REFERENCE: BP8.R006

PROJECT: N/A

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP8.R006	1	16

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *RICHMOND*

PROJECT DESCRIPTION *BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148) OVER COLEMANS CREEK*

CONTENTS

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.

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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

B. KEBEA

J. LITTLE

D. GARROW

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *J. SWARTLEY*

CHECKED BY *J. DAILY*

SUBMITTED BY *J. DAILY*

DATE *MARCH 2022*

9751 SOUTHERN PINE BLVD
CHARLOTTE, NC 28273
(704) 523-4726

NORTH CAROLINA PROFESSIONAL SEAL 045672 ENGINEER THOMAS J. DAILY

DocuSigned by:
Thomas J. Daily
F29CA6BB83F449F...

3/11/2022

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BP8.R006	2

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 (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,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10	50 MX													
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40														
LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	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	UNSUITABLE

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 RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	> 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	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				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	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
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / CPT / DMT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-550X
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD 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.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V 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. *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 GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
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.
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.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - 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 (SRQD) - 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: BM #1 N: 479537 E: 1733178

ELEVATION: 183.16 FEET

NOTES: FIAD: FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

09/08/60

PROJECT: BP8.R006

CONTRACT:

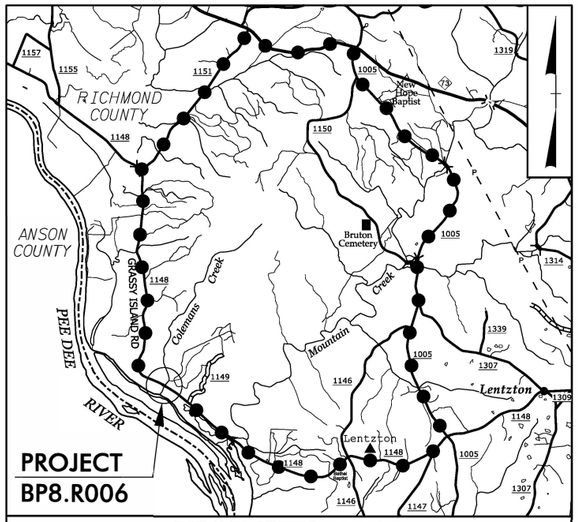
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RICHMOND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP8.R006	3	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
BP8.R006		PE	

LOCATION: BRIDGE NO. 91 ON SR 1148 (GRASSY ISLAND RD) OVER COLEMANS CREEK

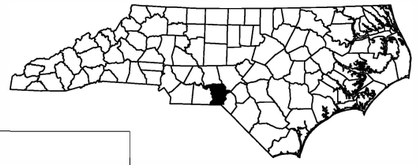
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE



VICINITY MAP

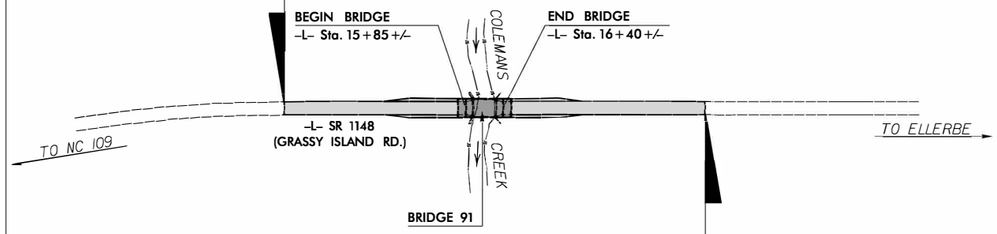
DENOTES OFF–SITE DETOUR

APPROVED 25% PLANS



4

BEGIN PROJECT BP8.R006
–L– POC STA. 13+15.00



END PROJECT BP8.R006
–L– POT STA. 19+40.00

NAD 83/ NSRS 2011

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL CITY LIMITS
CLEARING ON THIS PROJECT SHALL BE PERORMED TO THE LIMITS ESTABLISHED BY METHOD ____.

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

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2022 = 150
ADT 2042 = 300
K = %
D = %
T = % *
V = 60 MPH
* (TTST = %+DUAL %)
FUNC CLASS = LOCAL
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT BP8.R006 = 0.108 MILES
LENGTH STRUCTURE PROJECT BP8.R006 = 0.010 MILES
TOTAL LENGTH PROJECT BP8.R006 = 0.118 MILES

NCDOT CONTACT: TIMOTHY F. WELCH, PE

Prepared in the Office of:
Dewberry
2610 WYCLIFF ROAD
SUITE 400
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA NO. P-0608
FOR
DIVISION OF HIGHWAYS

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 2022

LETTING DATE:
NOVEMBER 2022

BENJAMIN STORMER, P.E.
PROJECT ENGINEER

ANDREW TYSINGER
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

10/4/2021 3:45:48 PM
...\Proj\BP8R006_RDY_TSH.dgn
USER: bstormer

March 10, 2022

STATE PROJECT: BP8.R006
FEDERAL PROJECT: N/A
COUNTY: Richmond
DESCRIPTION: Replace Bridge No. 91 on SR 1148 over Colemans Creek

SUBJECT: Geotechnical Report – Inventory

S&ME, Inc. has completed a reconnaissance and subsurface investigation for the above roadway project and presents the following inventory. Plans, profiles and cross-sections are included in this report.

