

REFERENCE: 17BP.8.R.135

PROJECT: N/A

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	PLAN SHEET LAYOUT
3A	INVENTORY LETTER
4	PLAN SHEET
5	PROFILE SHEET
6 - 8	CROSS SECTIONS

PLAN & PROFILE

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>	<u>PROFILE</u>
-L-	11+25 TO 21+60	4	5
-Y-	10+00 TO 11+90	4	5

CROSS SECTIONS

<u>LINE</u>	<u>STATION</u>	<u>SHEETS</u>
-L-	16+00	6
-L-	17+25	7
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APPENDICES

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY MONTGOMERY

PROJECT DESCRIPTION BRIDGE 610190 OVER CLARKS
CREEK ON SR 1110 (LILLYS BRIDGE ROAD)

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.8.R.135	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 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.

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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

J. A. BLYTHE

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Z. J. RODRIGUEZ

F. JOHNSON


INVESTIGATED BY S&ME, INC.

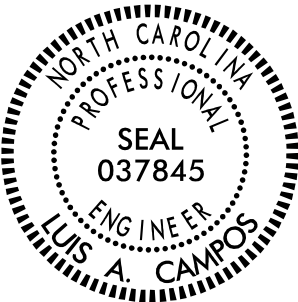
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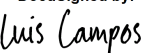
CHECKED BY K. H. HILL

SUBMITTED BY L. A. CAMPOS

DATE DECEMBER 2019

Prepared in the Office of:
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DocuSigned by:

72276FD8BA38437
SIGNATURE DATE

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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: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)										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										MINERALOGICAL COMPOSITION										WEATHERING																			
GENERAL CLASS.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.																			
GROUP CLASS.										COMPRESSIBILITY										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.																			
SYMBOL										PERCENTAGE OF MATERIAL										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.																			
%										GROUND WATER										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.																			
MATERIAL PASSING #40 LL PI										MISCELLANEOUS SYMBOLS										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>																			
GROUP INDEX										RECOMMENDATION SYMBOLS										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>																			
USUAL TYPES OF MAJOR MATERIALS										ABBREVIATIONS										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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>																			
GEN. RATING AS SUBGRADE										EQUIPMENT USED ON SUBJECT PROJECT										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.																			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																				ROCK HARDNESS																			
CONSISTENCY OR DENSENESS																				VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																			
PRIMARY SOIL TYPE																				HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																			
COMPACTNESS OR CONSISTENCY																				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.																			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)																				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.																			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																				SOFT CAN BE GROVED 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.																			
TEXTURE OR GRAIN SIZE																				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 FINGERNAIL.																			
U.S. STD. SIEVE SIZE OPENING (MM)																				FRACTURE SPACING										BEDDING									
BOULDER (BLDR.)																				TERM										TERM									
COBBLE (COB.)																				SPACING										THICKNESS									
GRAVEL (GR.)																				VERY WIDE										VERY THICKLY BEDDED									
COARSE SAND (CSE. SD.)																				WIDE										THICKLY BEDDED									
FINE SAND (F SD.)																				MODERATELY CLOSE										THINLY BEDDED									
SILT (SL.)																				CLOSE										VERY THINLY BEDDED									
CLAY (CL.)																				VERY CLOSE										THICKLY LAMINATED									
GRAIN SIZE																																							
SOIL MOISTURE - CORRELATION OF TERMS																																							
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 - SHRINKAGE LIMIT																																							
PLASTICITY																																							
NON PLASTIC																																							
SLIGHTLY PLASTIC																																							
MODERATELY PLASTIC																																							
HIGHLY PLASTIC																																							
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.																																							

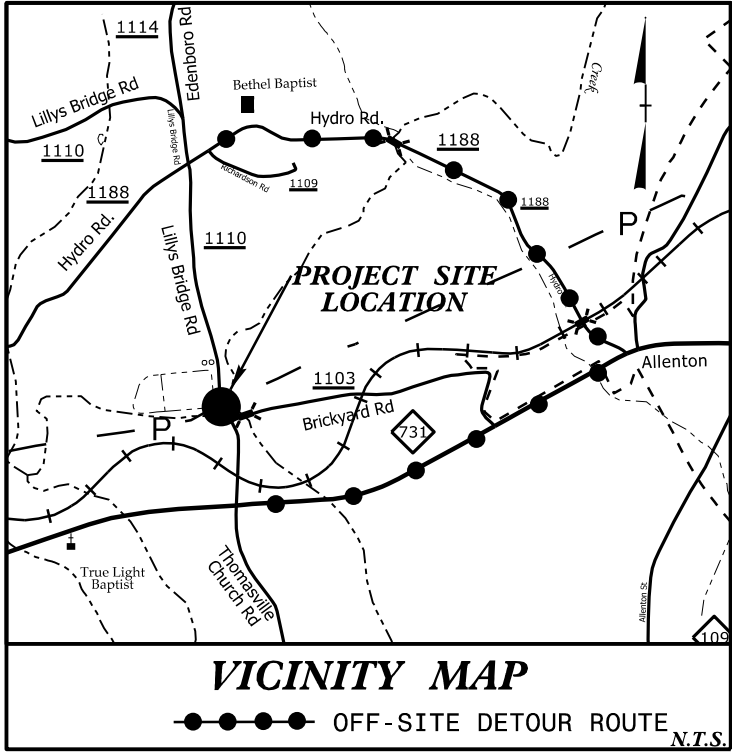
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PROJECT: 17BP.8.R.135

CONTRACT:

CONTRACT:

