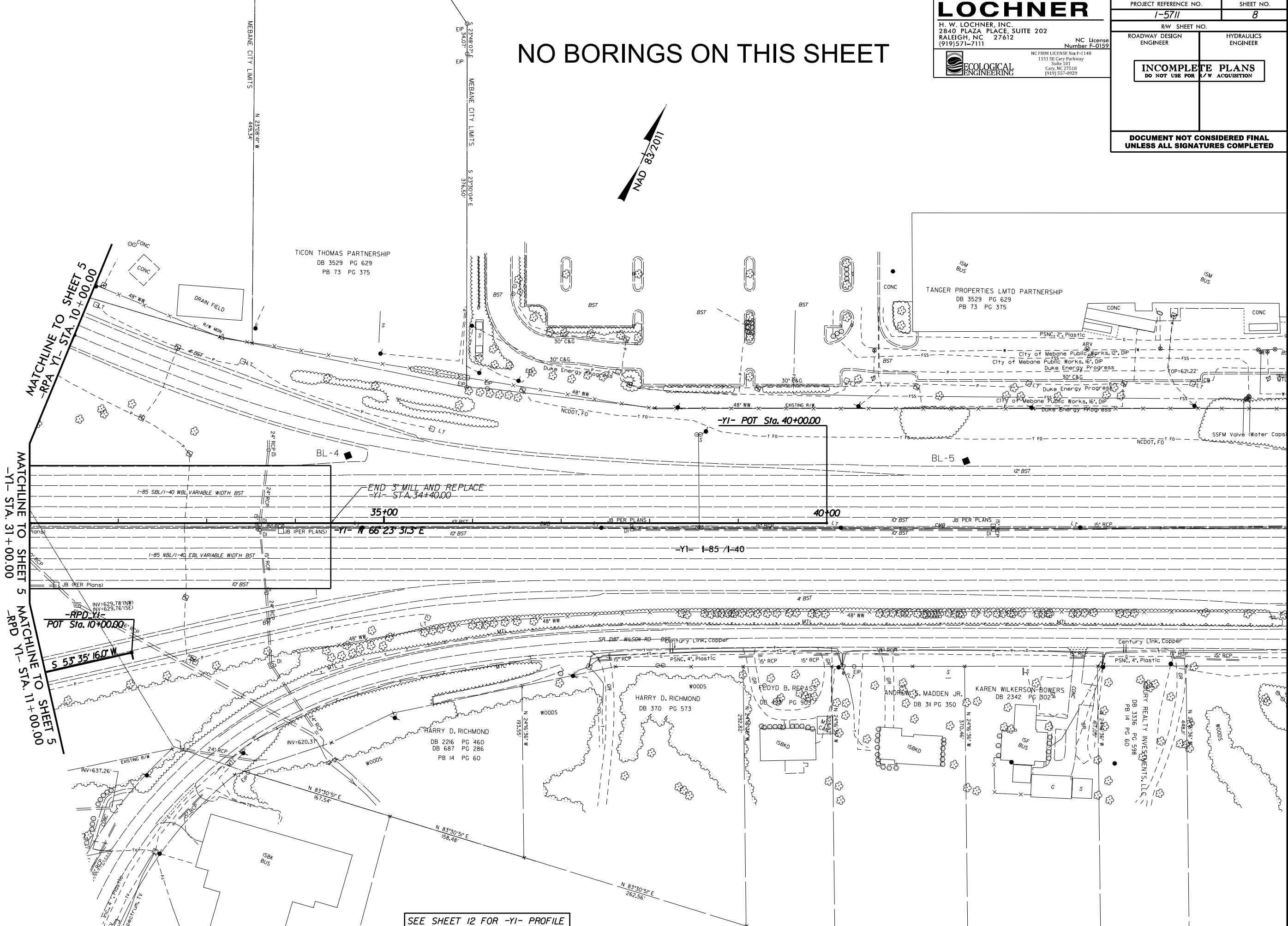
LOCHNER
 H. W. LOCHNER, INC.
 2840 PLAZA PLACE, SUITE 202
 RALEIGH, NC 27612
 (919) 571-7111

NC License Number F-0159
 NC FIRM LICENSE No. F-1148
 1151 SE Cary Parkway
 Suite 101
 Cary, NC 27518
 (919) 557-0929

ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO. 1-5711	SHEET NO. 8
R/W SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

NO BORINGS ON THIS SHEET



MATCHLINE TO SHEET 5
 -RPA Y1- STA. 10+00.00

MATCHLINE TO SHEET 5
 -Y1- STA. 31+00.00

MATCHLINE TO SHEET 5
 -RPD Y1- STA. 11+00.00

TICON THOMAS PARTNERSHIP
 DB 3529 PG 629
 PB 73 PG 375

TANGER PROPERTIES LMTD PARTNERSHIP
 DB 3529 PG 629
 PB 73 PG 375

END 3" MILL AND REPLACE
 -Y1- STA. 34+40.00

-Y1- POT Sta. 40+00.00

-RPD Y1-
 POT Sta. 10+00.00
 S 53°35'16.0" W

SEE SHEET 12 FOR -Y1- PROFILE

I:\JAN-2018 09:55
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 5/28/9c

-L-
MEBANE OAKS RD.

LOCHNER
 H. W. LOCHNER, INC.
 2840 PLAZA PLACE, SUITE 202
 RALEIGH, NC 27612
 (919) 571-7111

NC License Number F-0152
 NC FIRM LICENSE No. 15-1148
 1151 SE Cary Parkway
 Suite 101
 Cary, NC 27518
 (919) 557-0929

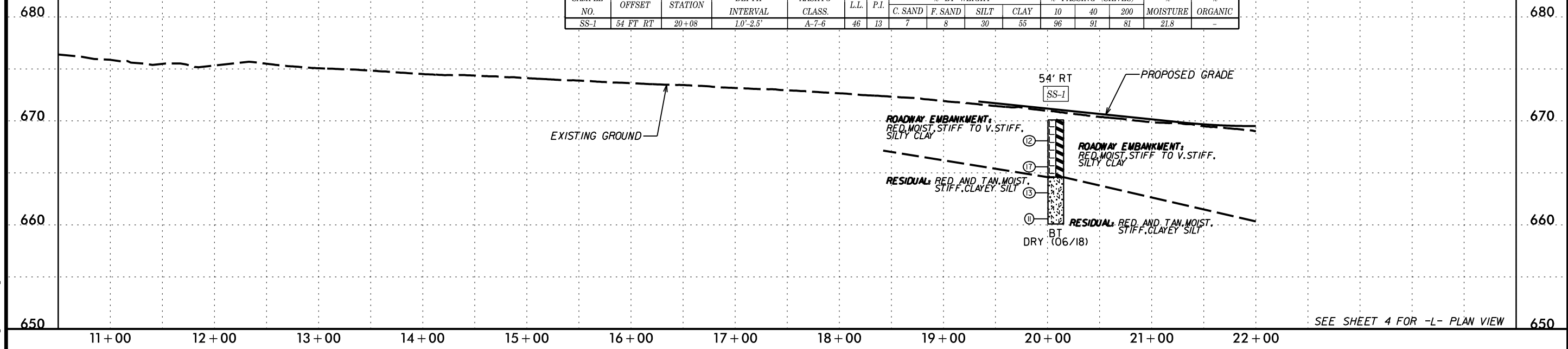
ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO. 1-5711	SHEET NO. 9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

BM#4
 -L- STA 14+33.18
 65.34 RIGHT
 ELEV 673.90'

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	54 FT RT	20+08	1.0'-2.5'	A-7-6	46	13	7	8	30	55	96	91	81	21.8	-



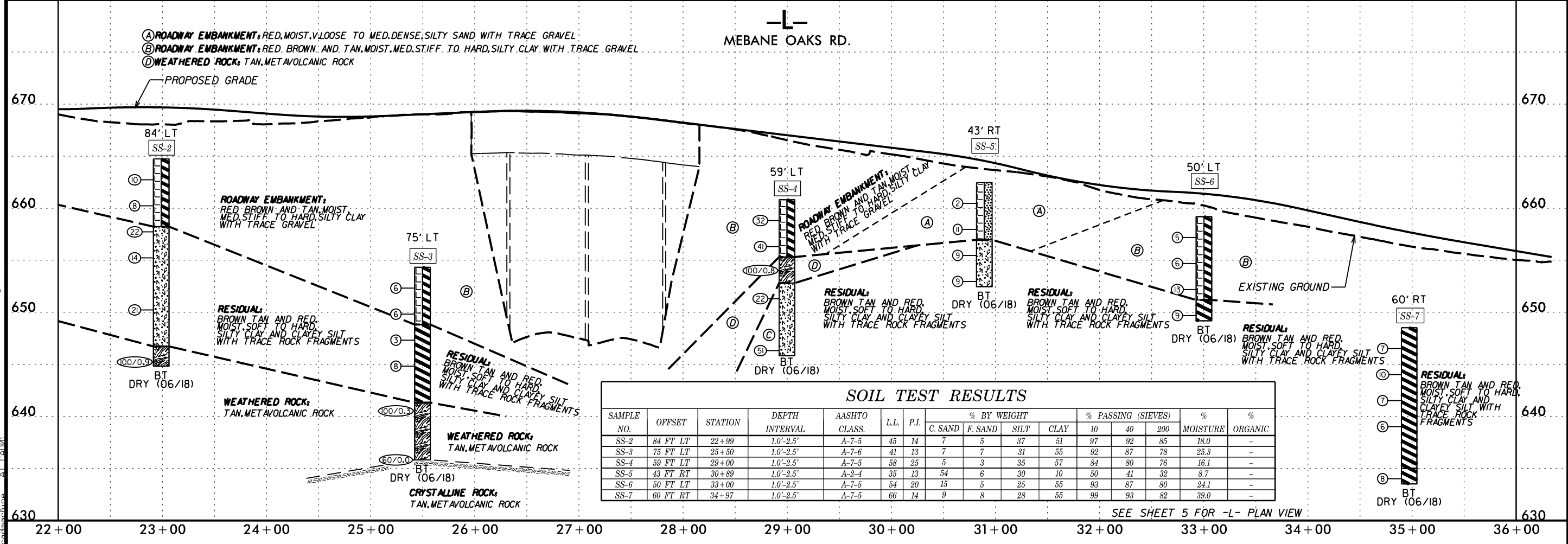
SEE SHEET 4 FOR -L- PLAN VIEW

-L-
MEBANE OAKS RD.

- Ⓐ ROADWAY EMBANKMENT: RED, MOIST, V. LOOSE TO MED. DENSE; SILTY SAND WITH TRACE GRAVEL
- Ⓑ ROADWAY EMBANKMENT: RED, BROWN, AND TAN, MOIST, MED. STIFF TO HARD, SILTY CLAY WITH TRACE GRAVEL
- Ⓓ WEATHERED ROCK: TAN, METAVOLCANIC ROCK

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	84 FT LT	22+99	1.0'-2.5'	A-7-5	45	14	7	5	37	51	97	92	85	18.0	-
SS-3	75 FT LT	25+50	1.0'-2.5'	A-7-6	41	13	7	7	31	55	92	87	78	25.3	-
SS-4	59 FT LT	29+00	1.0'-2.5'	A-7-5	58	25	5	3	35	57	84	80	76	16.1	-
SS-5	43 FT RT	30+89	1.0'-2.5'	A-2-4	35	13	54	6	30	10	50	41	32	8.7	-
SS-6	50 FT LT	33+00	1.0'-2.5'	A-7-5	54	20	15	5	25	55	93	87	80	24.1	-
SS-7	60 FT RT	34+97	1.0'-2.5'	A-7-5	66	14	9	8	28	55	99	93	82	39.0	-