Project Description

This project consists of replacing Bridge No. 91 and minor widening to Grassy Island Rd (SR 1148). The project begins just south of Bridge 91 and extends to the north for approximately 0.12 miles. The type of work being performed consists of grading, paving, and widening to accommodate the new structure over Colemans Creek.

Fieldwork was conducted in October of 2021 by S&ME, Inc. Standard Penetration Tests were performed at selected 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 were performed at various offset locations along -L- alignment. Representative soil samples were collected for visual classification in the field.

The following alignments were investigated. Subsurface profiles and/or cross-sections of these alignments are included in this report.

Line	Station
-L-	13+15 to 19+40

Physiography and Geology

The project corridor is located within the Piedmont Physiographic Province of North Carolina. The project corridor is predominately rural with few single-family homes and farm fields. Topography along the project is flat to gently sloping. Elevations along the project range from 173± to 189± feet above sea level.

The area is underlain by roadway embankment, recent alluvial sediments and residual soils. The residual soils are derived from the weathering of underlying bedrock most likely consisting of metamudstones and metasiltstones. Geologically these rocks are part of the Carolina Slate Belt. The alluvial soils were deposited and transported during fluctuating periods of river elevation rise and fall and channel migration. These soils should be found underneath and near the creek channel.

Water Bodies

Colemans Creek flows from north to south passing underneath Bridge No. 91. This creek flows into the Peedee River and is part of the Yadkin-Peedee river basin. Bridge No. 91 was investigated with the roadway borings and both reports will be submitted under one cover.

Soil Properties

Soils encountered during this investigation are separated into 2 categories: Roadway Embankment and Residual soils.

Roadway Embankment soils are semi-granular to cohesive in nature and may be derived from nearby sources. These soils consist of gray, tan, red and brown, stiff to very stiff, sandy silt (A-4) and clay (A-7-6).

Residual soils consist of soft to very stiff, sandy silt (A-4), clayey silt (A-5) and clay (A-7-6).

Rock Properties

Weathered rock and crystalline rock occur throughout the project. The weathered rock is derived from the underlying bedrock and begins at elevations ranging from 167± feet to 180± feet and ranges from 3± to 10± feet in thickness. Crystalline rock occurs at elevations ranging from 165± to 170± feet. Rock coring was not performed for this investigation.

Groundwater

Groundwater measurements were taken in October of 2021 during average to below average rainfall conditions. Groundwater measurements were taken immediately after drilling in some borings and were found to be between 173± to 174± feet in elevation. Groundwater is not expected to cause significant impacts during construction.

Respectfully Submitted,

Jarett Swartley, PG
Senior Geologist

PROJECT REFERENCE NO.	SHEET NO.
BP8.R006	4

SITE PLAN

0 50 100
FEET

SKEW = 90°

(1)
EVERGREEN TIMBERCO NC LLC
DB 1870 PG 01

NOTE: LAND POSTED WILDLIFE GAMELANDS/CONSERVATION EASEMENT BETWEEN PROPERTY LINES. NO RECORDS FOUND

(2)
EVERGREEN TIMBERCO NC LLC
DB 1870 PG 66

NOTE: LAND POSTED WILDLIFE GAMELANDS/CONSERVATION EASEMENT BETWEEN PROPERTY LINES. NO RECORDS FOUND

BM #1 ELEVATION = 183.16'
N 479537 E 1733178
BL STATION 10+85 84' LEFT
RR SPIKE IN BASE OF 28" PINE

N 20°51'17" E
102.30'

N 25°41'17" E
98.86'

EIP

JS

COLEMANS CREEK

15+00

18+00

RS-3

RS-4

RS-2

RS-1

HA-1

EB1-A

EB1-B

EB2-A

EB2-B

L-1500

L-1700

BL-101

CONC

HIGH WATER MARK 180.3'
OBSERVED FIELD OBSERVATION

WOOD WW

BRIDGE #91
WOOD & STEEL

GRASSY ISLAND ROAD SR 1148 ← TO MT. GILEAD
19.5' PAVED ROADWAY

TO ELLERBE →

GRASSY

19.5

WOODS

SOIL & GR
S 12°16'27" E
64.19'

N 12°16'27" W
30.10'

15" CM

NAD 83

BEGIN BRIDGE
-L- Sta.15+86 +/-

END BRIDGE
-L- Sta.16+41 +/-

PT Sta. 13+16.20

(3)
CAROLINA POWER & LIGHT
DB 680 PG 543

NOTE: LAND POSTED WILDLIFE GAMELANDS/CONSERVATION EASEMENT

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
BP8.R006	5
PROFILE PROJECTED ALONG -L-	