See Sheet 1A For Index of Sheets



PLANS 02/28/2019

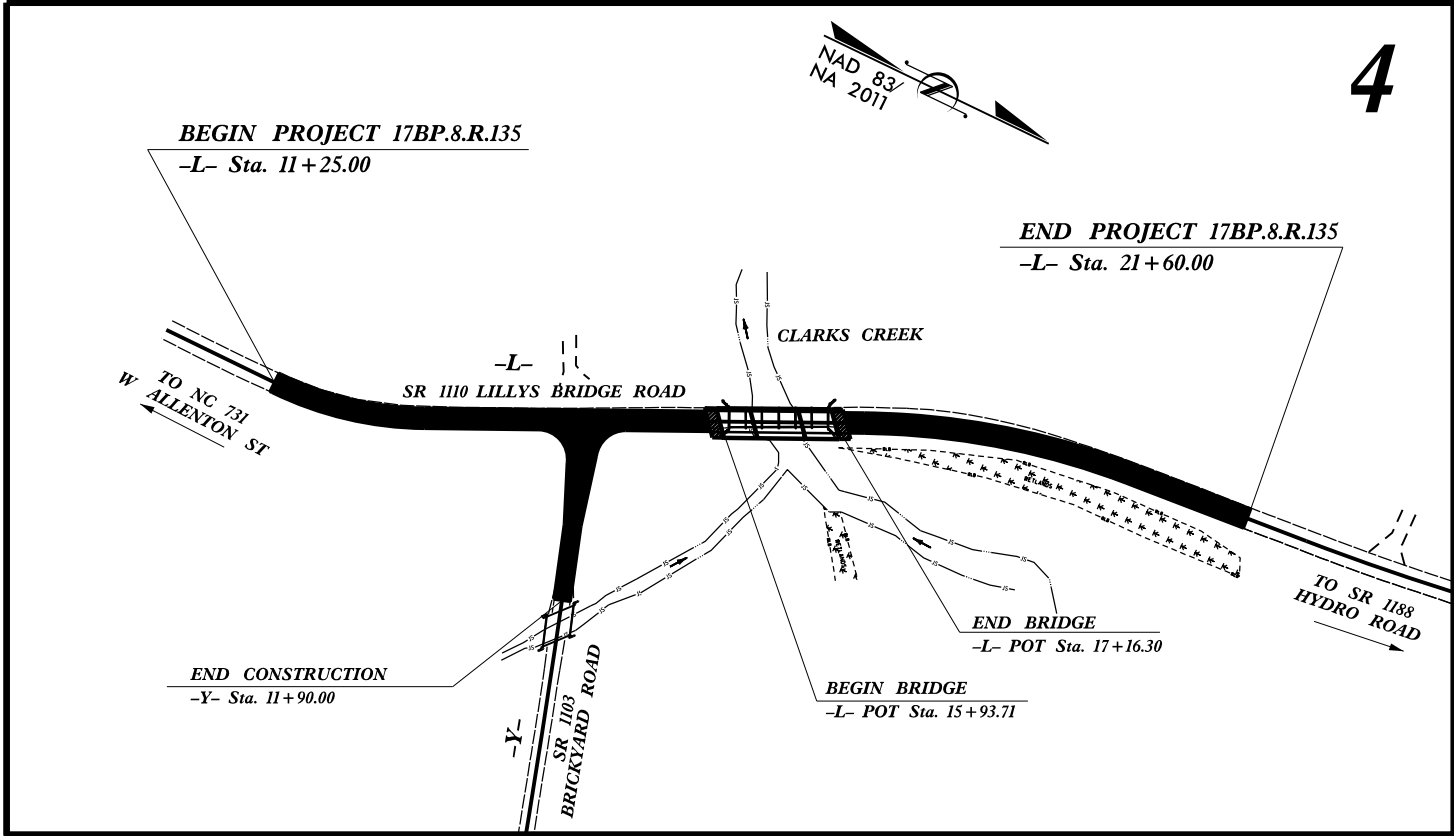
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MONTGOMERY COUNTY

LOCATION: BRIDGE 610190 OVER CLARKS CREEK
ON SR 1110 (LILLYS BRIDGE ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.8.R.135	3	12
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
17BP.8.R.135		P.E.	

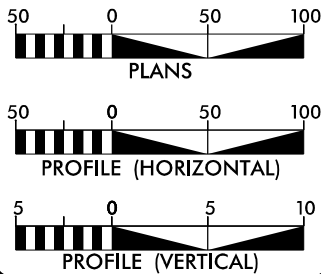


SPEED STUDY COMPLETED TO DETERMINE
DESIGN SPEED FOR PROJECT AND
NEED FOR HORIZONTAL AND VERTICAL
DESIGN EXCEPTIONS.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO
LIMITS ESTABLISHED BY METHOD ____.

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

GRAPHIC SCALES



DESIGN DATA

ADT 2015 = 480
ADT 2025 = 960
K = %
D = %
T = 6 % *
V = 40 MPH
* TTST = DUAL
FUNC CLASS =
LOCAL
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT 17BP.8.R.135 = 0.173 mi
LENGTH STRUCTURE PROJECT 17BP.8.R.135 = 0.023 mi
TOTAL LENGTH OF PROJECT 17BP.8.R.135 = 0.196 mi

PLANS PREPARED BY:

CH ENGINEERING
3220 GLEN ROYAL RD. RALEIGH, NC 27617
TELE 919.788.0224 FAX 919.788.0252
NC LICENSE #P-0189

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY xx, 2019

LETTING DATE:
JULY xx, 2019

PLANS PREPARED FOR:

DIVISION OF HIGHWAYS
DIVISION 8
121 DOT Drive
Carthage, NC 28327

BRIAN A. WILES, PE
PROJECT ENGINEER

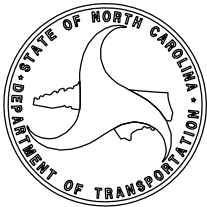
TIM WELCH, PE
NCDOT CONTACT
DIV 8 BRIDGE PROGRAM MANAGER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN
ENGINEER

SIGNATURE: P.E.