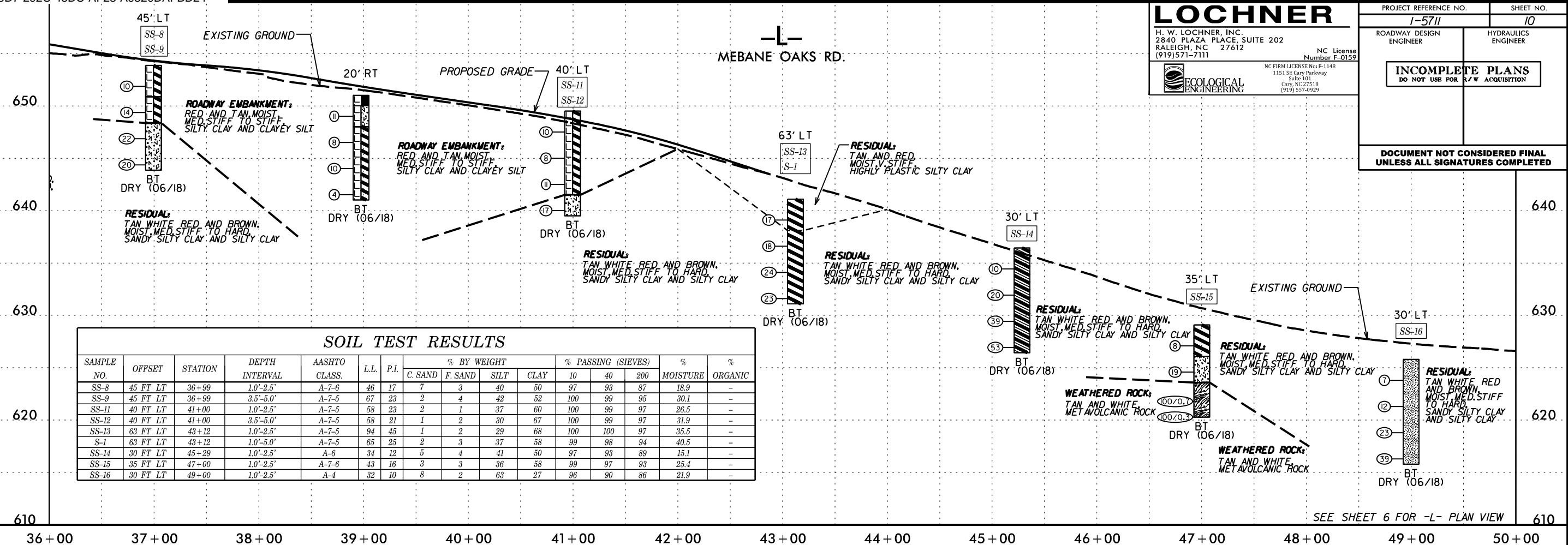


SEE SHEET 5 FOR -L- PLAN VIEW

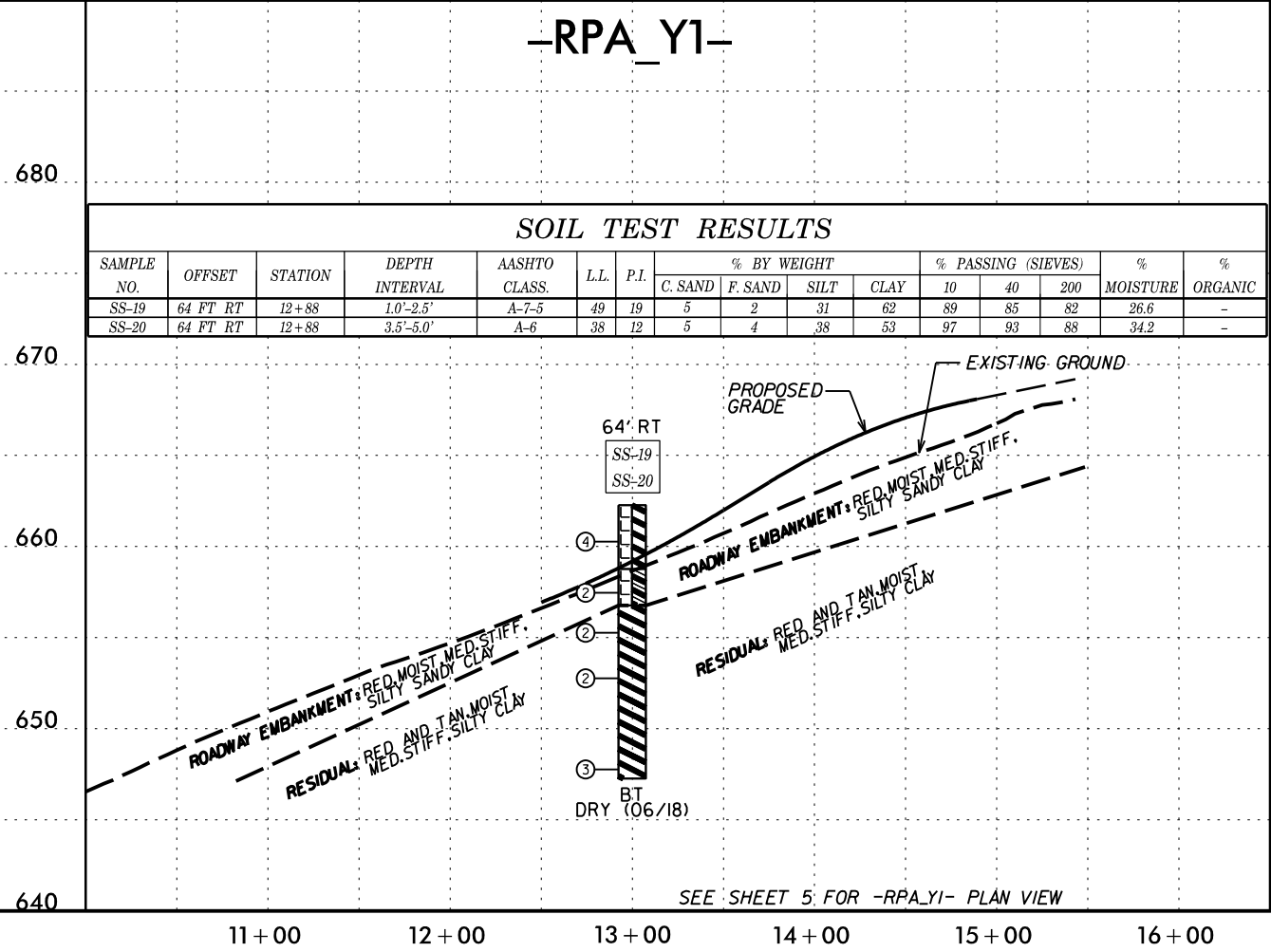
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 10/10/2018 10:00 AM

LOCHNER
 H. W. LOCHNER, INC.
 2840 PLAZA PLACE, SUITE 202
 RALEIGH, NC 27612
 (919) 571-7111
 NC License Number F-0152
 NC FIRM LICENSE No. 1348
 1151 SE Cary Parkway
 Suite 101
 Cary, NC 27518
 (919) 557-0929
ECOLOGICAL ENGINEERING

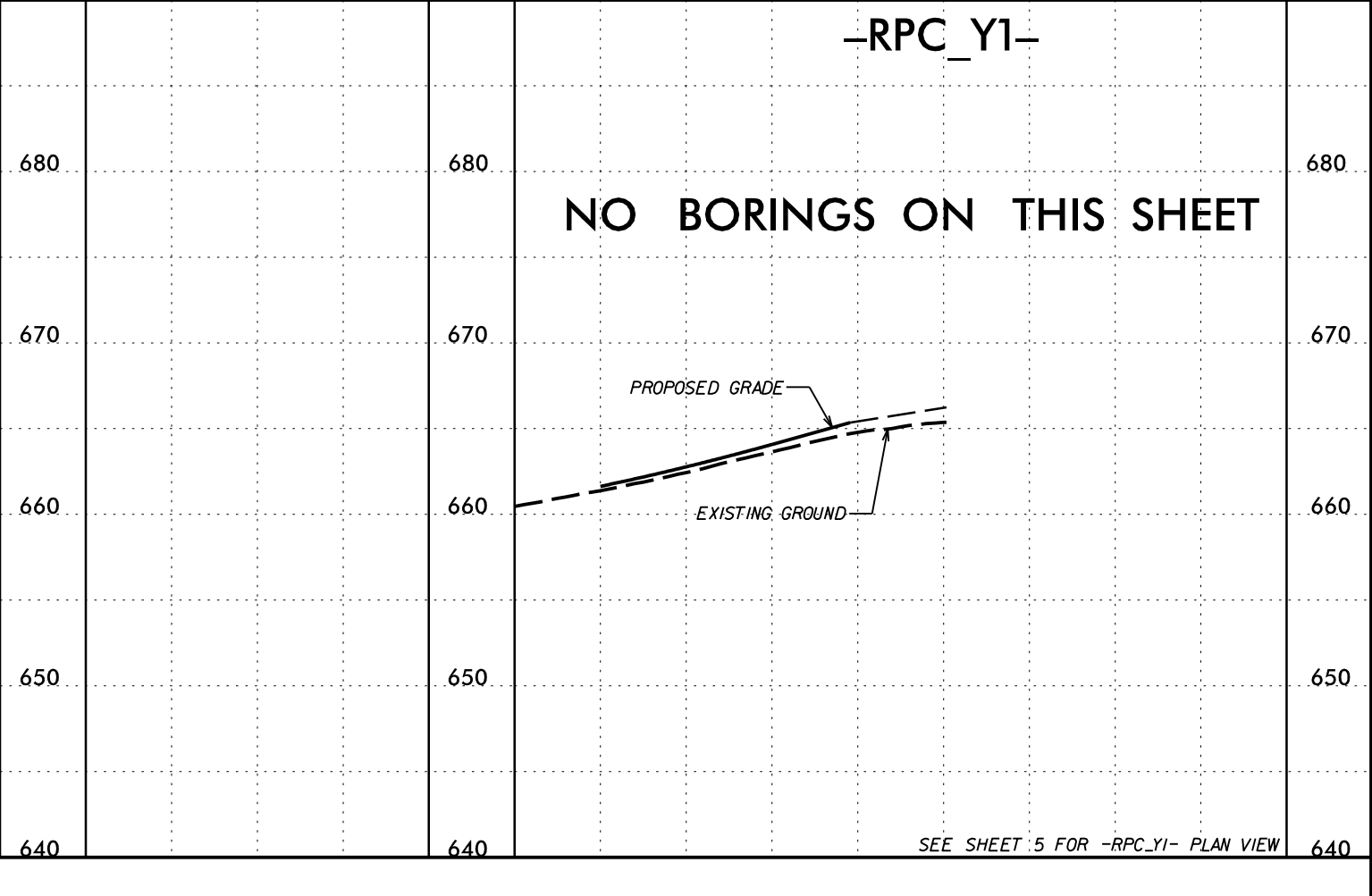
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	45 FT LT	36+99	1.0'-2.5'	A-7-6	46	17	7	3	40	50	97	93	87	18.9	-
SS-9	45 FT LT	36+99	3.5'-5.0'	A-7-5	67	23	2	4	42	52	100	99	95	30.1	-
SS-11	40 FT LT	41+00	1.0'-2.5'	A-7-5	58	23	2	1	37	60	100	99	97	26.5	-
SS-12	40 FT LT	41+00	3.5'-5.0'	A-7-5	58	21	1	2	30	67	100	99	97	31.9	-
SS-13	63 FT LT	43+12	1.0'-2.5'	A-7-5	94	45	1	2	29	68	100	100	97	35.5	-
S-1	63 FT LT	43+12	1.0'-5.0'	A-7-5	65	25	2	3	37	58	99	98	94	40.5	-
SS-14	30 FT LT	45+29	1.0'-2.5'	A-6	34	12	5	4	41	50	97	93	89	15.1	-
SS-15	35 FT LT	47+00	1.0'-2.5'	A-7-6	43	16	3	3	36	58	99	97	93	25.4	-
SS-16	30 FT LT	49+00	1.0'-2.5'	A-4	32	10	8	2	63	27	96	90	86	21.9	-



SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-19	64 FT RT	12+88	1.0'-2.5'	A-7-5	49	19	5	2	31	62	89	85	82	26.6	-
SS-20	64 FT RT	12+88	3.5'-5.0'	A-6	38	12	5	4	38	53	97	93	88	34.2	-



5/28/9c
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-RPB_Y1-

LOCHNER

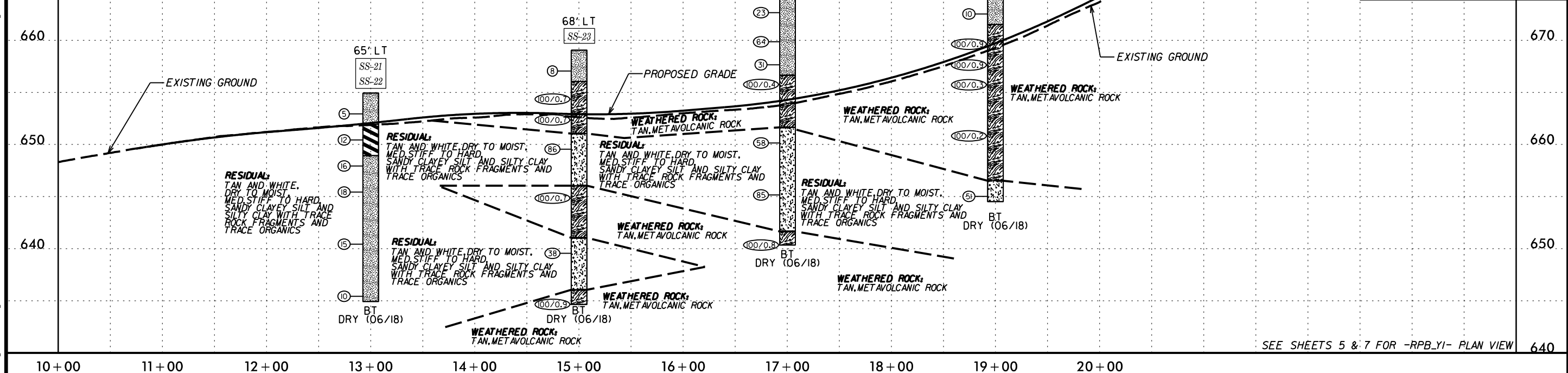
H. W. LOCHNER, INC.
 2840 PLAZA PLACE, SUITE 202
 RALEIGH, NC 27612
 (919) 571-7111

NC License Number F-0152
 NC FIRM LICENSE No. F-1148
 1151 SE Cary Parkway
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 Cary, NC 27518
 (919) 557-0929

ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO. 1-5711	SHEET NO. 11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

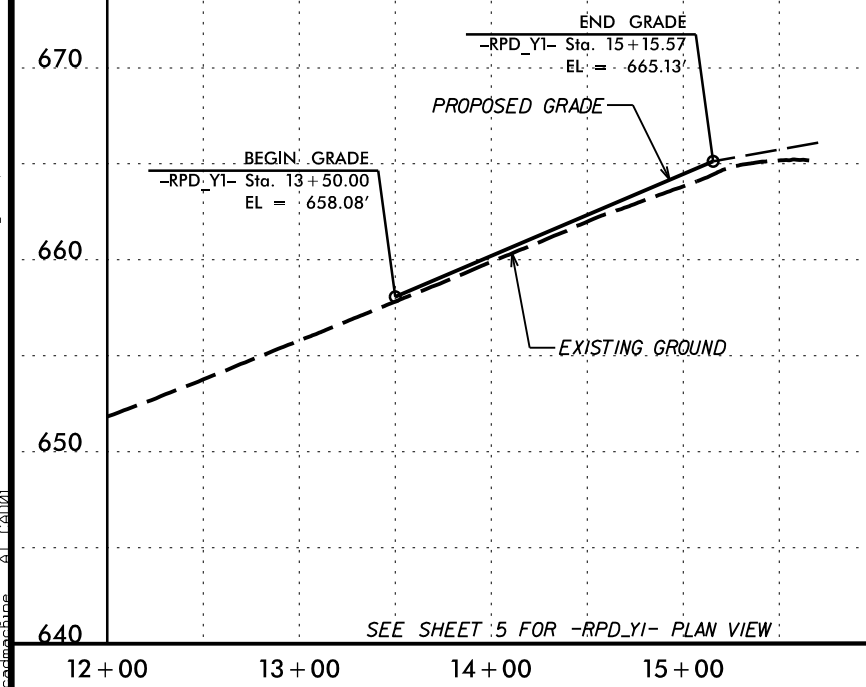
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-21	65 FT LT	13+02	1.0'-2.5'	A-4	29	7	5	3	32	40	69	65	61	8.3	-
SS-22	65 FT LT	13+02	3.5'-5.0'	A-7-5	57	18	3	9	33	55	100	98	88	30.6	-
SS-23	68 FT LT	14+96	1.0'-2.5'	A-4	30	7	5	2	58	35	80	76	73	16.5	-
S-2	68 FT LT	17+21	1.0'-5.0'	A-4	22	5	22	8	49	21	84	67	54	10.7	-
SS-24	72 FT LT	19+02	1.0'-2.5'	A-4	40	10	13	6	49	32	93	83	74	20.3	-



SEE SHEETS 5 & 7 FOR -RPB_Y1- PLAN VIEW

-RPD_Y1-

NO BORINGS ON THIS SHEET

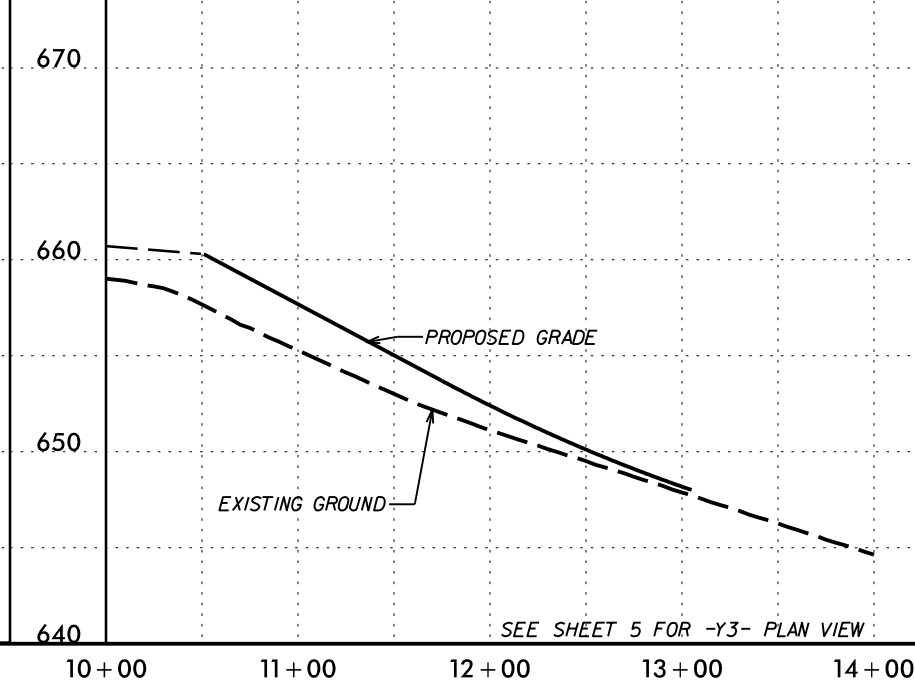


SEE SHEET 5 FOR -RPD_Y1- PLAN VIEW

-Y2-

SR 2210 FOREST OAKS LN.