0 50 100
FEET
VE = 5

Ⓐ ROADWAY EMBANKMENT, RED, BROWN AND GRAY, MOIST, STIFF TO VERY STIFF, SANDY SILT AND SANDY CLAY, A-4 & A-6
Ⓑ ROADWAY EMBANKMENT, RED AND BROWN, MOIST, STIFF, CLAY, A-7-6
Ⓒ RESIDUAL, RED, BROWN AND GRAY, MOIST, MED. STIFF, CLAY AND SANDY CLAY AND SANDY SILT, A-7-6 & A-6

-L- Sta.13+15.00
BEGIN GRADE
EL 188.62'

PROPOSED BRIDGE

BEGIN BRIDGE
-L- Sta. 15+85.50

END BRIDGE
-L- Sta. 16+40.50

EXISTING BRIDGE

-L- Sta.19+40.00
END GRADE
EL 185.85'

EXISTING GROUND

PROPOSED GRADE

L_1500
15+00
13' RT
-L-
SS-31
SS-33

EB1-B
15+85
12' RT
-L-
SS-26

EB2-B
16+40
11' RT
-L-
SS-5

L_1720
17+20
13' LT
SS-24

(-)11.2551%
(-)10.3600%
(-)10.3600%
(+)0.3289%

15 9 5 6 — FIAD 10/21
12 7 11 16 — 100/0.4, 60/0.0 — FIAD 10/21
10 11 8 20 4 — 100/0.4, 60/0.1 — FIAD 10/21
22 32 9 4 — FIAD 10/21