December 19, 2019

STATE PROJECT: 17BP.8.R.135
FEDERAL PROJECT: N/A
COUNTY: Montgomery
DESCRIPTION: Bridge 610190 over Clarks Creek on SR 1110 (Lillys Bridge Road)
SUBJECT: Geotechnical Report – Inventory

Project Description

This project consists of minor widening of Lillys Bridge Road in Montgomery County, NC. The project begins about 470 feet southwest of Bridge 610190 and extends to the northeast for approximately 1,035 feet. The roadway length is 0.196 miles. The type of work being performed consists of grading, paving, and widening to accommodate the new bridge over Clarks Creek.

Field work was conducted in April of 2019 by S&ME, Inc. Standard Penetration Test borings were performed at select locations along the project. A CME-550X ATV-mounted drill machine with an automatic hammer was used to perform the SPT borings. Six SPT borings and one auger boring were performed at various offset locations along -L- and -Y- alignments. Representative samples were collected for visual classification in the field and select samples were submitted for laboratory analysis.

The following alignments were investigated. Subsurface profiles of the following alignments are included in this report.

<u>Line</u>	<u>Station (±)</u>
-L-	11+25 to 21+60
-Y-	10+00 to 11+90

Areas of Special Geotechnical Interest

The following borehole locations encountered soft cohesive soils which have the potential to cause subgrade stability problems:

<u>Alignment</u>	<u>Station (±)</u>	<u>Offset</u>
-L-	13+32	10' RT
-L-	15+90	9' LT
-L-	18+03	7' RT

The following borehole locations were found to contain weathered rock within 5 feet of grade:

<u>Alignment</u>	<u>Station (±)</u>	<u>Offset</u>
-L-	11+46	26' LT

Physiography and Geology

The project corridor is located in central North Carolina in the Piedmont Physiographic Province. The project corridor is rural, and is mainly surrounded by wooded areas. The Town of Mt. Gilead Wastewater Treatment Plant lies directly north of the project corridor. Topography along the project corridor is flat to gently sloping. Elevations along the project range from 265± to 220± feet above sea level.

Geologically, surficial soils in the project area are classified as Roadway Embankment or Residual soils. The rock underlying these surficial soils consists of metamudstone and meta-argillite belonging to the Tillery Formation; part of the Albemarle Group within the Carolina Slate Belt. The Carolina Slate Belt contains generally low-grade metamorphosed volcanic and sedimentary rocks. These rocks are Cambrian to late Proterozoic in age.

Soil & Rock Properties

Soils encountered during this investigation are separated into 3 categories: Roadway Embankment, Alluvial, and Residual soils.

Roadway Embankment soils consist of loose to medium dense, brown and gray sandy gravel and gravelly sand (A-1-a and A-1-b), medium dense, tan and gray, slightly plastic clayey sand (A-2-7), medium stiff, brown and red sandy silt (A-4), and soft to very stiff, orange, red, brown, and gray, slightly plastic silty clay (A-7-5). The PI of the silty clay (A-7-5) tested was 13. The Roadway Embankment soils range in thickness from approximately 3 to 7 feet.

Alluvial soils consist of loose, gray and brown gravelly sand (A-1-b). The alluvial soils were approximately 6.8 feet thick.

Residual soils consist of very dense, red and brown, moderately plastic clayey sand (A-2-7), soft to hard, orange, brown, and gray, slightly plastic sandy clay (A-6), and soft to medium stiff, gray, brown, and orange, highly plastic silty clay (A-7-5/A-7-6). The PI of the sandy clay (A-6) tested was 14.

Weathered rock and non-crystalline rock were encountered during this investigation. The weathered rock is derived from the underlying thinly to thickly laminated metamudstone and meta-argillite. Weathered rock was first encountered at elevations ranging from 254.7± to 222.9± feet. Non-crystalline rock was first encountered at elevations ranging from 250.7± to 219.2± feet. The non-crystalline rock encountered during this investigation is classified as very soft to moderately hard, slightly to moderately weathered metamudstone and/or meta-argillite, with very close to moderately close fracture spacing. The average core recovery achieved was 97.9%, and the average Rock Quality Designation is 86%. These figures are taken from core borings performed as part of the bridge investigation for this project.

Groundwater

Groundwater measurements were taken in April of 2019. Groundwater was encountered at elevations ranging from approximately 227.2± to 222.2± feet at the termination of drilling.