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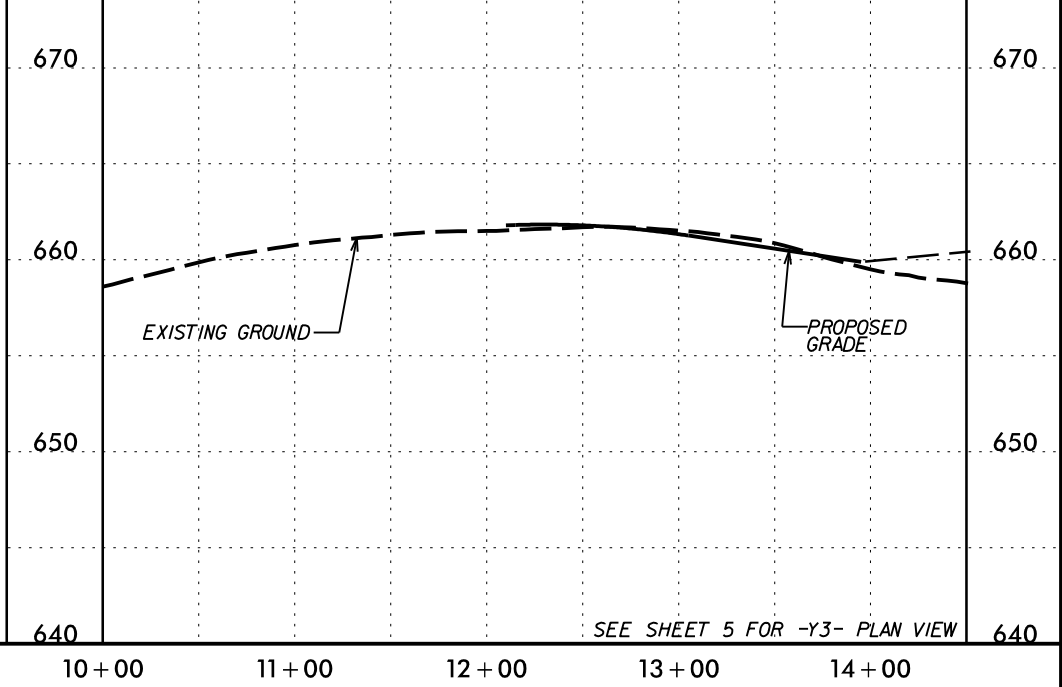


SEE SHEET 5 FOR -Y2- PLAN VIEW

-Y3-

SR 2186 BRUNDAGE LN.

NO BORINGS ON THIS SHEET



SEE SHEET 5 FOR -Y3- PLAN VIEW

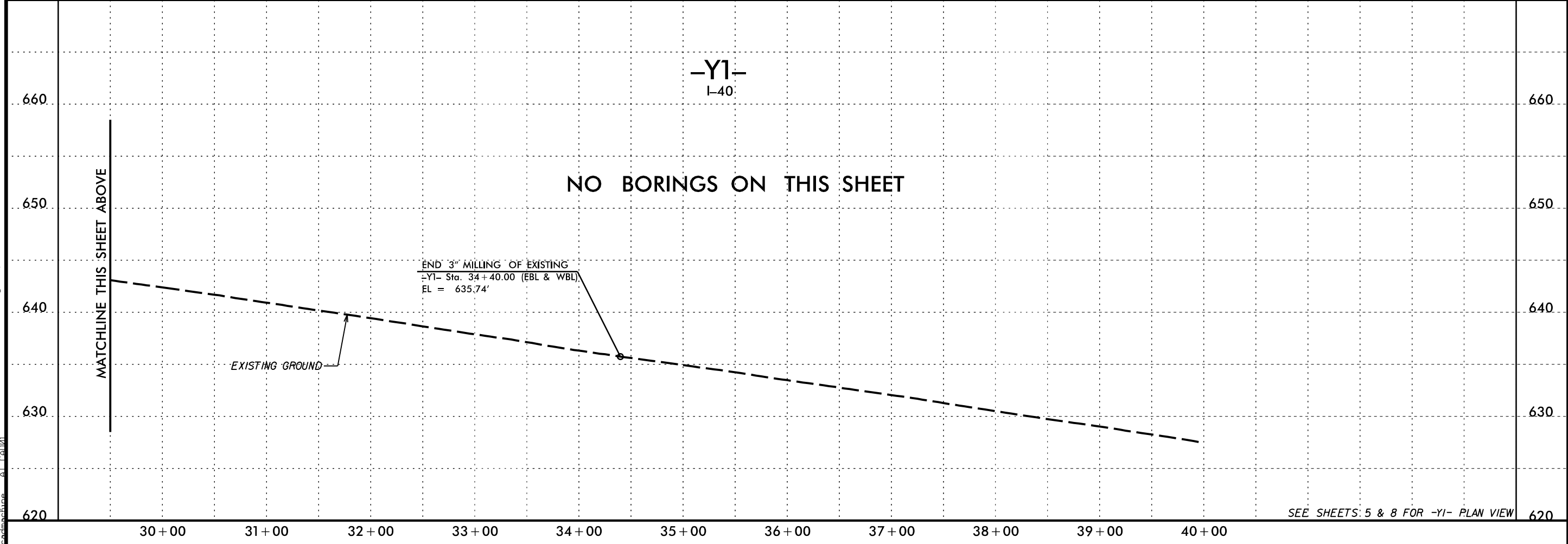
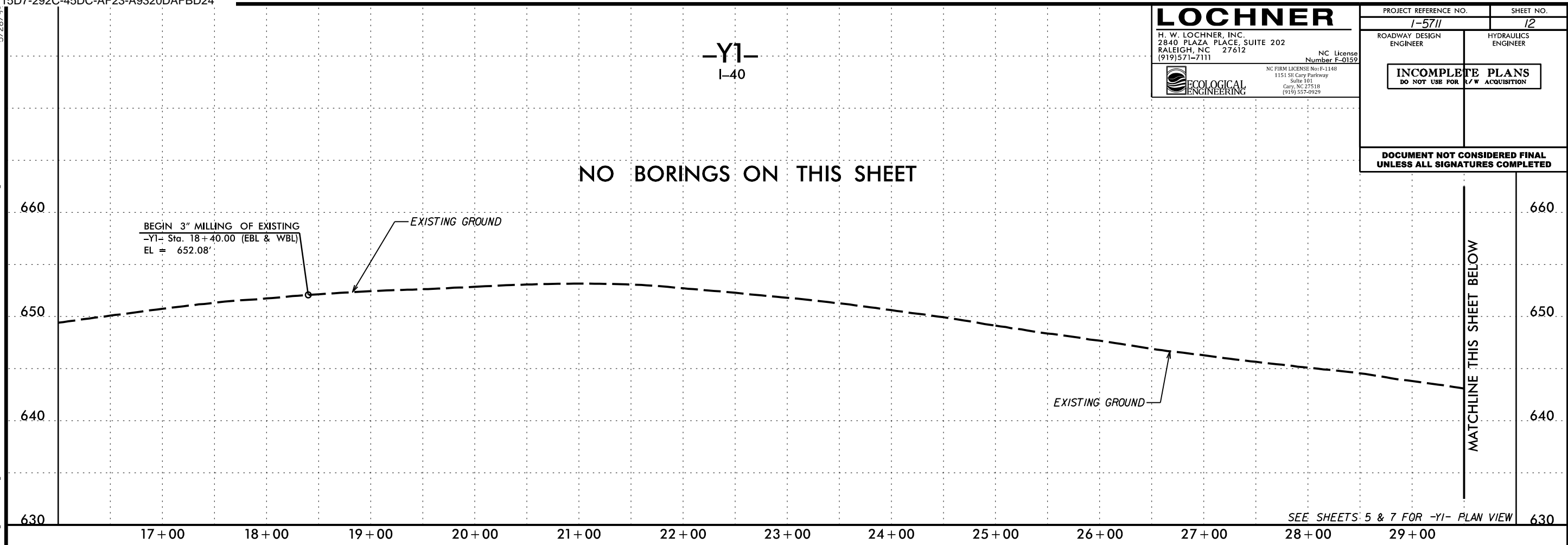
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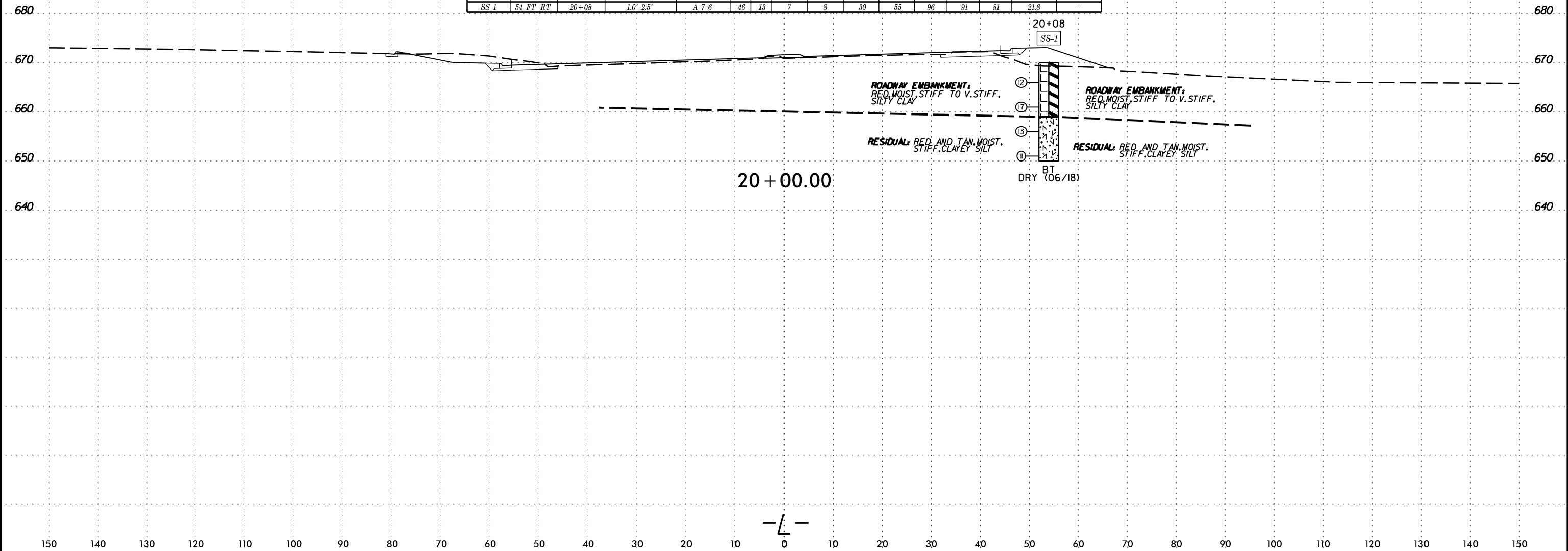
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



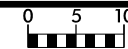
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INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

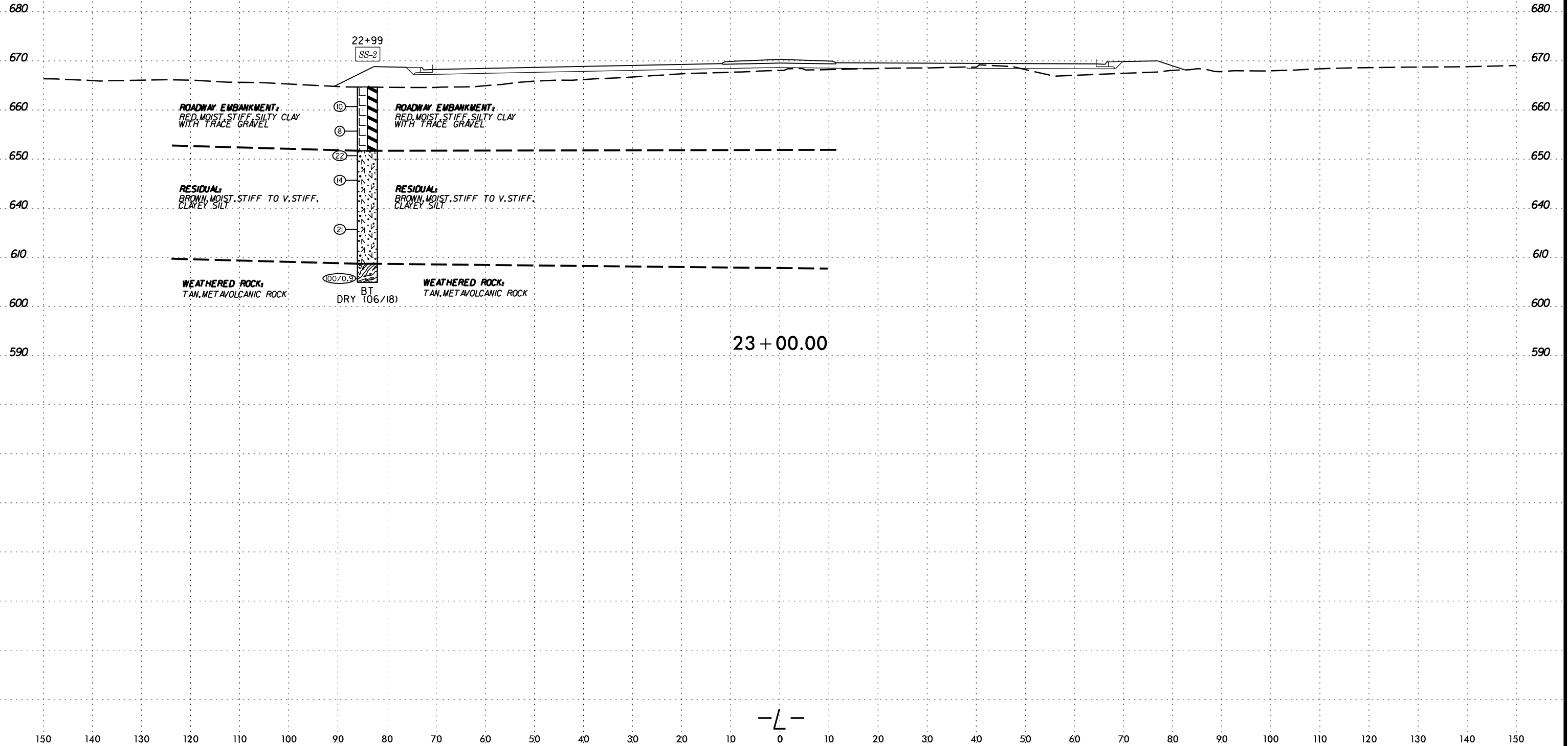
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	54 FT RT	20+08	10'-2.5'	A-7-6	46	13	7	8	30	55	96	91	81	21.8	-