11/2019

RESIDUAL,
GRAY, BROWN AND RED, MOIST, SOFT TO VERY STIFF, SANDY AND CLAYEY SILT, A-4 & A-5

WEATHERED ROCK,
METAMUDSTONE

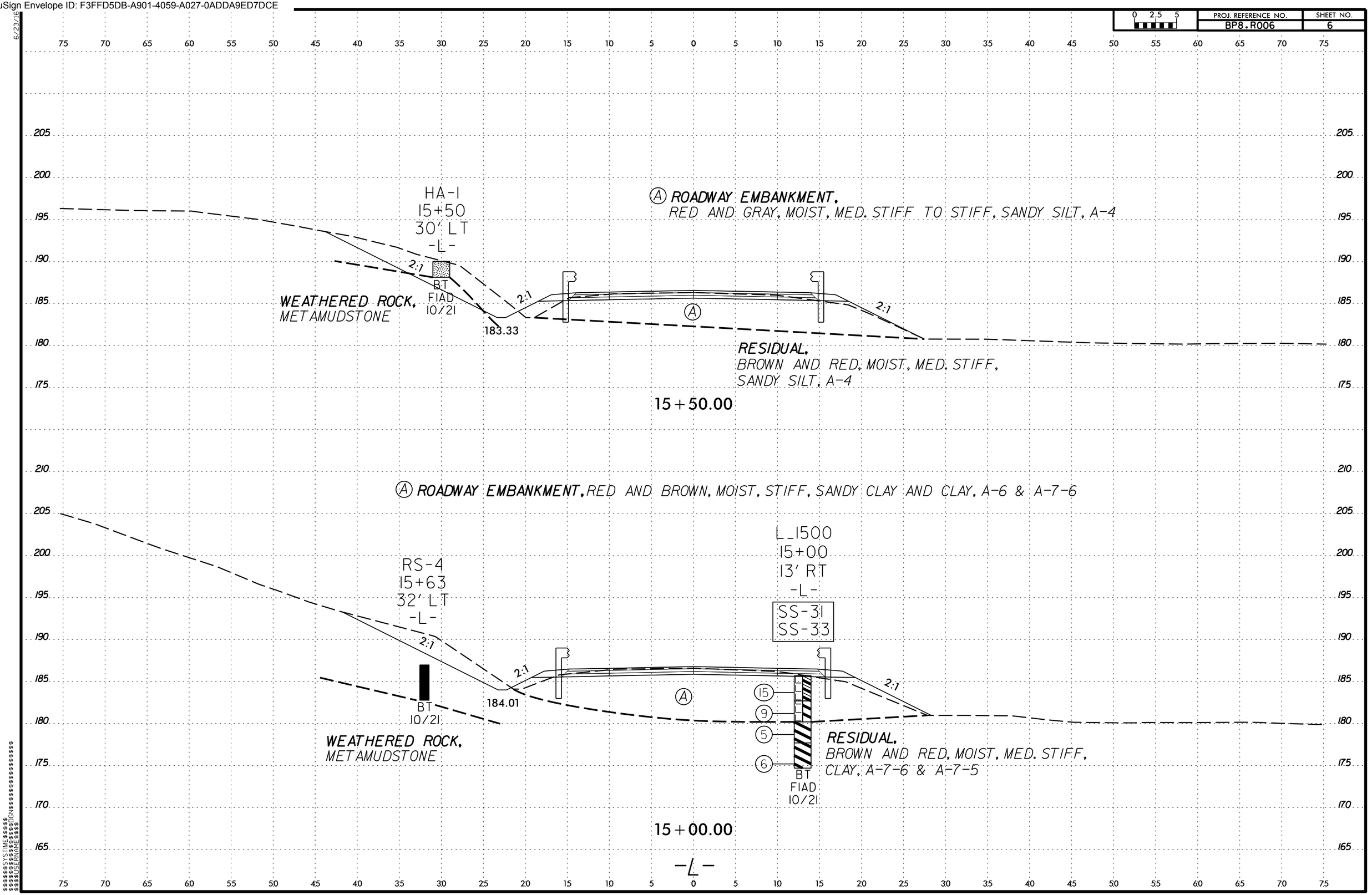
NON-CRYSTALLINE ROCK,
METAMUDSTONE

-L-

NOTE: EXISTING GROUND SURFACE PROFILE OF -L- CENTERLINE TAKEN FROM ELECTRONIC TIN FILE 'b5750_ls_tin.tin' DATED 10/17/16. INFERRED STRATIGRPAHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

220 210 200 190 180 170 160 150

13+00 14+00 15+00 16+00 17+00 18+00 19+00



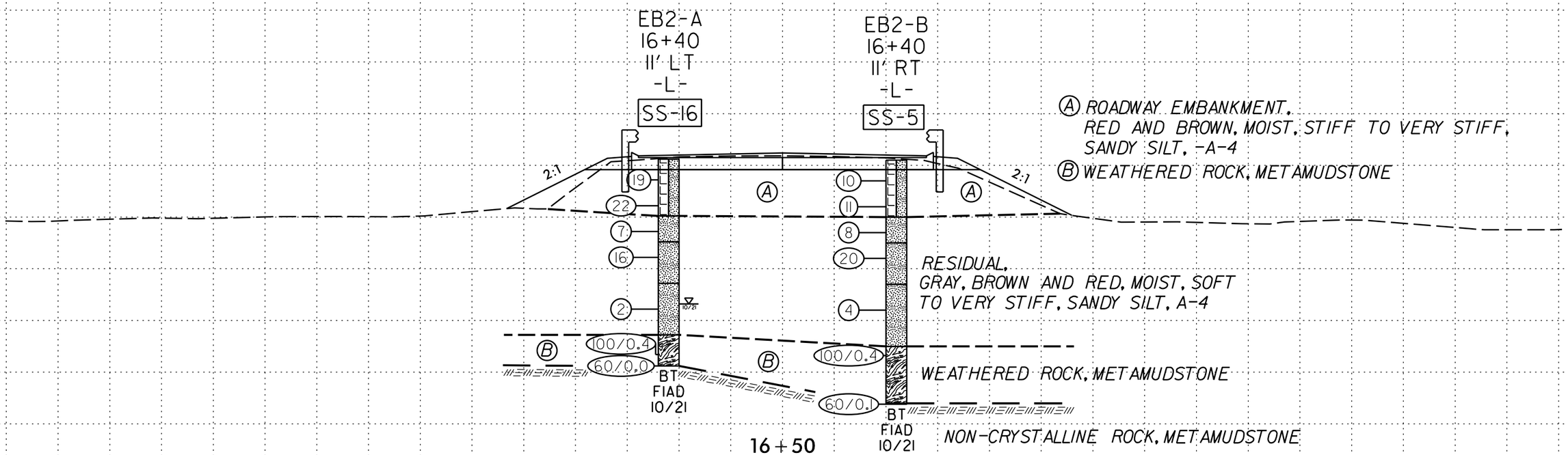
DocuSign Envelope ID: F3FFD5DB-A901-4059-A027-0ADDA9ED7DCE