5/28/99

CHENGINEERING

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NC LICENSE #P-0189

PROJECT REFERENCE NO.
17BP.8.R135

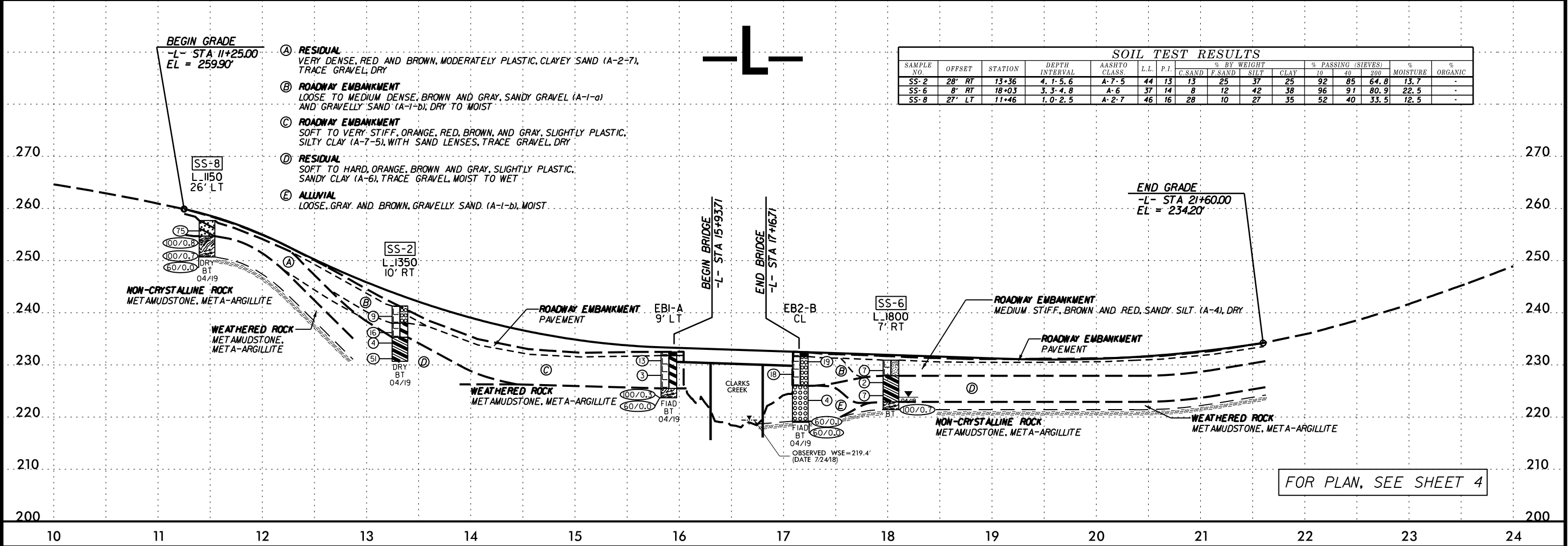
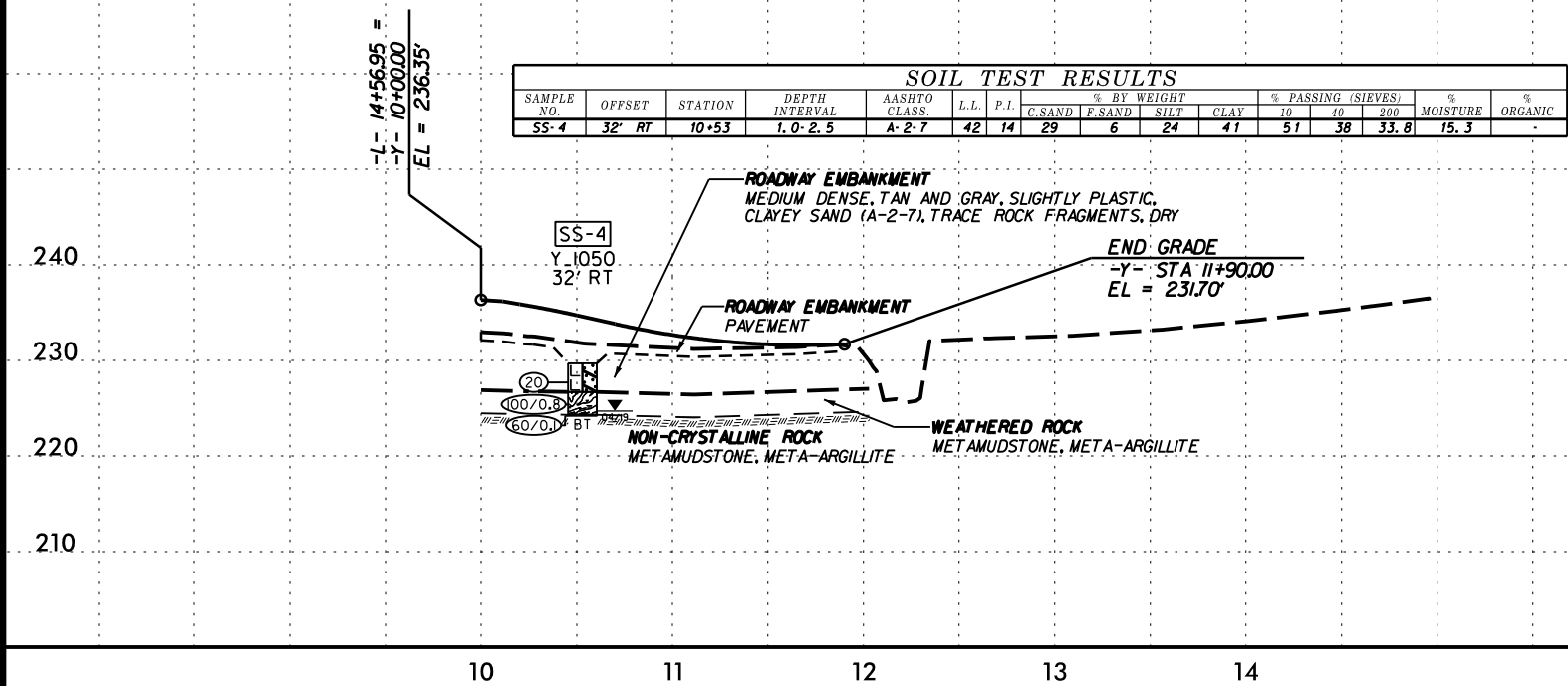
SHEET NO.
5