-L-



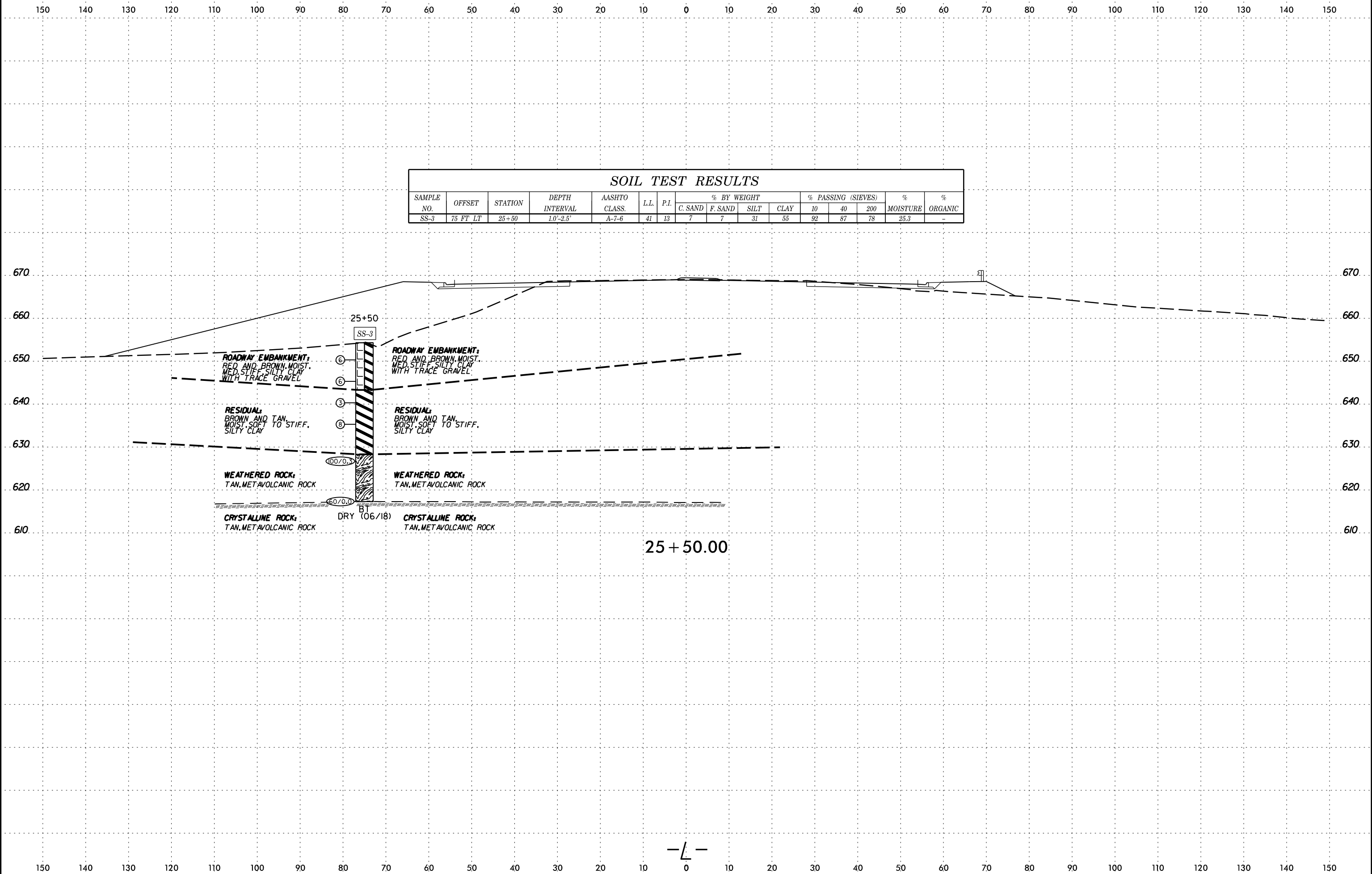
SOIL TEST RESULTS															
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	84 FT LT	22+99	1.0'-2.5'	A-7-5	45	14	7	5	37	51	97	92	85	18.0	-



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 6/23/16

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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		
SS-3	75 FT LT	25+50	10'-2.5'	A-7-6	41	13	7	7	31	55	92	87	78	25.3	-

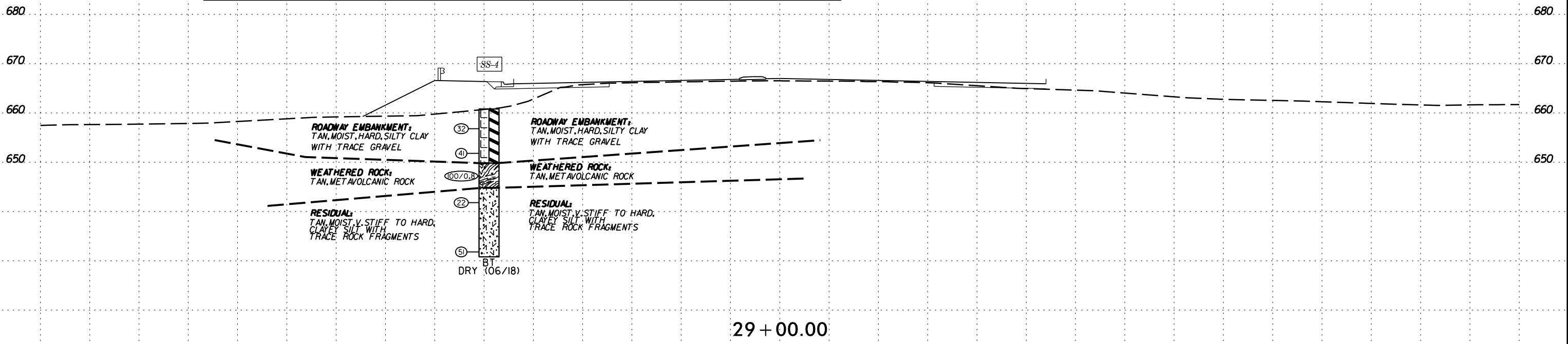


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 6/23/16



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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	59 FT LT	29+00	1.0'-2.5'	A-7-5	58	25	5	3	35	57	84	80	76	16.1	-



29 + 00.00

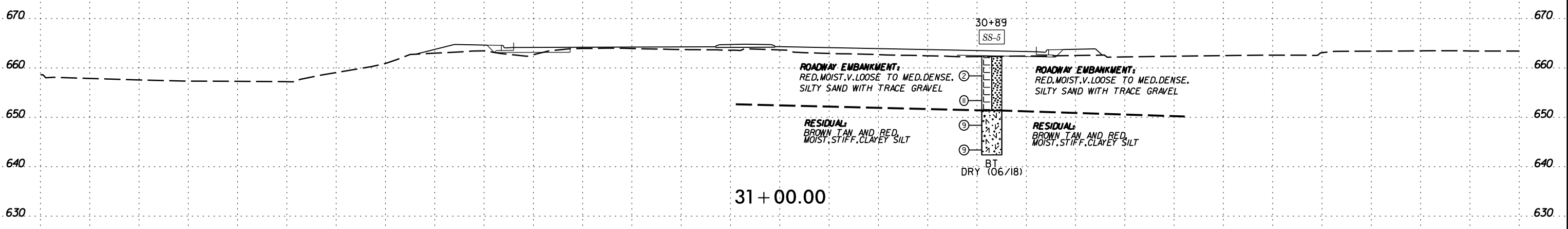
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 6/23/16
 cadmachine

6/23/16
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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		
SS-5	43 FT RT	30+89	1.0'-2.5'	A-2-4	35	13	54	6	30	10	50	41	32	8.7	-

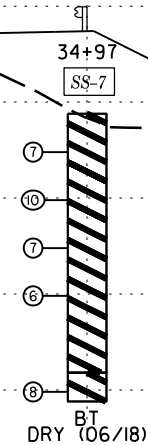


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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



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		
SS-7	60 FT RT	34+97	1.0'-2.5'	A-7-5	66	14	9	8	28	55	99	93	82	39.0	-

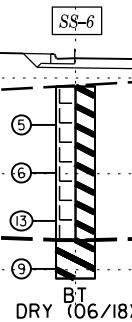


RESIDUAL:
BROWN TAN AND RED.
MOIST. MED. STIFF. TO STIFF.
SILTY CLAY AND CLAYEY SILT

RESIDUAL:
BROWN TAN AND RED.
MOIST. MED. STIFF. TO STIFF.
SILTY CLAY AND CLAYEY SILT

35 + 00.00

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		
SS-6	50 FT LT	33+00	1.0'-2.5'	A-7-5	54	20	15	5	25	55	93	87	80	24.1	-



ROADWAY EMBANKMENT:
RED. AND BROWN. MOIST.
MED. STIFF. TO STIFF.
SILTY CLAY

ROADWAY EMBANKMENT:
RED. AND BROWN. MOIST.
MED. STIFF. TO STIFF. SILTY CLAY

RESIDUAL:
RED. MOIST. STIFF.
SILTY CLAY

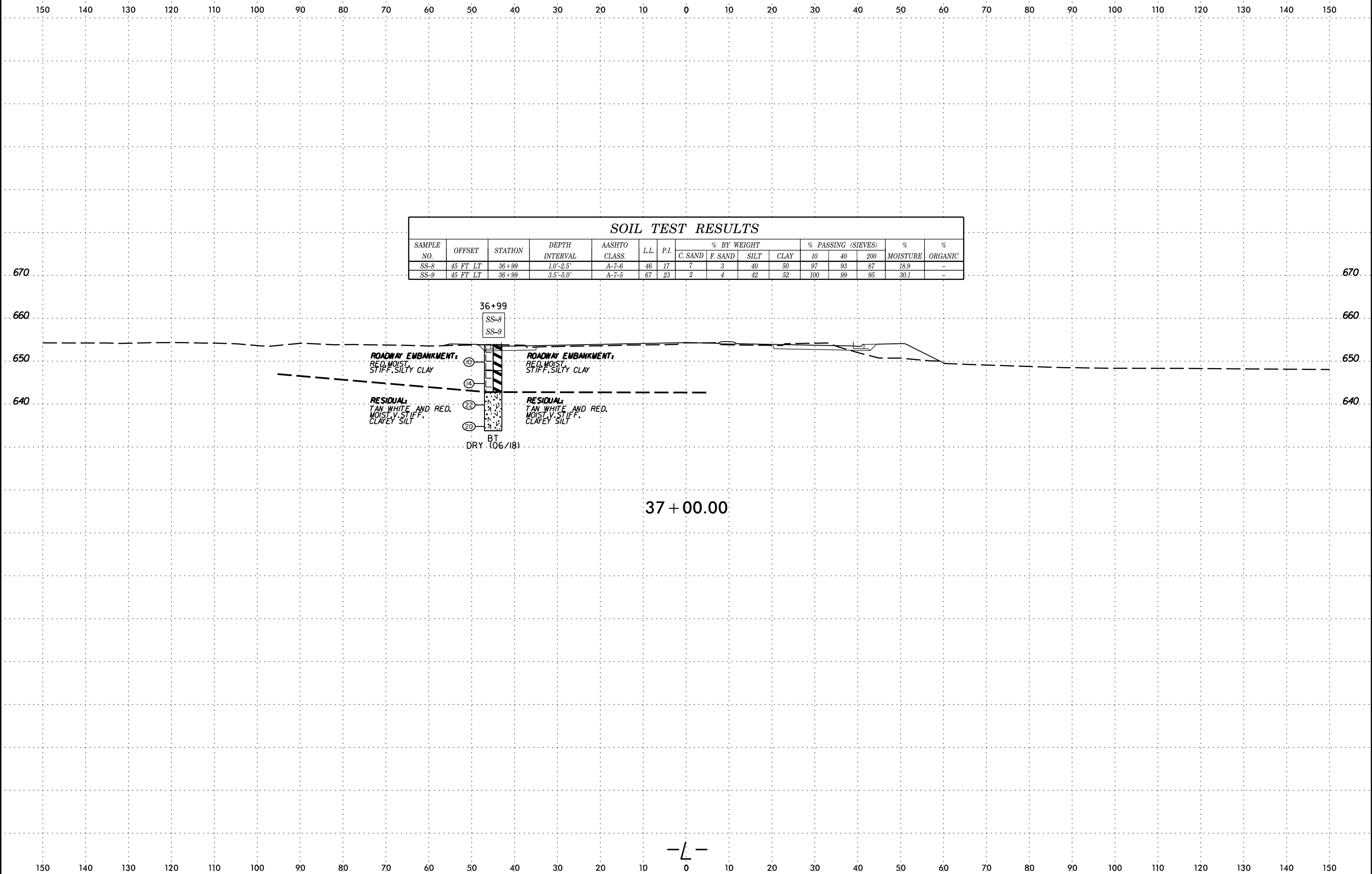
RESIDUAL:
RED. MOIST. STIFF.
SILTY CLAY

33 + 00.00

-L-

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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		
SS-8	45 FT LT	36+99	1.0'-2.5'	A-7-6	46	17	7	3	40	50	97	93	87	18.9	-
SS-9	45 FT LT	36+99	3.5'-5.0'	A-7-5	67	23	2	4	42	52	100	99	95	30.1	-