6/23/16

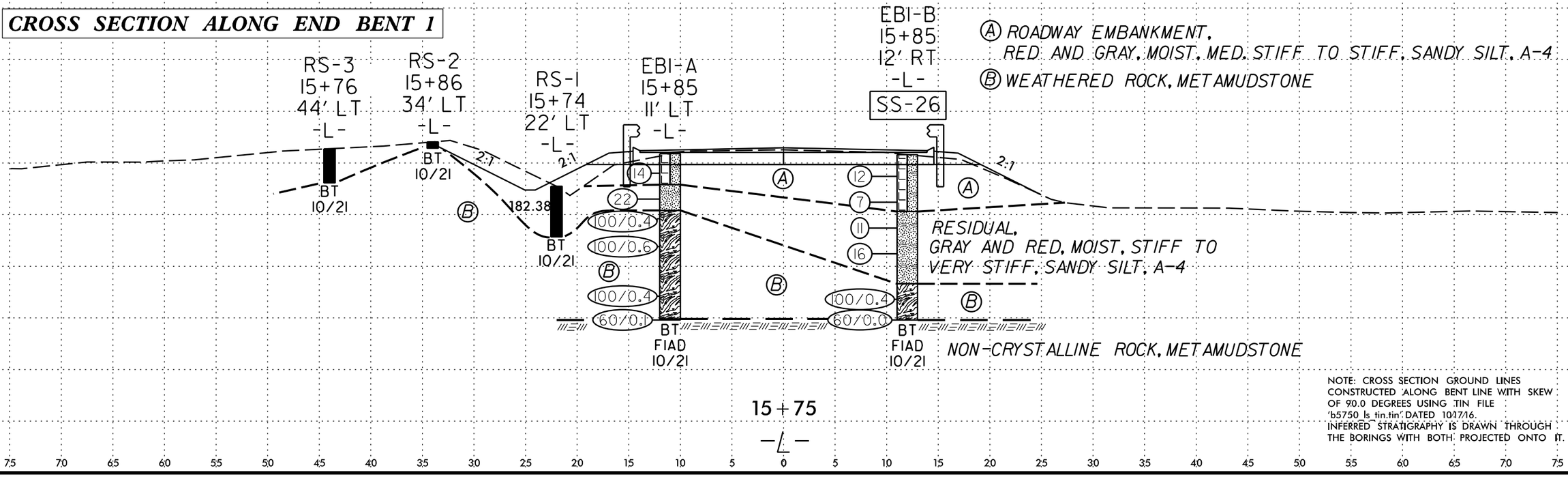
0 2.5 5 UNITS = FEET	PROJ. REFERENCE NO.	SHEET NO.
	BP8.R006	7

BRIDGE NO. 91

CROSS SECTION ALONG END BENT 2



CROSS SECTION ALONG END BENT 1



NOTE: CROSS SECTION GROUND LINES CONSTRUCTED ALONG BENT LINE WITH SKEW OF 90.0 DEGREES USING TIN FILE 'b5750_ls_tin.tin' DATED 10/17/16.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO IT.

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

195 190 185 180 175 170

L_I720
17+20
13' LT
-L-

SS-24

Ⓐ *ROADWAY EMBANKMENT,*
RED, BROWN AND GRAY, MOIST, VERY STIFF TO HARD, SANDY SILT, A-4

2:1 2:1

22
32
9
4

Ⓐ

RESIDUAL, *BROWN AND RED, MOIST, STIFF, CLAYEY SILT, A-5*

GRAY, MOIST, SOFT, SANDY SILT, A-4

BT
FIAD
10/21

17+25.00

-L-

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP8.R006	**TIP** N/A	**COUNTY** RICHMOND	**GEOLOGIST** Kebea, B.	
SITE DESCRIPTION BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148) OVER COLEMANS CREEK				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+85	**OFFSET** 11 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 185.9 ft	**TOTAL DEPTH** 16.1 ft	**NORTHING** 479,558	**EASTING** 1,733,041	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 87% 09/28/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Little, J.	**START DATE** 10/14/21	**COMP. DATE** 10/14/21	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
185	185.0	0.9	4	6	8	14 22		M		185.9 GROUND SURFACE	0.0
	182.5	3.4	6	7	15			M		**ROADWAY EMBANKMENT** STIFF, RED AND GRAY, SANDY SILT, TRACE GRAVEL, A-4 182.9	3.0
180	180.0	5.9	100/0.4			100/0.4				**RESIDUAL** VERY STIFF, GRAY AND RED, SANDY SILT, LITTLE ROCK FRAGMENTS, A-4 180.4	5.5
	177.5	8.4	82	18/0.1		100/0.6				**WEATHERED ROCK** (METAMUDSTONE)	
175	172.5	13.4	100/0.4			100/0.4					
170	169.9	16.0	60/0.1			60/0.1				169.9 169.8 **NON-CRYSTALLINE ROCK** (METAMUDSTONE) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 169.8 ft IN NON-CRYSTALLINE ROCK (METAMUDSTONE) Topsoil - 0.2'	16.0 16.1