ROADWAY DESIGN
ENGINEER

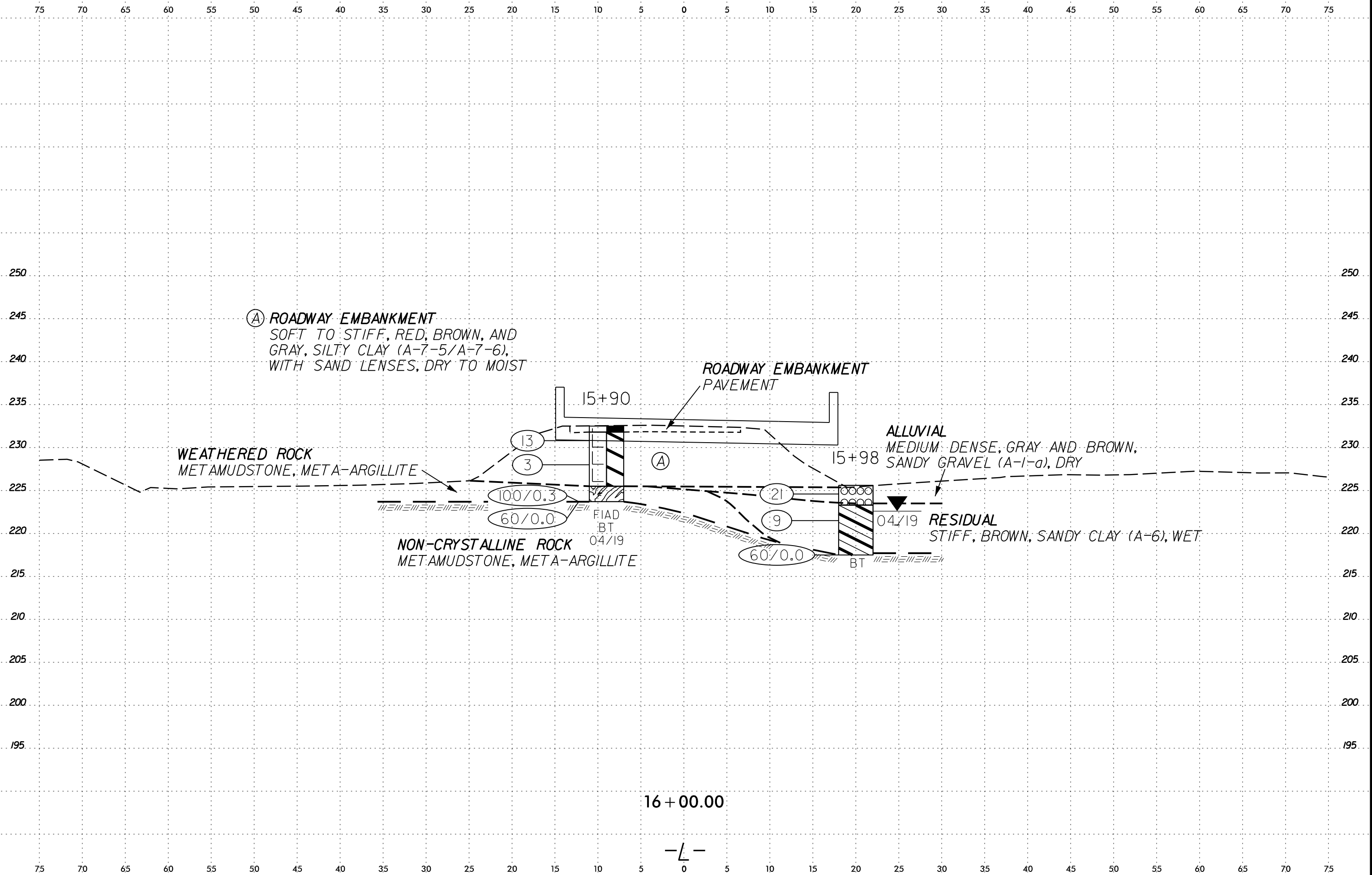
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ENGINEER