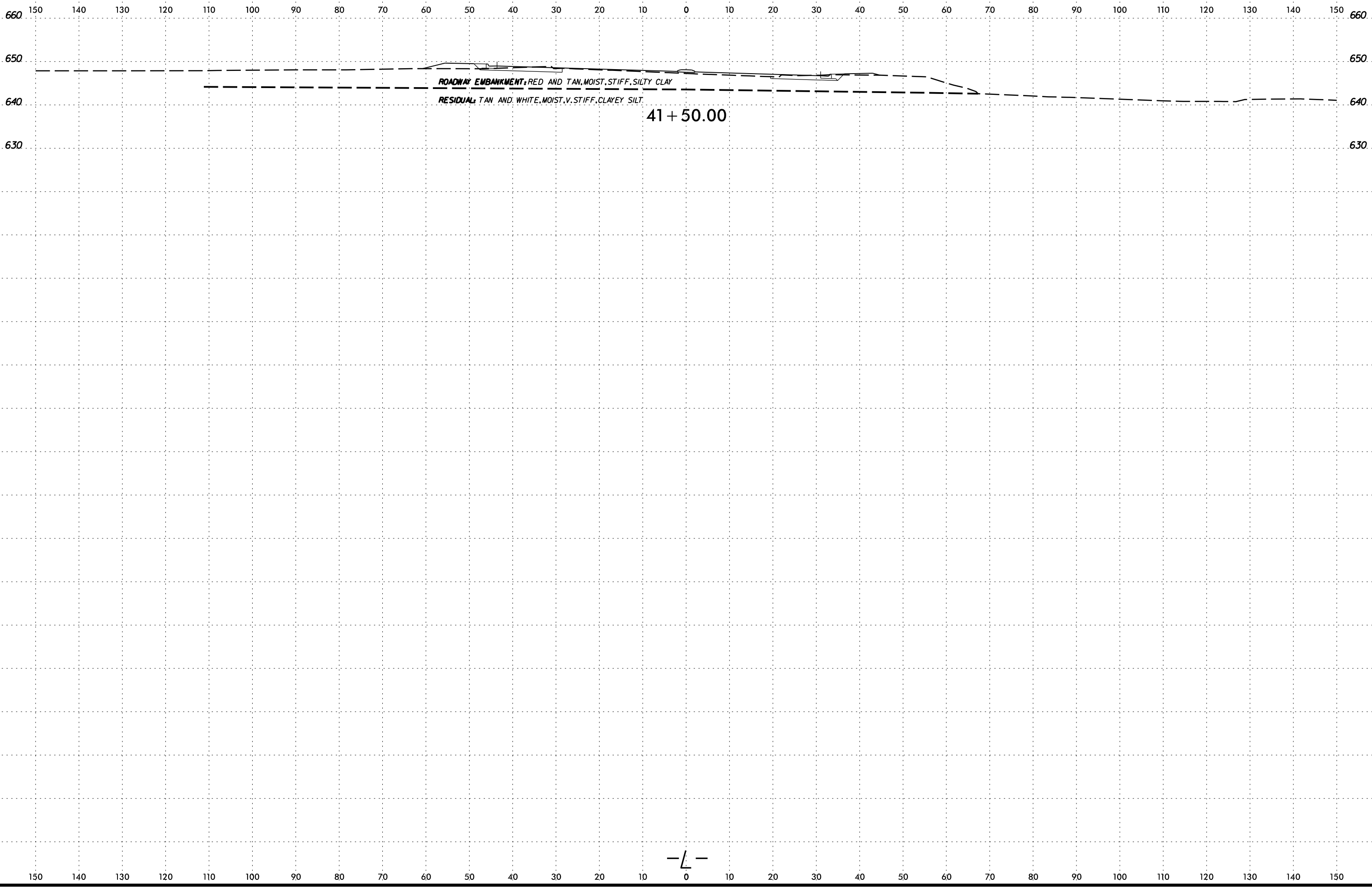


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 6/23/16
 cadmachine AI CAD01

6/23/16



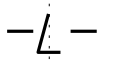
PROJ. REFERENCE NO.	SHEET NO.
I-5711	20



ROADWAY EMBANKMENT: RED AND TAN, MOIST, STIFF, SILTY CLAY

RESIDUAL: TAN AND WHITE, MOIST, V. STIFF, CLAYEY SILT

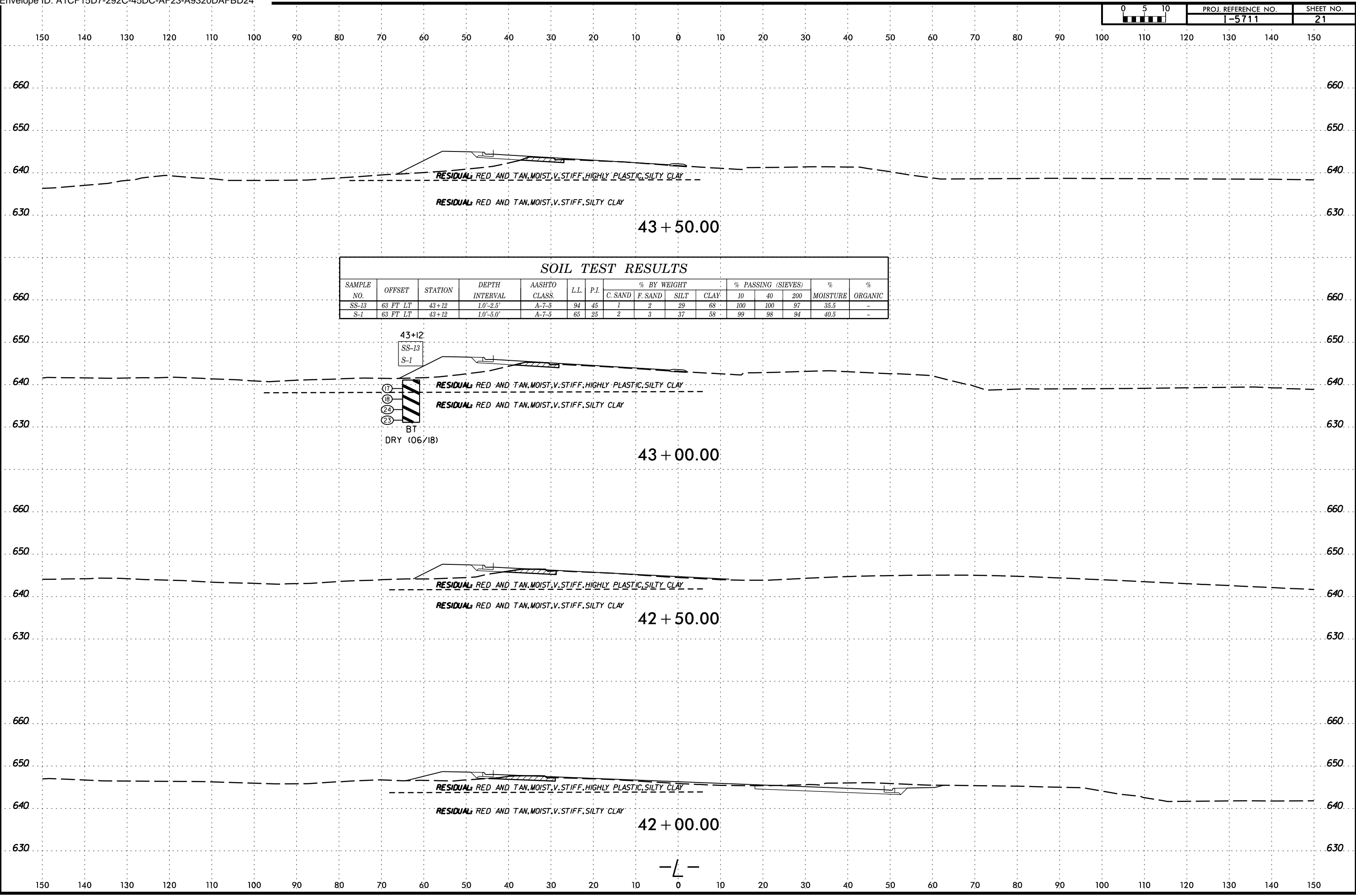
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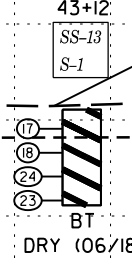
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 6/23/16
 6/23/16



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		
SS-13	63 FT LT	43+12	1.0'-2.5'	A-7-5	94	45	1	2	29	68	100	100	97	35.5	-
S-1	63 FT LT	43+12	1.0'-5.0'	A-7-5	65	25	2	3	37	58	99	98	94	40.5	-



RESIDUAL RED AND TAN, MOIST, V. STIFF, HIGHLY PLASTIC, SILTY CLAY

RESIDUAL RED AND TAN, MOIST, V. STIFF, SILTY CLAY

43 + 50.00

RESIDUAL RED AND TAN, MOIST, V. STIFF, HIGHLY PLASTIC, SILTY CLAY

RESIDUAL RED AND TAN, MOIST, V. STIFF, SILTY CLAY

43 + 00.00

RESIDUAL RED AND TAN, MOIST, V. STIFF, HIGHLY PLASTIC, SILTY CLAY

RESIDUAL RED AND TAN, MOIST, V. STIFF, SILTY CLAY

42 + 50.00

RESIDUAL RED AND TAN, MOIST, V. STIFF, HIGHLY PLASTIC, SILTY CLAY

RESIDUAL RED AND TAN, MOIST, V. STIFF, SILTY CLAY

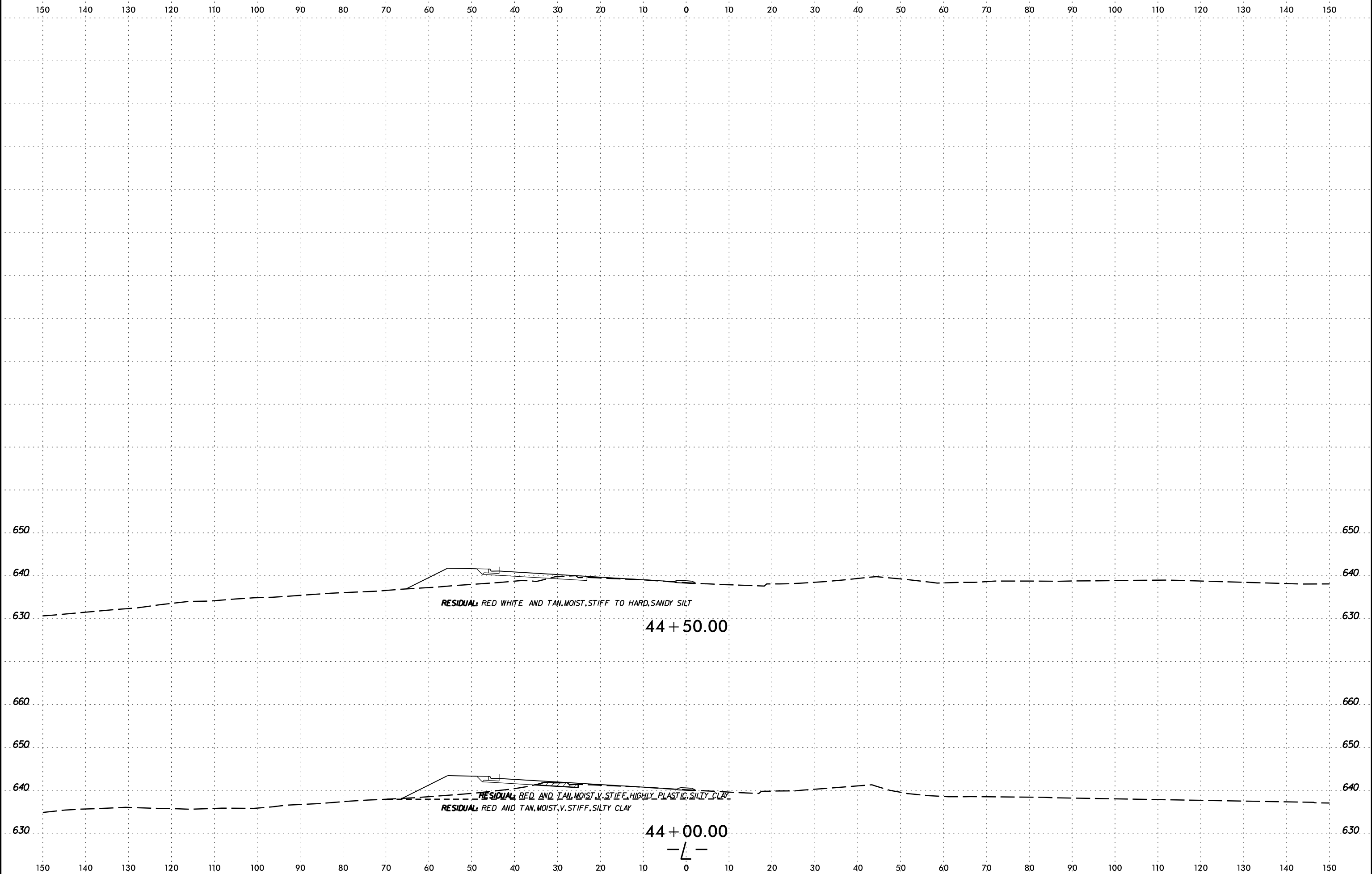
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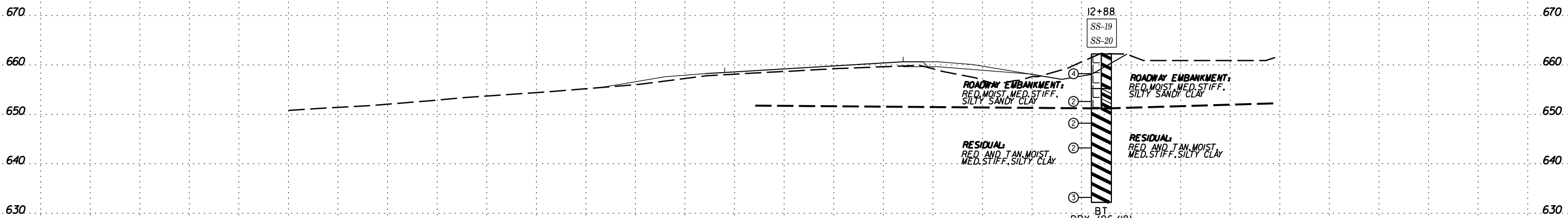
PROJ. REFERENCE NO.	SHEET NO.
I-5711	22



6/23/16

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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-19	64 FT RT	12+88	1.0'-2.5'	A-7-5	49	19	5	2	31	62	89	85	82	26.6	-
SS-20	64 FT RT	12+88	3.5'-5.0'	A-6	38	12	5	4	38	53	97	93	88	34.2	-

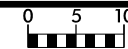


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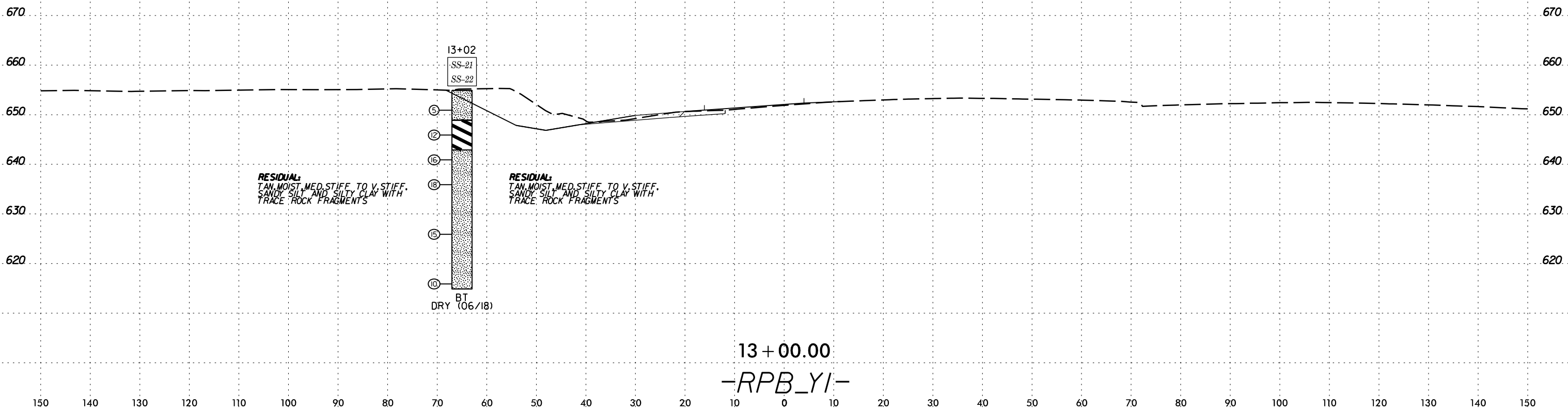
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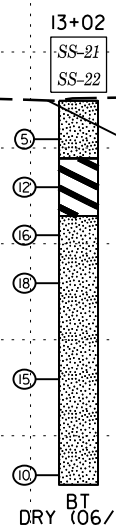
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-21	65 FT LT	13+02	1.0'-2.5'	A-4	29	7	5	3	52	40	69	65	61	8.3	-
SS-22	65 FT LT	13+02	3.5'-5.0'	A-7-5	57	18	3	9	33	55	100	98	88	30.6	-