WBS BP8.R006	**TIP** N/A	**COUNTY** RICHMOND	**GEOLOGIST** Kebea, B.	
SITE DESCRIPTION BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148) OVER COLEMANS CREEK				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 15+85	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 185.8 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 479,539	**EASTING** 1,733,028	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 87% 09/28/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Little, J.	**START DATE** 10/14/21	**COMP. DATE** 10/14/21	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
185	184.7	1.1	5	5	7	12 7		M		185.8 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** STIFF TO MEDIUM STIFF, RED AND BROWN, SANDY SILT, TRACE GRAVEL, A-4
	182.2	3.6	4	3	4		SS-26	12%		180.3 5.5
180	179.7	6.1	4	4	7	11		M		**RESIDUAL** STIFF TO VERY STIFF, RED AND BROWN, SANDY SILT, TRACE TO LITTLE ROCK FRAGMENTS, A-4
	177.2	8.6	4	7	9	16		M		173.3 12.5 **WEATHERED ROCK** (METAMUDSTONE)
175	172.2	13.6	100/0.4			100/0.4				169.8 16.0
170	169.8	16.0	60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 169.8 ft ON NON-CRYSTALLINE ROCK (METAMUDSTONE) Topsoil - 0.2'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP8.R006	**TIP** N/A	**COUNTY** RICHMOND	**GEOLOGIST** Kebea, B.	
SITE DESCRIPTION BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148) OVER COLEMANS CREEK				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 16+40	**OFFSET** 11 ft LT	**ALIGNMENT** -L-	**0 HR.** 14.0
COLLAR ELEV. 185.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 479,534	**EASTING** 1,733,086	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 87% 09/28/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Little, J.	**START DATE** 10/14/21	**COMP. DATE** 10/14/21	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
185	184.6	1.0	11	10	9	19 22		M		185.6 GROUND SURFACE	0.0
	182.1	3.5								**ROADWAY EMBANKMENT** VERY STIFF, BROWN AND GRAY, SANDY SILT, TRACE GRAVEL, A-4	
180	179.6	6.0	12	11	11			M		180.1 **RESIDUAL**	5.5
	177.1	8.5	2	3	4	7 16	SS-16	17%		VERY SOFT TO VERY STIFF, SANDY SILT, TRACE CLAY POCKETS, TRACE ROCK FRAGMENTS, A-4	
175			5	8	8			M			
	172.1	13.5						W			
170			2	1	1	2					
	167.1	18.5	100/0.4			100/0.4				168.6 **WEATHERED ROCK** (METAMUDSTONE)	17.0
	165.6	20.0	60/0.0			60/0.0				165.6 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 165.6 ft ON NON-CRYSTALLINE ROCK (METAMUDSTONE)	20.0
										Topsoil - 0.2'	

WBS BP8.R006	**TIP** N/A	**COUNTY** RICHMOND	**GEOLOGIST** Kebea, B.	
SITE DESCRIPTION BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148) OVER COLEMANS CREEK				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 16+40	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 185.5 ft	**TOTAL DEPTH** 23.6 ft	**NORTHING** 479,514	**EASTING** 1,733,075	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 87% 09/28/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Little, J.	**START DATE** 10/14/21	**COMP. DATE** 10/14/21	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
190										
185	184.5	1.0	5	5	5	10 11		M		185.5 GROUND SURFACE 0.0
	182.0	3.5								**ROADWAY EMBANKMENT** STIFF, RED AND BROWN, SANDY SILT, TRACE GRAVEL, A-4
180	179.5	6.0	5	4	7			M		180.0 **RESIDUAL** 5.5
	177.0	8.5	2	3	5	8 20		M		SOFT TO VERY STIFF, BROWN RED AND TAN, SANDY SILT, TRACE CLAY POCKETS, TRACE ROCK FRAGMENTS, A-4
175			5	10	10			M		
	172.0	13.5								
170			1	2	2	4	SS-5	20%		
	167.0	18.5	100/0.4			100/0.4				167.5 **WEATHERED ROCK** (METAMUDSTONE) 18.0
165	162.0	23.5	60/0.1			60/0.1				162.0 **NON-CRYSTALLINE ROCK** (METAMUDSTONE) 23.5
										161.9 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 161.9 ft IN NON-CRYSTALLINE ROCK (METAMUDSTONE) 23.6
										Topsoil - 0.2'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP8.R006	**TIP** N/A	**COUNTY** RICHMOND	**GEOLOGIST** Kebea, B.	
SITE DESCRIPTION BRIDGE NO. 91 ON GRASSY ISLAND ROAD (SR 1148)				**GROUND WTR (ft)**
BORING NO. HA-1	**STATION** 15+50	**OFFSET** 30 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 185.2 ft	**TOTAL DEPTH** 1.9 ft	**NORTHING** 479,586	**EASTING** 1,733,027	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 87% 09/28/2021		**DRILL METHOD** Hand Auger		**HAMMER TYPE** N/A
DRILLER Kebea, B.	**START DATE** 10/15/21	**COMP. DATE** 10/15/21	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
190											
185										185.2 GROUND SURFACE	0.0
										RESIDUAL	
										183.3 STIFF TO VERY STIFF, BROWN AND RED, SANDY SILT, A-4	1.9
										Boring Terminated at Elevation 183.3 ft ON WEATHERED ROCK (METAMUDSTONE)	
										Topsoil - 0.2'	

NCDOT GEOTECHNICAL ENGINEERING UNIT

FIELD PENETROMETER LOG (ENGLISH)