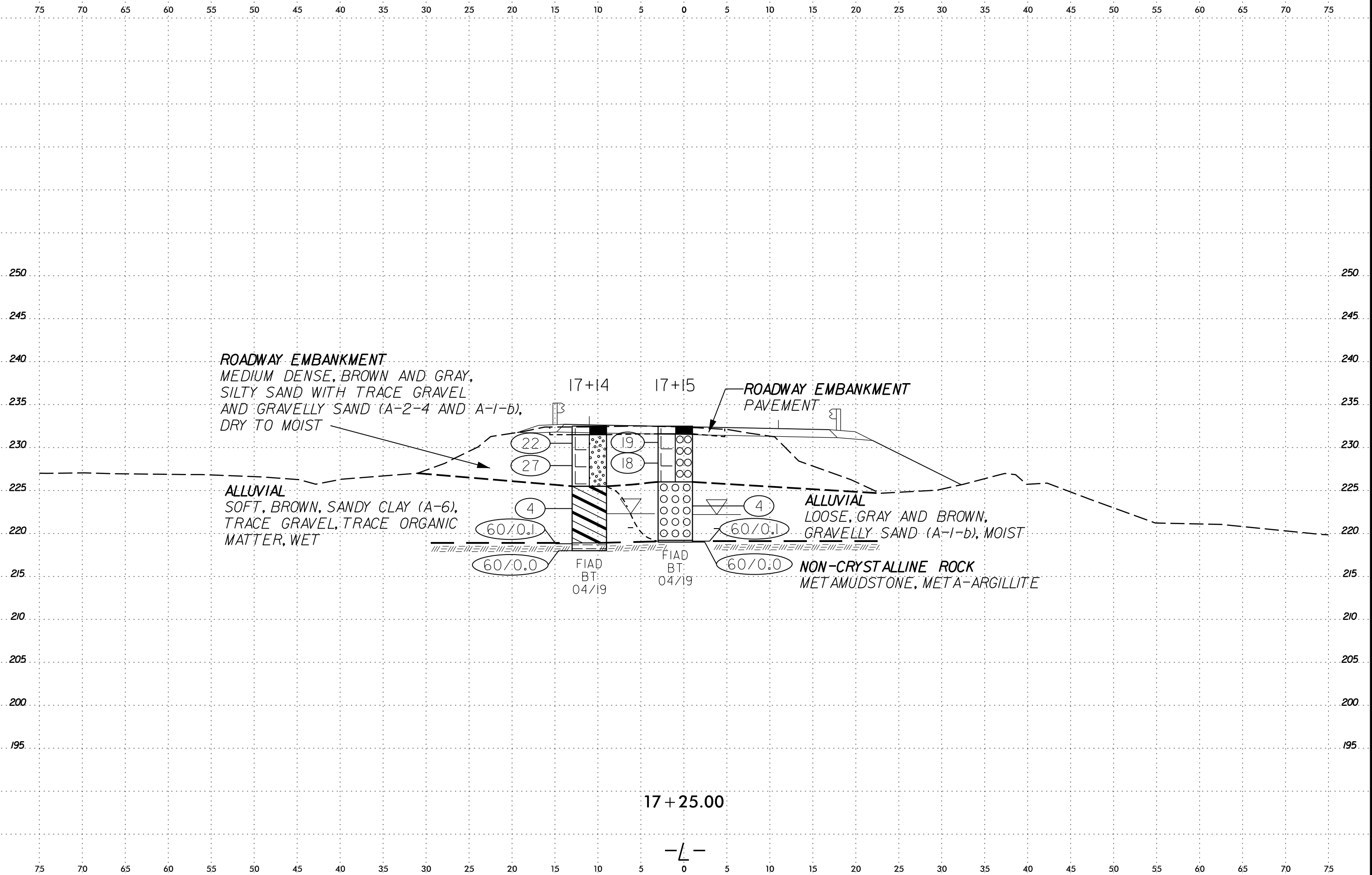
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



FOR PLAN, SEE SHEET 4





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-6	8' RT	18+03	3.3-4.8	A-6	37	14	8	12	42	38	96	91	80.9	22.5	-

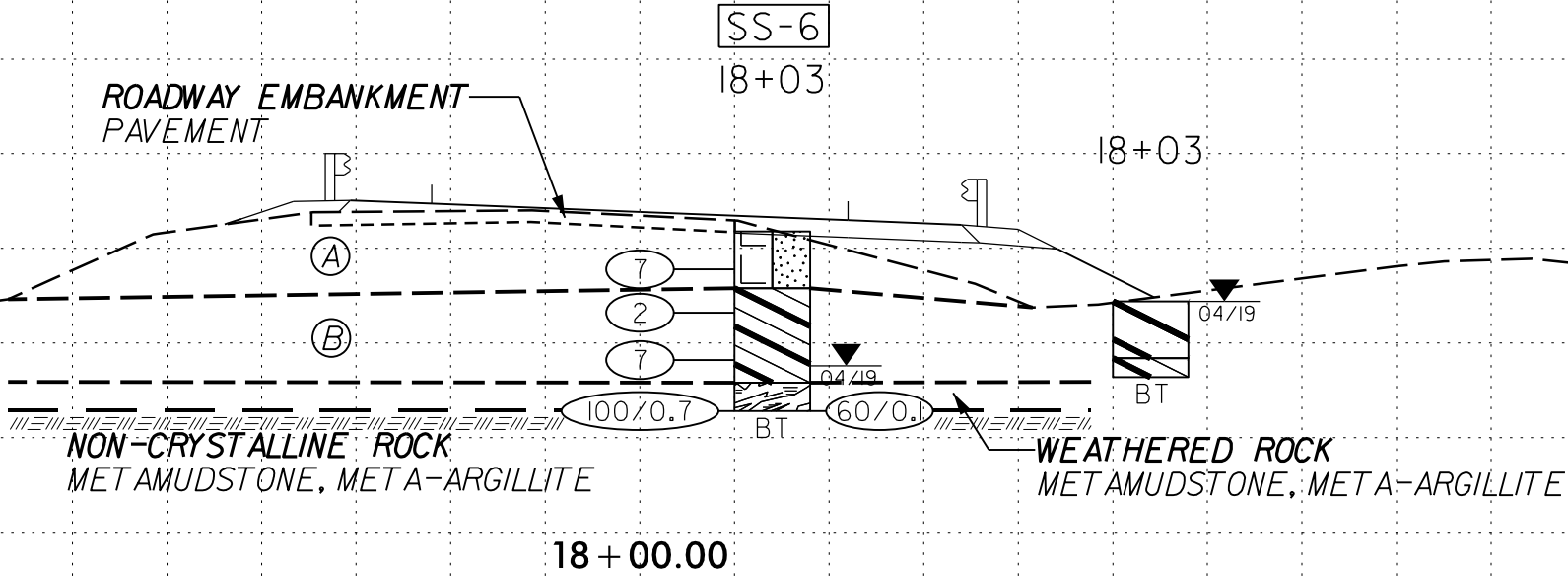
- Ⓐ

ROADWAY EMBANKMENT

MEDIUM STIFF, BROWN AND RED, SANDY SILT (A-4), DRY
- Ⓑ

RESIDUAL

SOFT TO MEDIUM STIFF, ORANGE, BROWN, AND GRAY, SLIGHTLY PLASTIC, SILTY CLAY AND SANDY CLAY (A-7-5/A-7-6 AND A-6), MOIST TO WET