RESIDUAL
TAN MOIST MED. STIFF TO V. STIFF
SANDY SILT AND SILTY CLAY WITH
TRACE ROCK FRAGMENTS

RESIDUAL
TAN MOIST MED. STIFF TO V. STIFF
SANDY SILT AND SILTY CLAY WITH
TRACE ROCK FRAGMENTS

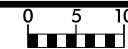


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 cadmachine

6/23/16

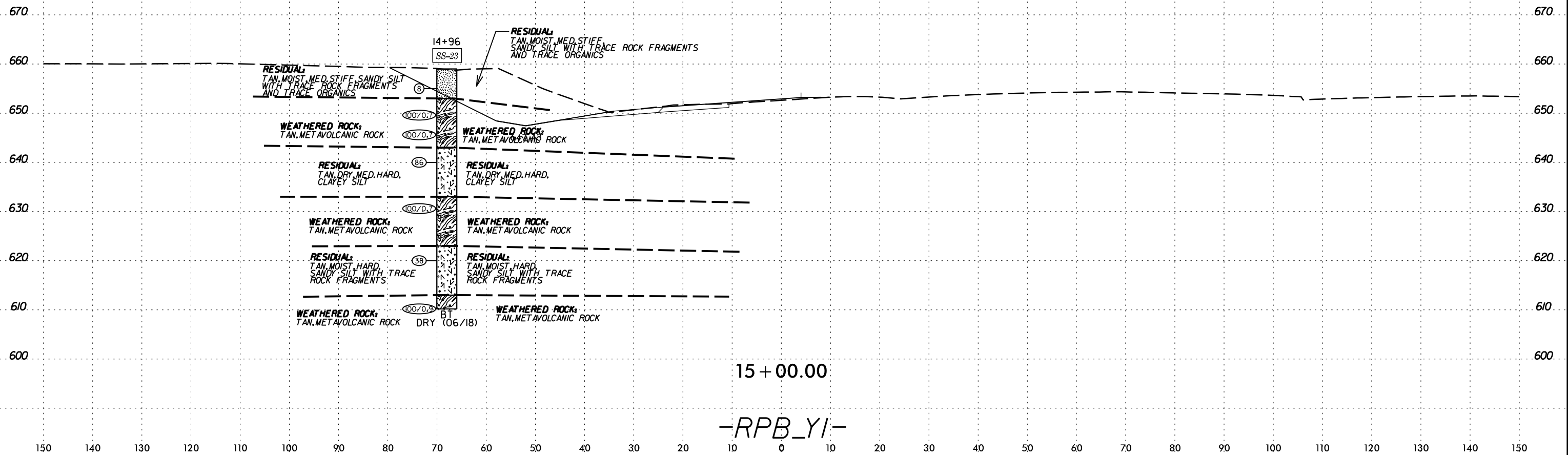


PROJ. REFERENCE NO.
I-5711

SHEET NO.
25

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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-23	68 FT LT	14+96	1.0'-2.5'	A-4	30	7	5	2	58	35	80	76	73	16.5	-



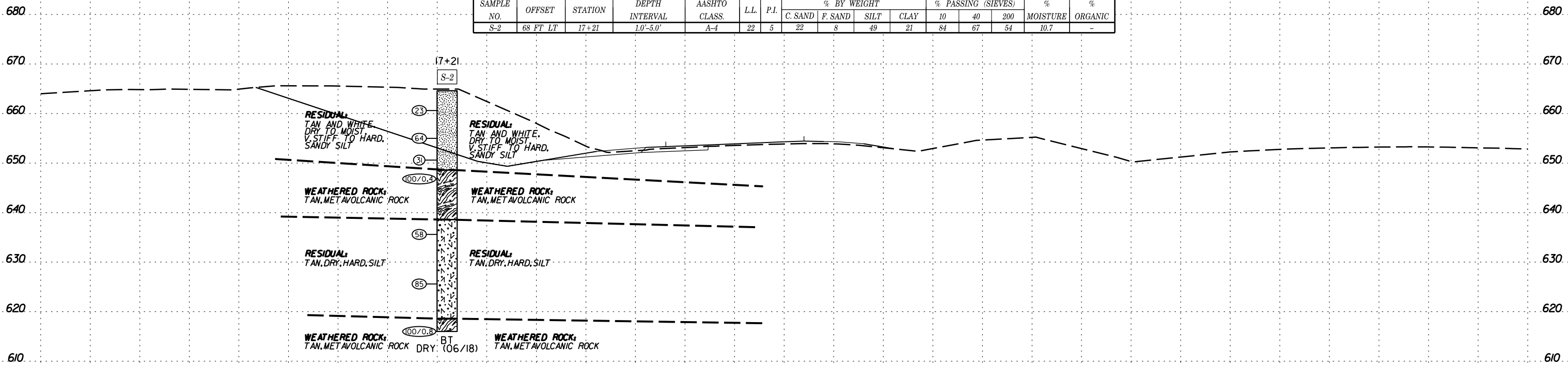
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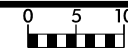
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-2	68 FT LT	17+21	1.0'-5.0'	A-4	22	5	22	8	49	21	84	67	54	10.7	-



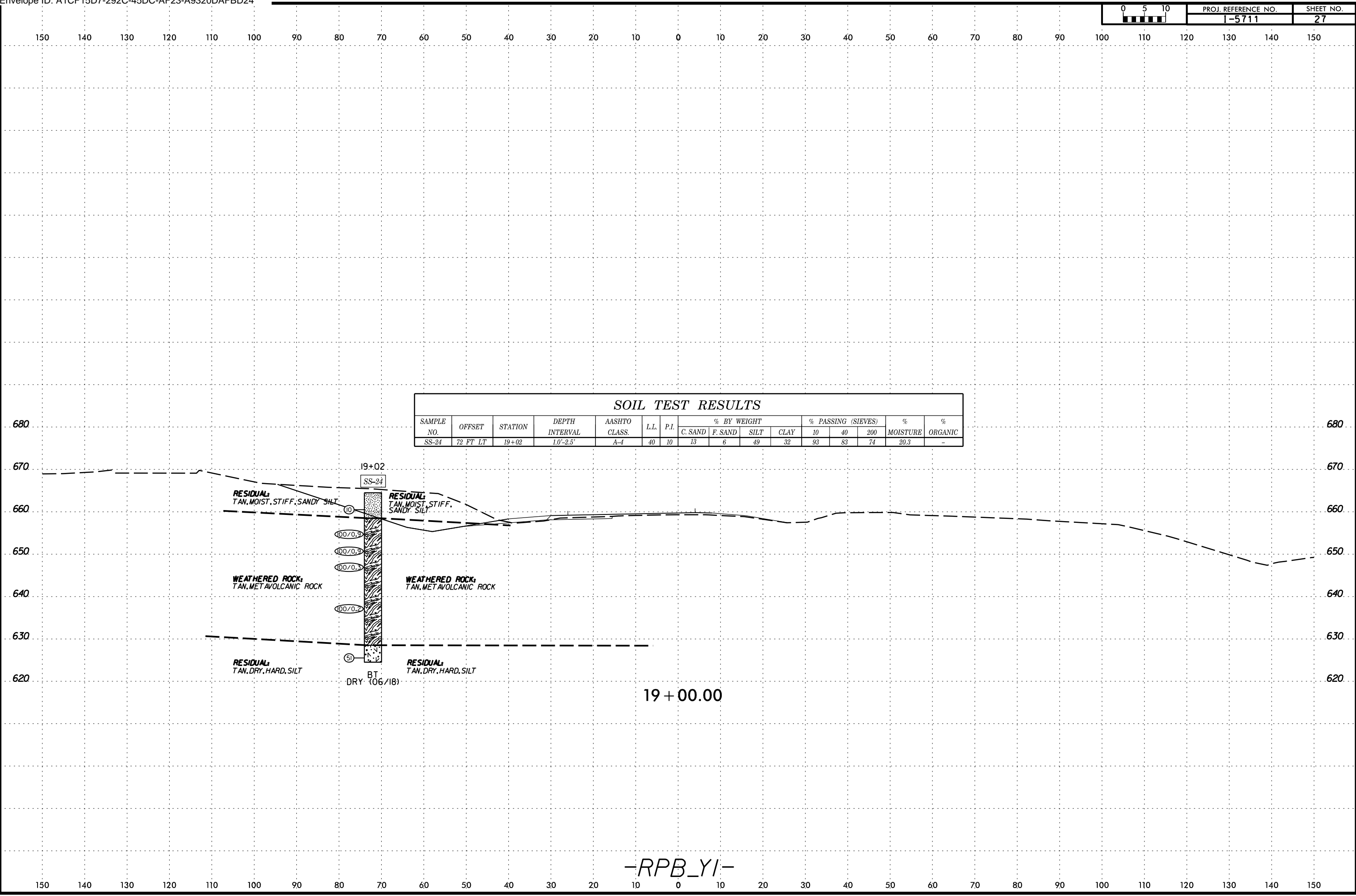
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 cadmachine AI CAD



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-24	72 FT LT	19+02	1.0'-2.5'	A-4	40	10	13	6	49	32	93	83	74	20.3	-

19+02
 SS-24
 RESIDUAL
 TAN. MOIST. STIFF. SANDY SILT
 (10)
 (00/0.5)
 (00/0.5)
 (00/0.3)
 WEATHERED ROCK
 TAN. METAVOLCANIC ROCK
 (00/0.2)
 BT
 DRY (06/18)
 RESIDUAL
 TAN. DRY. HARD. SILT

19 + 00.00

-RPB_YI-

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

SUBSURFACE INVESTIGATION

*APPENDIX A
LABORATORY RESULTS*

REFERENCE: I-5711

PROJECT: 50401



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

PHONE: 919.871.0800
www.falconengineers.com

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, Cary, NC 27513

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193

PROJECT #: **G17066.00** DATE: **9/16/2018**
PROJECT NAME: **I-5711 Interchange Improvement**
BORING: **B-11** SAMPLE: **BS-1** DEPTH: **1-5'**

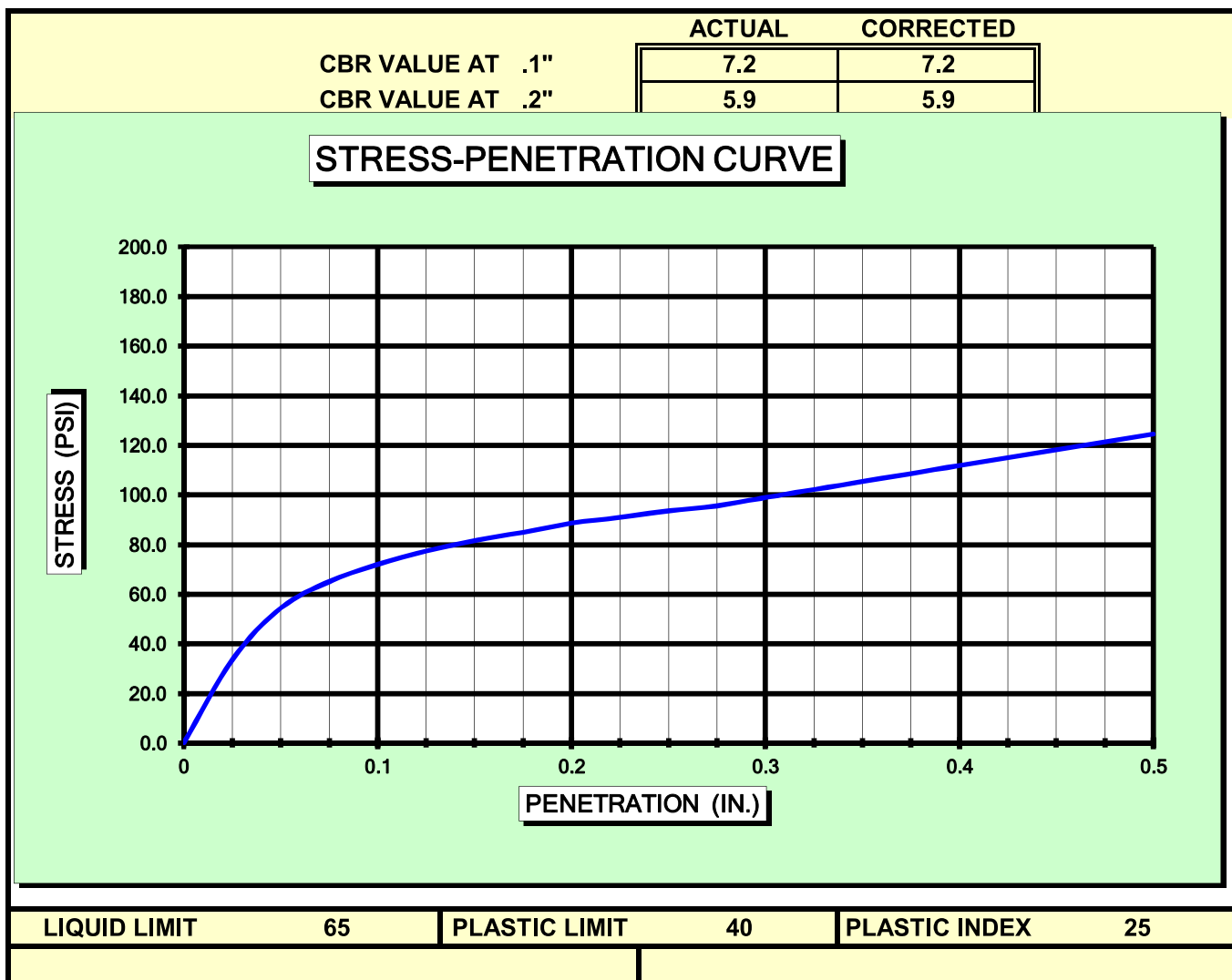
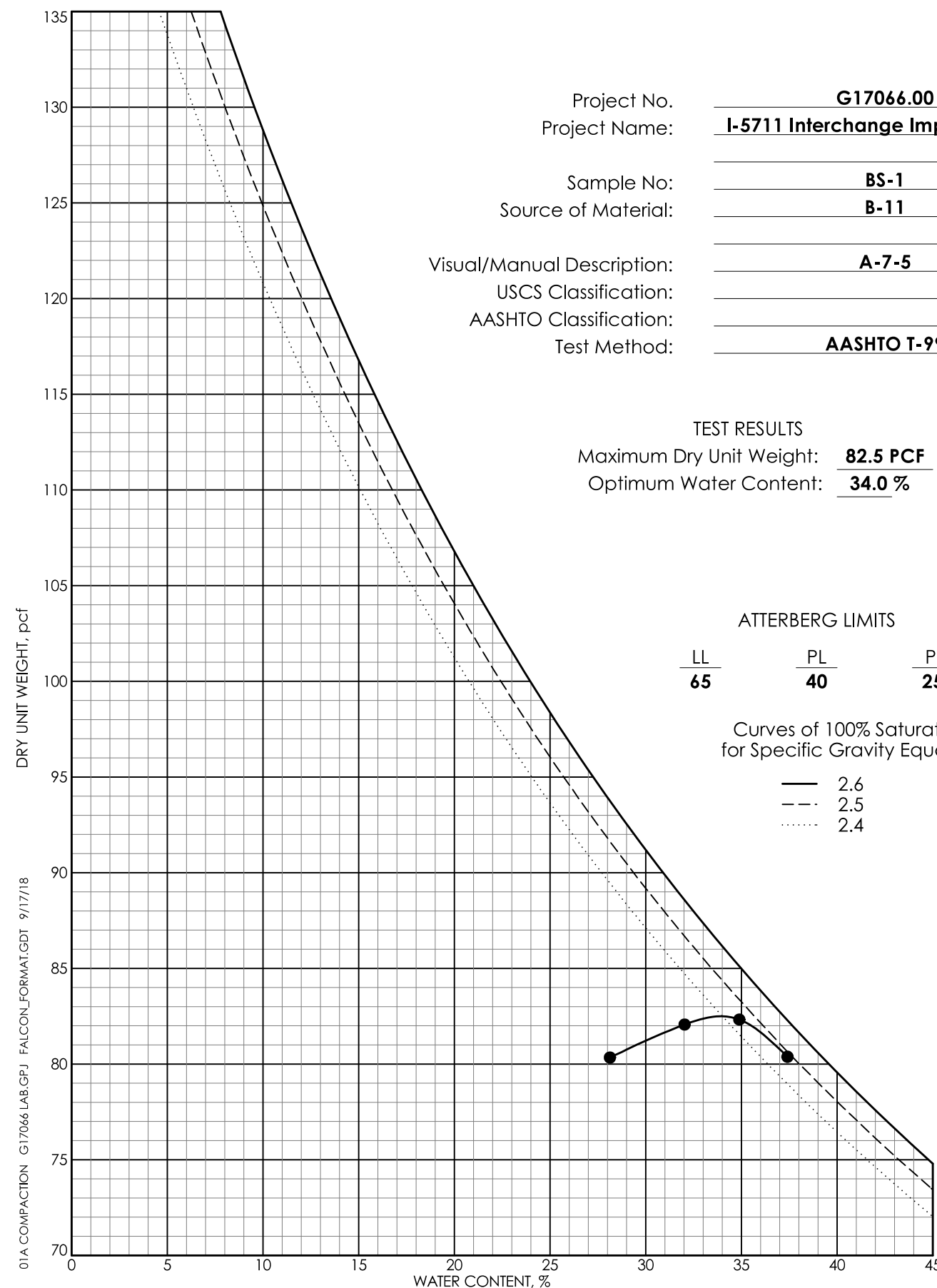
SOIL DESCRIPTION: A-7-5 Clay			
COMPACTION METHOD	AASHTO T-99A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	82.5 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	34.0%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	80.4 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	35.0%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	97.5%	SWELL	4.38%