SHEET 1 OF 1

PROJECT NUMBER	BP8.R006	ID	N/A	CO	Richmond	GEO	B. Kebea
SITE DESC	Bridge No. 91 on Grassy Isand Rd. (SR 1148)						
BORING NUMBER	RS-4	STA	15+63	OFFSET	32 FT LT	ALIGN-MENT	-L-
ELEVATION	186.98 FT	TOTAL DEPTH	4.2 FT	NORTH	479,590	EAST	1,733,017
WORK PERFORMED	Rod Soundings						
START DATE	10/15/21	COMP DATE	10/15/21	SURFACE WTR DEPTH	N/A FT	DEPTH TO ROCK	4.2 FT

DEPTH (ft)	BLOW COUNT 0.5 ft	0.5 ft	TOTAL	BLOWS PER FOOT 0 25 50 75 100
	2	5	7	
	5	3	8	
	5	15	20	
	15	50	65	
	100/0.2'		100	

Notes

Rod Sounding

4.2 feet

Rod Sounding reached a depth of 4.2 feet. Rod Sounding stopped advancing at 4.2 feet and began to bounce back.

Rod Sounding terminated at 4.2 feet on WR

NOTES N/A

DECK TO DATUM DISTANCE N/A FT

RED LINE

SIGNATURE _____ DATE _____

NOTES _____

Form GEU-005e Revised 2/6/2007

NCDOT GEOTECHNICAL ENGINEERING UNIT

FIELD PENETROMETER LOG (ENGLISH)

SHEET 1 OF 1

PROJECT NUMBER	BP8.R006	ID	N/A	CO	Richmond	GEO	B. Kebea
SITE DESC	Bridge No. 91 on Grassy Isand Rd. (SR 1148)						
BORING NUMBER	RS-1	STA	15+74	OFFSET	22 FT LT	ALIGN-MENT	-L-
ELEVATION	185.16 FT	TOTAL DEPTH	4.9 FT	NORTH	479,576	EAST	1,733,021
WORK PERFORMED	Rod Soundings						
START DATE	10/15/21	COMP DATE	10/15/21	SURFACE WTR DEPTH	N/A FT	DEPTH TO ROCK	4.9 FT

DEPTH (ft)	BLOW COUNT 0.5 ft	0.5 ft	TOTAL	BLOWS PER FOOT 0 25 50 75 100
	2	2	4	
	3	4	7	
	5	6	11	
	22	22	44	
	20	80/0.4'	100	

Notes

Rod Sounding

4.9 feet

Rod Sounding reached a depth of 4.9 feet. Rod Sounding stopped advancing at 4.9 feet and began to bounce back.

Rod Sounding terminated at 4.9 feet on WR

NOTES N/A

DECK TO DATUM DISTANCE N/A FT

RED LINE

SIGNATURE _____ DATE _____

NOTES _____

Form GEU-005e Revised 2/6/2007

NCDOT GEOTECHNICAL ENGINEERING UNIT

FIELD PENETROMETER LOG (ENGLISH)

SHEET 1 OF 1

PROJECT NUMBER	BP8.R006	ID	N/A	CO	Richmond	GEO	B. Kebea
SITE DESC	Bridge No. 91 on Grassy Isand Rd. (SR 1148)						
BORING NUMBER	RS-2	STA	15+86	OFFSET	34 FT LT	ALIGN-MENT	-L-
ELEVATION	181.40 FT	TOTAL DEPTH	0.6 FT	NORTH	479,580	EAST	1,733,037
WORK PERFORMED	Rod Soundings						
START DATE	10/15/21	COMP DATE	10/15/21	SURFACE WTR DEPTH	N/A FT	DEPTH TO ROCK	0.6 FT

DEPTH (ft)	BLOW COUNT 0.5 ft	0.5 ft	TOTAL	BLOWS PER FOOT 0 25 50 75 100	Notes
	55	45/0.1'	100		Rod Sounding
					Rod Sounding reached a depth of 0.6 feet. Rod Sounding stopped advancing at 0.6 feet
					and began to bounce back.
					Rod Sounding terminated at 0.6 feet on WR

NOTES N/A

DECK TO DATUM DISTANCE N/A FT

RED LINE

SIGNATURE _____ DATE _____

NOTES _____

Form GEU-005e Revised 2/6/2007

NCDOT GEOTECHNICAL ENGINEERING UNIT

FIELD PENETROMETER LOG (ENGLISH)

SHEET 1 OF 1

PROJECT NUMBER	BP8.R006	ID	N/A	CO	Richmond	GEO	B. Kebea
SITE DESC	Bridge No. 91 on Grassy Isand Rd. (SR 1148)						
BORING NUMBER	RS-3	STA	15+76	OFFSET	44 FT LT	ALIGN-MENT	-L-
ELEVATION	185.40 FT	TOTAL DEPTH	3.3 FT	NORTH	479,594	EAST	1,733,034
WORK PERFORMED	Rod Soundings						
START DATE	10/15/21	COMP DATE	10/15/21	SURFACE WTR DEPTH	N/A FT	DEPTH TO ROCK	3.3 FT