APPENDICES

<u>TITLE</u>	<u>SHEETS</u>
SOIL TEST RESULTS	10
CBR AND PROCTOR DATA	11



SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616									
S&ME Project #:	6235-18-032							Date Report	5/23/2019
State Project No.:	N/A					County:	Montgomery	Date Tested	5/2 - 5/10/19
Federal ID No.:	N/A					WBS No.:	17BP.8.R.135		
Project Name:	Bridge No. 610190 on SR 1110 over Clarks Creek								
Client Name:	CH Engineering, PLLC					Client Address: 3200 Glen Royal Royal Road, Raleigh, NC 27617			

Boring No.	Sample No.	Station No.	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
												Coarse	Fine						
								Sand	Sand	Silt	Clay								
L_1350	SS-2	13+36	28' RT	L	4.1 - 5.6	A-7-5	(8)	92	85	81	64.8	13	25	37	25	44	31	13	13.7
Y_1050	SS-4	10+53	32' RT	Y	1.0 - 2.5	A-2-7	(1)	51	38	36	33.8	29	6	24	41	42	28	14	15.3
L_1800	SS-6	18+03	8' RT	L	3.3 - 4.8	A-6	(11)	96	91	88	80.9	8	12	42	38	37	23	14	22.5
L_1150	SS-8	11+46	27' LT	L	1.0 - 2.5	A-2-7	(1)	52	40	38	33.5	28	10	27	35	46	30	16	12.5
L_1150	CBR-1	11+47	26' LT	L	1.0 - 5.0	A-2-7	(0)	49	37	35	30.5	29	11	21	39	46	31	15	11.6

References / Comments / Deviations: ND=Not Detemined.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET

Signature

104-01-0703

Certification #

Luis Campos, P.E.

Technical Responsibility:

Project Manager

Position

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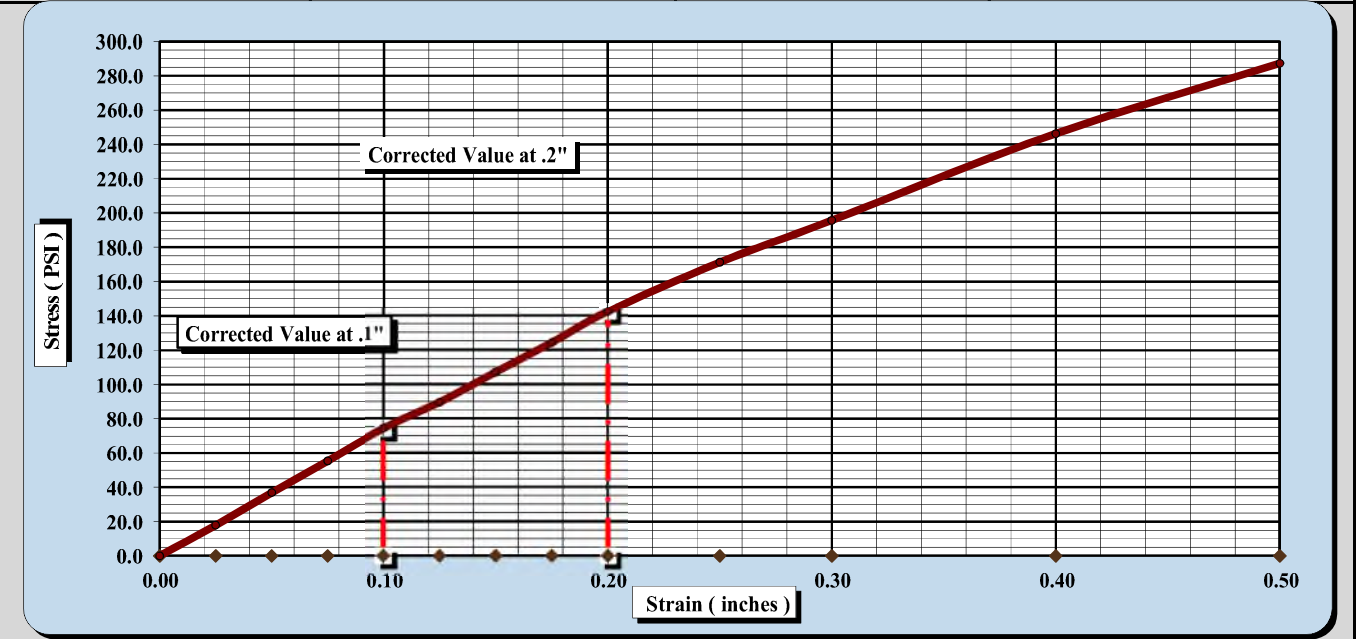
CBR (CALIFORNIA BEARING RATIO)
OF LABORATORY COMPACTED SOIL



AASHTO T 193

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616			
WBS	17BP.8.R.135	Report Date:	5/20/2019
Project Name:	Montomery Bridge 190	Test Date(s)	5/13 - 5/20/19
Client Name:	CH		
Client Address:	3200 Glen Royal Road, Raleigh, NC 27617		
Boring #:	L_1150	Sample #:	CBR-1
Location:	STA 11+47	Offset:	26' LT
		Depth (ft):	1 - 5 ft.
Sample Description: Brown Silty Clayey Fine to Coarse SAND (A-2-7) (0)			
AASHTO T99	Method B	Maximum Dry Density:	113.0 PCF
		Optimum Moisture Content:	16.0%
		Compaction Test performed on grading complying with CBR spec.	% Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	7.4	CBR at 0.1 in.	7.4
CBR at 0.2 in.	9.5	CBR at 0.2 in.	9.5



CBR Sample Preparation:
The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	112.5
Initial Dry Density (PCF)	112.7	Average Final Moisture Content	18.2%
Moisture Content of the Compacted Specimen	16.1%	Moisture Content (top 1" after soaking)	20.1%
Percent Compaction	99.7%	Percent Swell	0.4%

Soak Time:	96 hrs.	Surcharge Weight	10.0	Surcharge Wt. per sq. Ft.	50.9
Liquid Limit	46	Plastic Index	15		

Notes/Deviations/References:
Test specimen compacted to 100% at optimum moisture.