Project No: **G17066.00**
Project Name: **I-5711 Interchange Improvements**
Sample No: **BS-1**
Source of Material: **B-11**
Visual/Manual Description: **A-7-5**
USCS Classification: _____
AASHTO Classification: _____
Test Method: **AASHTO T-99**

TEST RESULTS
Maximum Dry Unit Weight: **82.5 PCF**
Optimum Water Content: **34.0 %**

ATTERBERG LIMITS
LL **65** PL **40** PI **25**

Curves of 100% Saturation
for Specific Gravity Equal to:
— 2.6
- - - 2.5
... 2.4





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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193

PROJECT #:	G17066.00	DATE:	9/16/2018
PROJECT NAME:	I-5711 Interchange Improvement		
BORING:	RPB-3	SAMPLE:	BS-2
		DEPTH:	1-5'

SOIL DESCRIPTION: A-4 Silt			
COMPACTION METHOD	AASHTO T-99A	SOAK	96 HRS.
MAXIMUM DRY DENSITY	116.0 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	15.2%	LOAD CELL	6000
TEST DATA		SURCHARGE WEIGHT	
DRY DENSITY	114.2 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	14.5%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.4%	SWELL	2.08%

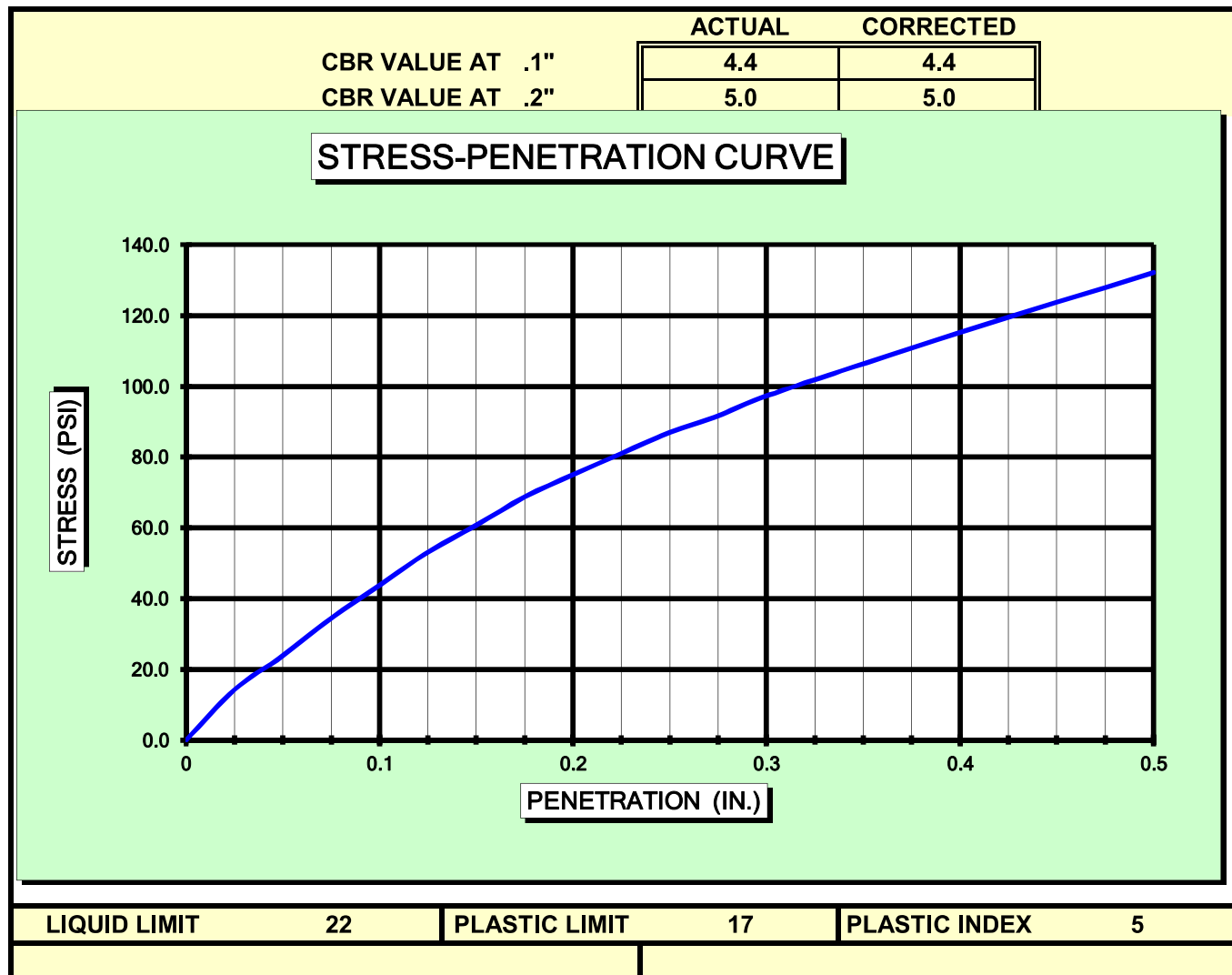
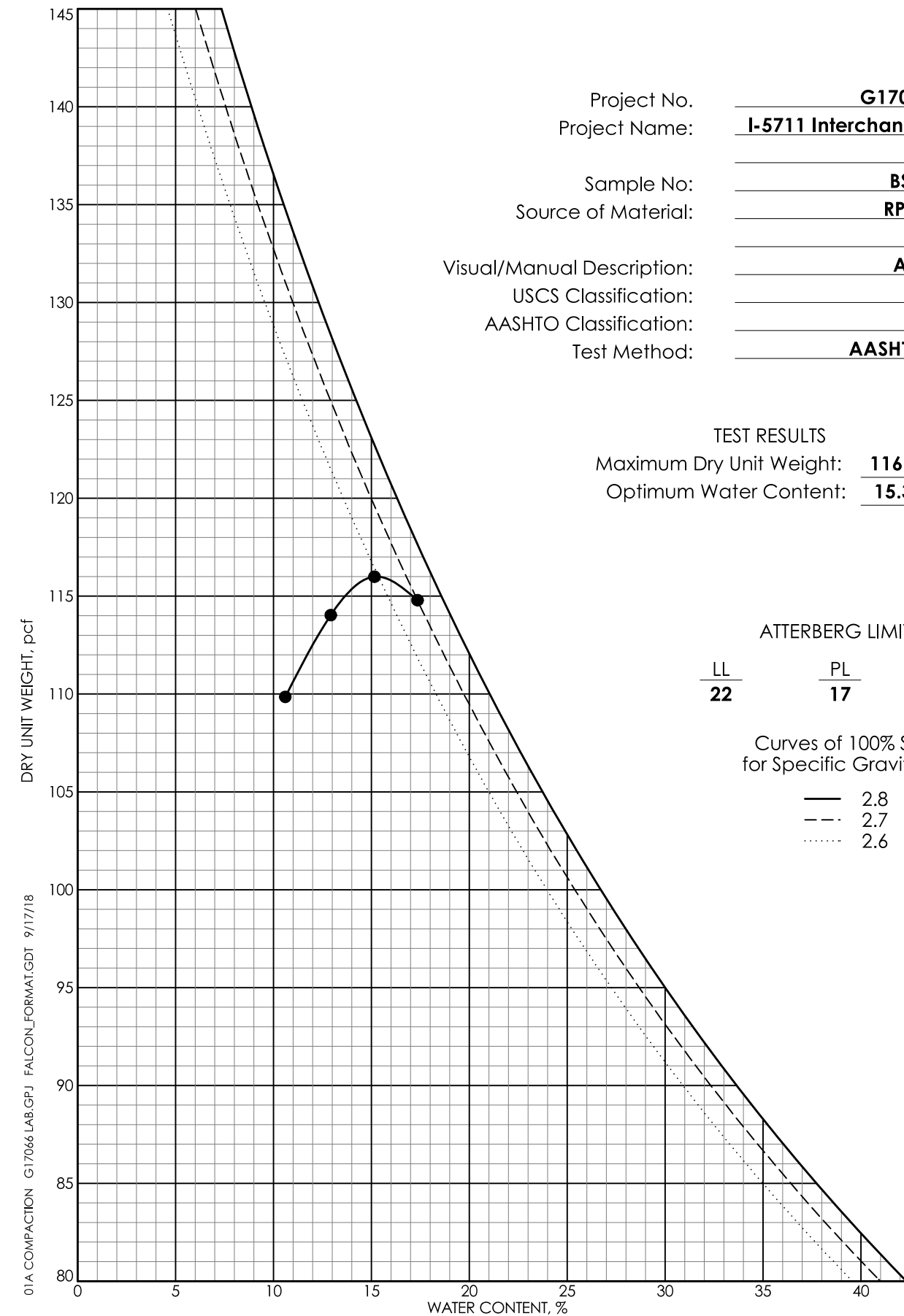
Project No. G17066.00
 Project Name: I-5711 Interchange Improvements
 Sample No: BS-2
 Source of Material: RPB-3
 Visual/Manual Description: A-4
 USCS Classification: _____
 AASHTO Classification: _____
 Test Method: AASHTO T-99

TEST RESULTS
 Maximum Dry Unit Weight: 116.0 PCF
 Optimum Water Content: 15.3 %

ATTERBERG LIMITS

LL	PL	PI
22	17	5

Curves of 100% Saturation for Specific Gravity Equal to:
 — 2.8
 - - - 2.7
 ····· 2.6



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

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 BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT, AT 1000 TOTTENHAM, 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 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 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

GOODNIGHT, D.

INVESTIGATED BY GOODNIGHT, D.

DRAWN BY CROCKETT, S.

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 200, 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		
	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		
GROUP CLASS.	A-1-a	A-1-b	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 11 MN	40 MX 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN			
MATERIAL PASSING #40 LL PI	-	-	NP	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN			
GROUP INDEX	0	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX								
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS												
GEN. RATING AS 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	305 IN. 12	75	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 - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT	- 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

RECOMMENDATION SYMBOLS

ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
	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 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 DISLOGGED 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

DATE: 8-15-14

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

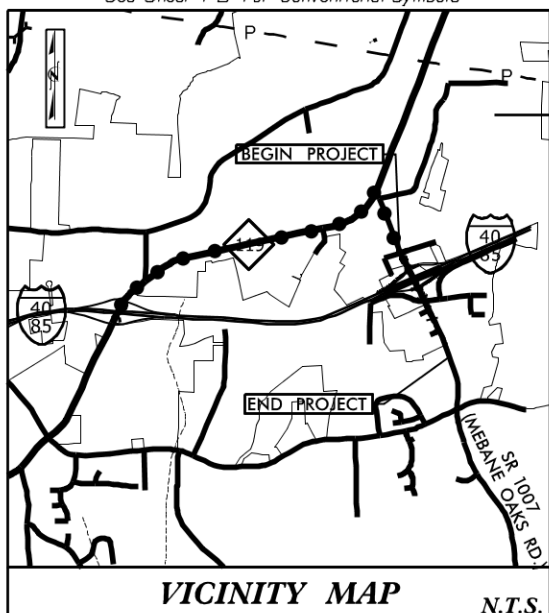
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