DEPTH (ft)	BLOW COUNT 0.5 ft	0.5 ft	TOTAL	BLOWS PER FOOT 0 25 50 75 100	Notes
	2	6	8		Rod Sounding
	6	8	14		3.3 feet
	7	11	18		Rod Sounding reached a depth of 3.3 feet. Rod Sounding stopped advancing at 3.3 feet
	100/0.3'		100		and began to bounce back.
					Rod Sounding terminated at 3.3 feet on WR

NOTES N/A

DECK TO DATUM DISTANCE N/A FT

RED LINE

SIGNATURE _____ DATE _____

NOTES _____

Form GEU-005e Revised 2/6/2007

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	218968			Date Report:	12/3/2021
State Project No.:		County:	Richmond	Date Tested:	11/1/21-11/12/21
Federal ID No.:	NA	TIP No.:	BP8.R006		
Project Name:	Bridge No. 91 on Grassy Island Rd over Colemans Creek				
Client Name:	Dewberry	Client Address:	Raleigh, NC		

Sample No.	Boring No.	Station No.	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #				Total Mortar Fraction (%)				LL	PL	PI	Organic	Moist. %
								10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay					
SS-5	EB2-B	16+40	11 RT	-L-	13.5-15.0	A-4	(2)	72	62	59	56	18	6	45	31	31	24	7	-	20.4
SS-16	EB2-A	16+40	11 LT	-L-	6.0-7.5	A-4	(9)	99	96	93	87	6	8	44	42	33	23	10	-	17.0
SS-24	L_1720	17+20	13 LT	-L-	8.5-10.0	A-4	(8)	98	96	94	88	4	8	44	44	31	22	9	-	26.0
SS-26	EB1-B	15+85	12 RT	-L-	3.6-5.1	A-4	(3)	85	61	57	51	33	8	30	29	34	24	10	-	11.8
SS-31	L_1500	15+00	13 RT	-L-	1.0-2.5	A-6	(8)	84	74	71	68	15	5	33	47	36	22	14	-	16.3
SS-33	L_1500	15+00	13 RT	-L-	6.0-7.0	A-6	(9)	92	89	88	82	4	9	43	44	34	23	11	-	27.0

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

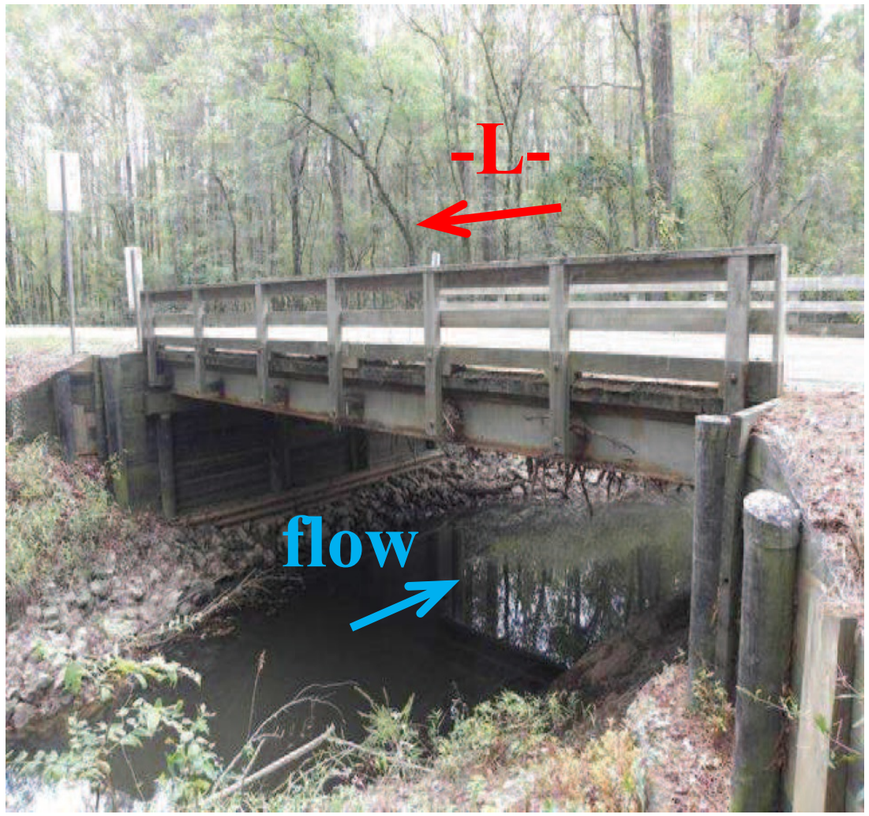
AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Karen Warner		NCDOT 118-06-0305	Joey Daily	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

SITE PHOTOGRAPHS

Bridge No. 91 on –L– (SR 1148) over Colemans Creek

Looking Northwest



Looking South