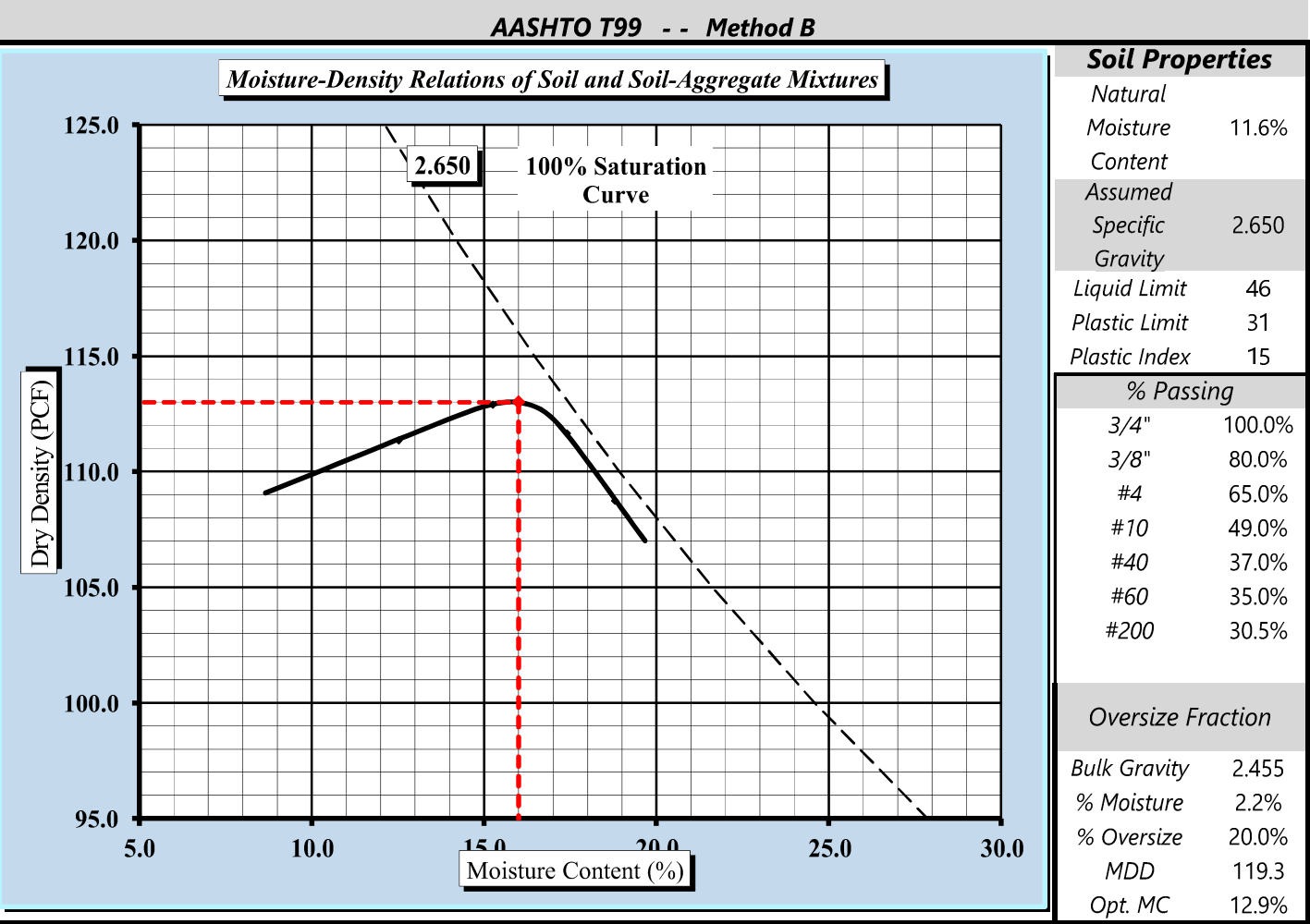
Mal Krajan, ET		Laboratory Manager	5/23/2019
Technical Responsibility	Signature	Position	Date

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MOISTURE - DENSITY REPORT



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616			
WBS	17BP.8.R.135	Report Date:	5/8/19
Project Name:	Montgomery Bridge 190	Test Date(s):	5/6 - 5/8/19
Client Name:	CH		
Client Address:	3200 Glen Royal Road, Raleigh, NC 27617		
Boring #:	L_1150	Sample #:	CBR-1
Location:	STA 11+47	Offset:	26' LT
		Depth (ft):	1 - 5 ft.
Sample Description: Brown Silty Clayey Fine to Coarse SAND (A-2-7) (0)			
Maximum Dry Density	113.0	PCF.	Optimum Moisture Content
			16.0%



Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☐ 3/8 inch Sieve ☒ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET		Laboratory Manager	5/16/2019
Technical Responsibility	Signature	Position	Date

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