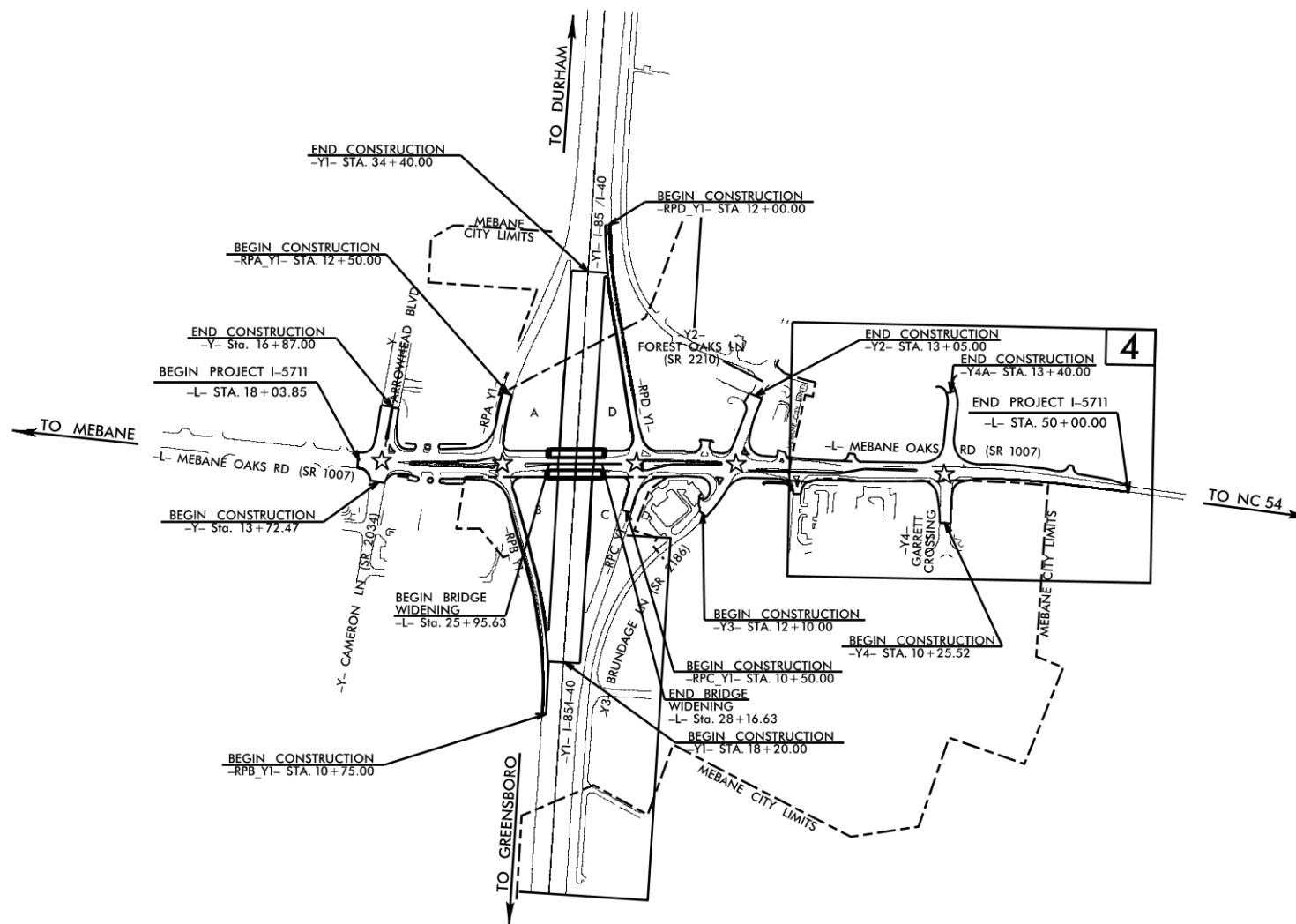
LOCATION: INTERCHANGE IMPROVEMENTS AT I-40/I-85
AND SR 1007 (MEBANE OAKS RD) IN MEBANE

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



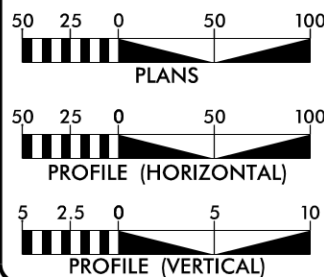
TIP PROJECT: I-5711

CONTRACT: C204352

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
V. W. LOCHNER, INC.
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RALEIGH, NC 27612
(919) 571-7111

vhb VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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

SIGNATURE: _____

ROADWAY DESIGN ENGINEER

SIGNATURE: _____

Professional Engineer Seals for Brian K. Eason and Rodney Knight.



02-DEC-2020 13:16 I:\Projects\2020\20051.00 LOCHNER I-5711\Wilson Rd Connector\15711_GEO_RDWY\CADD_GEO\TECH\PlanProj\I-5711_GEO_RDY_TSH_3.dgn cadmchine 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



B:17/99

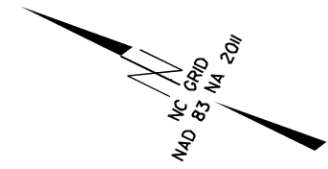
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NC License
 Number F-0159

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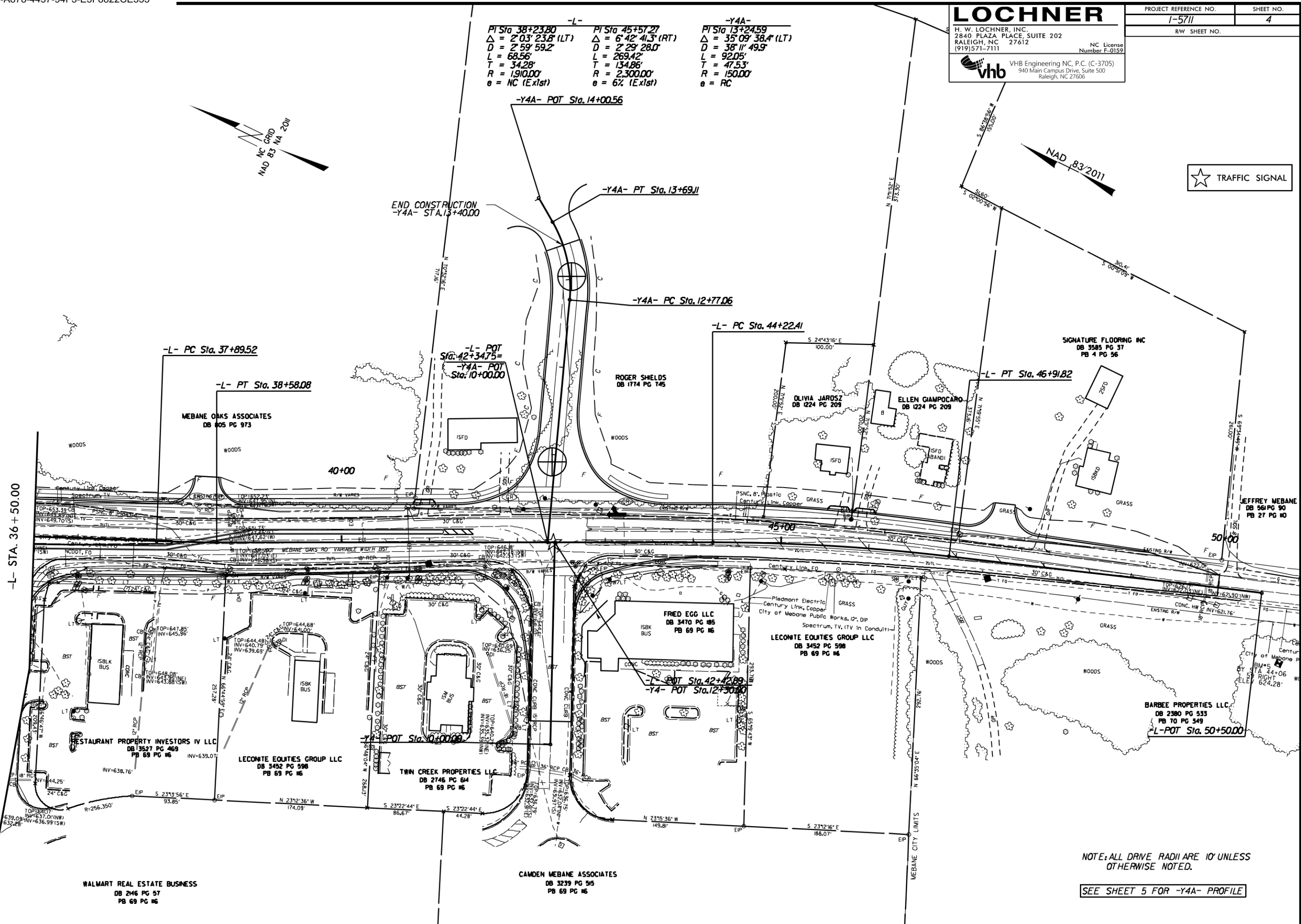
PROJECT REFERENCE NO.	SHEET NO.
1-5711	4
RW SHEET NO.	

-L-	-L-	-Y4A-
PI Sta 38+23.80	PI Sta 45+57.27	PI Sta 13+24.59
$\Delta = 2^{\circ}03'23.8"$ (LT)	$\Delta = 6^{\circ}42'41.3"$ (RT)	$\Delta = 35^{\circ}09'38.4"$ (LT)
D = 259' 59.2'	D = 229' 28.0'	D = 38' 11' 49.9"
L = 68.56'	L = 269.42'	L = 92.05'
T = 34.28'	T = 134.86'	T = 47.53'
R = 1910.00'	R = 2300.00'	R = 150.00'
e = NC (Ex1st)	e = 6% (Ex1st)	e = RC



REVISIONS

IS: NOV-2020 12:55 LOCHNER 1-5711 M:\son Rd Connector\15711.GEO_RDWY\CADD_GEO\TECH\Plan\Prof\1-5711.GEO_PDW_PSH_04.dgn



NOTE: ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

SEE SHEET 5 FOR -Y4A- PROFILE

5/28/99

-Y4A-
WILSON ROAD CONNECTOR

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111

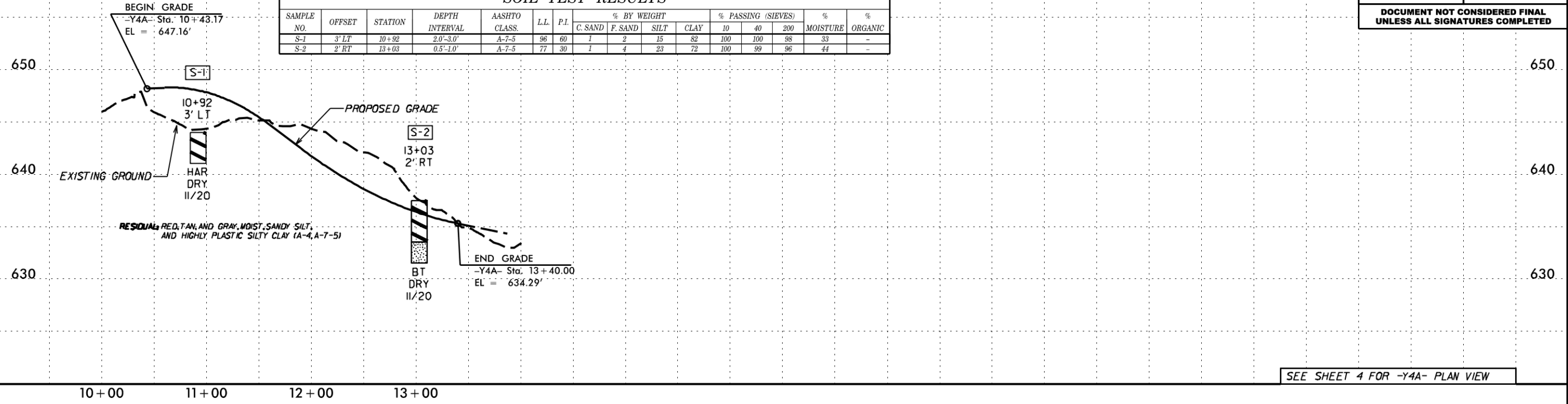
NC License
Number F-0159

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	

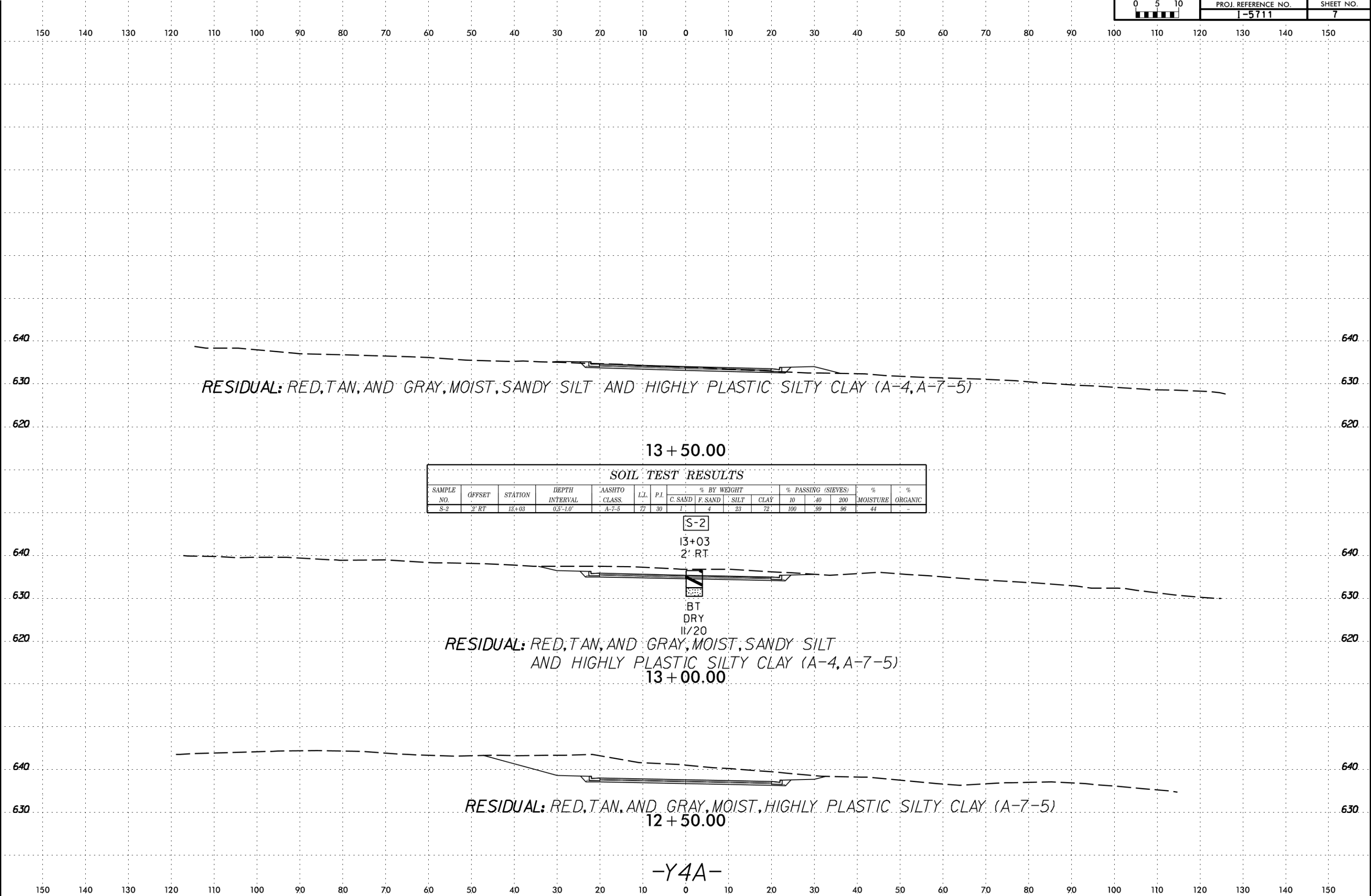
SOIL TEST RESULTS

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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CADMACHINE AT CAD02



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

